

**L·ST
MARBLE**



m. MOHO[®]
ANIMATION SOFTWARE

USER MANUAL

Contents

Welcome	1
Chapter 1: Introduction	2
Demo Limitations	2
What's New in Moho 13.5	2
System Requirements	5
Installing Moho	6
Activating Moho	7
Deactivating Moho	12
Getting Started	15
Creating a Content Folder	16
Choosing Your Startup Mode (Debut Only)	18
Automatic Update Checking	21
Chapter 2: License	22
End User License Agreement and Limited Warranty	22
Moho Tools	31
Chapter 3: The Draw Tools	32
Working with Bezier Curves	34
Creating Boolean Shapes	37
Select Points	39
Transform Points	41
Add Point	45
Curvature	48
Freehand	49
Draw Shape	52
Delete Edge	53
Magnet (Pro Only)	54
Blob Brush	54
Eraser	56
Point Reduction	58
Scatter Brush	59
Perspective Points (Pro Only)	60
Shear Points (Pro Only)	60
Bend Points (Pro Only)	61
Noise (Pro Only)	61
Chapter 4: Fill Tools	62
Select Shape	63
Create Shape	65
Paint Bucket	67
Delete Shape	72
Line Width	72
Hide Edge	73

Stroke Exposure (Pro Only)	74
Curve Profile (Pro Only)	76
Working with Fills	77
Color Points	80
Chapter 5: Bone Tools	82
Select Bone	82
Add Bone	90
Transform Bone	92
Manipulate Bones	94
Sketch Bones	94
Reparent Bone	98
Bone Strength	98
Offset Bone	99
Bind Layer	99
Bind Points	100
Bone Physics (Pro Only)	101
Smart Bones (Pro Only)	103
Chapter 6: Layer Tools	117
Transform Layer	117
Set Origin	124
Follow Path	125
Rotate Layer XY (Pro Only)	128
Shear Layer (Pro Only)	129
Layer Selector	129
Insert Text	130
Creating Word Balloons (Pro Only)	136
Eyedropper	137
Chapter 7: Camera and Workspace Tools	138
Camera Tools	138
Workspace Tools	139
Chapter 8: Special Tools	142
Poser (Pro Only)	142
Switch Layer	144
Particle Layer (Pro Only)	145
Crop	146
Image Masking	147
Video Tracking	148
Moho Windows	158
Chapter 9: Moho's Main Window	159
Overview	159
Working Area	159
Toolbar	160
Status Bar	161
Playback Buttons	161
Display Quality (Pro Only)	162

Docking and Undocking Windows	164
Chapter 10: Layers Window	165
Overview	165
Layer Toolbar	166
Searching the Layer List (Pro Only)	167
Layer List Columns	168
Reordering Column Headers	172
Sorting Columns	172
Resizing Columns	173
The Layer List	173
Using Layer Comps (Pro Only)	176
Using Layer Colors	177
Using Layer Referencing (Pro Only)	178
Using Layer Quick Settings	179
Chapter 11: Layer Types	181
Layer Types	181
Enhanced Layer Alignment Features (Pro Only)	183
Vector Layers	183
Image Layers	184
Image Sequence Layers	185
Group Layers (Pro Only)	186
Group with Selection Layers (Pro Only)	187
Bone Layers	188
Switch Layers	190
Frame by Frame Layers (Pro Only)	194
Particle Layers (Pro Only)	195
Note Layers (Pro Only)	198
Audio Layers	199
3D Layers (Pro Only)	200
Patch Layers (Pro Only)	201
Text Layers	203
Chapter 12: Layer Settings	205
Editing Multiple Layers	205
General Tab	207
Shadows Tab	217
Motion Blur Tab	222
Masking Tab	224
Vectors Tab	232
Depth Sort Tab	239
Image Tab	241
Audio Tab	246
Switch Tab	248
Particles Tab (Pro Only)	249
3D Options (Pro Only)	250
Note Tab (Pro Only)	253
Physics Tab (Pro Only)	253

Bones Tab	254
Chapter 13: Style Window	256
Shapes	256
Fills	259
Stroke	272
Applied Styles	284
Swatches	285
Copy, Paste, and Reset Buttons	287
Advanced Window Checkbox (26)	287
Checker Selection (27, Pro Only)	288
Chapter 14: The Library Window	289
Library Tabs	290
Using the Location Menu (Pro only)	291
Searching the Library	293
Maintaining Your Library	296
Library Icons	301
Details Panel	302
Chapter 15: The Character Wizard	304
Using the Character Wizard	304
Body Tab	308
Face Tab	311
Movement Tab	315
Clothing Tab	317
Style Tab	319
Designing a Character and Walk Cycle	321
Making Your Character Walk	322
Rotating Your Character 360 Degrees	324
Designing Your Own Actions (Pro Only)	327
Creating Content for the Character Wizard (Pro Only)	329
Chapter 16: The Timeline Window	332
Consolidating Timeline Channels	333
Condensing and Expanding the Timeline	334
Controlling Time	336
Navigating the Timeline with the Mouse	337
Using Timeline Markers (Pro Only)	337
Choosing an Interpolation Method	338
Choosing an Animation Interval (Pro Only)	344
Onion Skins (Pro Only)	345
Playing a Partial Segment	347
Animation Channels	347
Hiding and Showing Timeline Channels (Pro Only)	351
Working with Keyframes	352
Sequencer	358
Motion Graph (Pro Only)	360
Displaying Multiple Layers in the Timeline	362
Muting Animation Channels (Pro only)	363

Chapter 17: Other Windows	365
Audio Recording	365
Actions Window (Pro Only)	366

Moho Menus **375**

Chapter 18: File Menu	376
New	377
New Workspace (Pro Only)	379
New from Template (Pro Only)	380
Open...	380
Open Recent	381
Close	382
Close All	382
Save	382
Save As...	382
Save All	383
Revert	383
Gather Media	383
Export as Version 9 File (Pro Only)	384
Export as Version 10 File (Pro Only)	384
Export as Version 11 File (Pro Only)	385
Remove Comments & Tags	385
Project Settings...	385
Import	392
Real-Time Media Connection (Pro Only)	396
Poser Integration (Pro Only)	396
Import Notes and Tips	396
Photoshop Tips	397
Show in Explorer (Windows only)	403
Show in Finder (Mac only)	404
Refresh Media	404
Preview	404
Preview No Antialiasing (Pro Only)	405
Preview Animation (Pro Only)	406
Export Animation...	406
Export Animation with Previous Settings	417
Export FBX (Pro Only)	418
Export OBJ (Pro Only)	418
Export POV (Pro Only)	418
Export Styles (Pro Only)	418
Export Frame to SVG	419
Upload to YouTube	419
Upload to Facebook®	419
Moho Exporter	419
Relaunch in (x)-bit Mode (Pro Only)	425
Quit	425

Chapter 19: Edit Menu	426
Undo	426
Redo	426
Cut, Copy, Paste	426
Paste Relative	427
Clear	427
Copy Layer (Pro Only)	427
Paste Layer (Pro Only)	427
Normalize Layer Scale (Pro Only)	427
Reset Layer Scale Normalization (Pro Only)	429
Select All	429
Select None	429
Select Inverse	429
Select Connected	429
Edit Keyboard Shortcuts	429
Preferences...	433
Using Custom Resource Images	446
Chapter 20: Draw Menu	448
Insert Text...	448
Snap to Grid (Pro Only)	449
Reset Line Width (Pro Only)	449
Random Line Width (Pro Only)	449
Peak	449
Smooth	449
Raise Shape	450
Lower Shape	450
Raise to Front	450
Lower to Back	450
Trace Image	450
Triangulate 2D Mesh	456
Hide Selected Points	456
Show All Points	456
Hide Shape	456
Show All Shapes	456
Freeze Points	456
Freeze Selected Points	457
Freeze Visible Points	457
Reset Points	457
Reset All Points	457
Chapter 21: Bone Menu	458
Release Points	458
Flexi-Bind Points	458
Release Layer	459
Flexi-Bind Layer	459
Release Layer And Points	459
Use Selected Bones for Flexi-Binding	459

Create Smooth Joint for Bone Pair (Pro Only)	459
Use All Bones for Flexi-Binding	462
Reset All Bone Rigging	462
Hide Selected Bones	462
Hide/Show Shy Bones (Pro Only)	462
Hide Controlled Bones	462
Show All Bones	462
Track Bone to Video	462
Make Smart Bone Dial (Pro Only)	463
Freeze Pose	465
Freeze Selected Bones	466
Freeze Visible Bones	466
Reset Bone	466
Reset All Bones	466
Chapter 22: Animation Menu	467
Allow Frame Skipping	467
Enable Bone Dynamics (Pro Only)	468
Reset All Layer Channels	468
Consolidate Layer Channels	468
Set Layer Start Time	468
Align Layer with Camera	469
Select All Keyframes	469
Rescale Keyframes...	469
Copy Current Frame...	470
Add Keyframe	471
Auto-Freeze Keyframes	471
Clear Animation	473
Track Layer to Video	474
Nudge Physics Object (Pro Only)	474
Mute Audio	474
Restart Audio Track	475
Audio Level	475
Restart Movie	475
Chapter 23: Scripts Menu (Pro Only)	476
3D	476
Camera	477
Draw	478
Image	479
Layer Effects	479
Particle Effects	480
Script Writing	481
Sound	482
Text	483
Tiling	483
Visibility	483
Warp	484

Other Popular Scripts	484
Scripting Documentation	484
Install Script	484
Chapter 24: View Menu	486
Reset	486
Zoom In	487
Zoom to Layer	487
Zoom to Selection	487
Zoom Out	487
Direction (Pro Only)	487
Enable Grid (Pro Only)	487
Grid Settings (Pro Only)	487
Enable Grid Snapping (Pro Only)	487
Show 3D Axes (Pro Only)	488
Video Safe Zones (Pro Only)	488
Show Rule Of Thirds	488
Show Output Only	488
Show Play & View Controls	488
Show Timeline Options	488
Timeline Channels (Pro Only)	488
Enable Onion Skins (Pro Only)	489
Select Tracing Image (Pro Only)	489
Show Tracing Image (Pro Only)	489
Show Curves (Pro Only)	489
Auto Hide Curves (Pro Only)	489
Fade Unselected Layers (Pro Only)	489
Active Switch Layer (Pro Only)	490
Design Mode (Pro Only)	490
Return to Mainline (Pro Only)	490
FBX Preview Mode (Pro Only)	490
Stereo (Pro Only)	491
Show Document Tabs	491
Chapter 25: Window Menu	492
Tools	492
Layers	492
Timeline	492
Style	492
Switch Selection	493
Docking	493
Actions (Pro Only)	493
Blend Morphs	493
Keyframe	494
Layer Settings	494
Poser Parameters (Pro Only)	495
Library	495
Audio Recording	495

Character Wizard	495
Chapter 26: Help Menu	496
Help	496
Tutorials	496
Online Tutorials	496
Community Forums	497
Technical Support	497
Online Video Gallery	497
Download Bonus Content Pack	497
Buy Content	497
Upgrade to Professional Version (Debut Only)	497
Check For Updates	497
Deactivate License	497
Update License	498
License Manager	498
Register Your Product	498
Welcome Screen	498
About Moho	498
About Scripts	498
Chapter 27: Moho 13.5 New Features	500
Create a Vitruvian Group	500
Rigging Vitruvian Bones	505
Animating Vitruvian Bones	506
Wind Dynamics	511
Perspective warp and Quad warp	515
Appendix	523
Appendix A: Product Comparison	524
Feature Comparisons	524
Usability Features	525
Window Menu	525
Vector Drawing Features	525
Vector Modifiers	526
Fill Features	526
Fill Modifiers	526
Bone Features	526
Layer Features	527
Layer Modifiers	528
Layer Types	528
Camera Features	529
Workspace Features	529
Timeline Features	529
Action Features	530
Style Features	530
Preferences	530
Project Settings	530

Content	531
Scripts	531
View	531
Import/Export	532
Upload Features	533
Optimization Features	533
Appendix B: Technical Support	534
User Manual	534
Moho on the Web	534
Moho Discussion Forum	534
Email Support	534
Appendix C: Acknowledgements	535
Moho Development Team	535
Technology and Content	535
Appendix D: Moho Shortcuts	537
How to Work Quickly in Moho	537
Menu Shortcuts	537
Keyboard Shortcuts	539
Mouse Shortcuts	543
Multi-touch Support	545
Appendix E: Media Support	547
Writing Your Own Presets	547
Appendix F: Moho Document File Format	551
Introduction	551
Document Overview	551
Document Structure	554
Tips	560
Appendix G: Command Line Renderer (Pro Only)	568
Introduction	568
Usage	568
Platform Notes	577
Index	579

Welcome

Chapter 1: Introduction

Moho is a complete animation system for creating 2D anime and cartoons. This document is the user's manual, containing useful information to get you started, as well as a detailed reference to all of Moho's features.

If you're just getting started using Moho, the best place to begin is with the quick start tutorials, which appear in **"Quick Start" on page 2 in your Moho Tutorial Manual**. Choose **Help > Tutorials** to open the manual in PDF format. This section will give you a quick overview of how Moho works, and what you can do with it. Even if you've used Moho in the past, you might want to give the tutorials a quick read to see what's changed in this version.

If you've been using Moho for a while now, and you want more information on some specific feature or interface element, choose the section that interests you from the table of contents.

Finally, if you're having a problem that just isn't answered in this document, please see **"Appendix B: Technical Support" on page 534**. We want to do everything we can to make using Moho a fun and productive experience.

Demo Limitations

If you haven't purchased a copy of Moho, then the program will be running in demo mode. While in demo mode, Moho still allows you access to all features of the program. Anything you can do in the full version you can do in the demo. Also, any files you create with the demo version of Moho will still work fine if you purchase the full version.

The demo version has just three limitations: First, you can only run the demo version of Moho for 30 days. Second, you cannot import any external file formats including images and movies. Third, you cannot export your animations to other formats (QuickTime, AVI, Flash, etc.).

To purchase Moho, go to <http://mohoanimation.com>.

What's New in Moho 13.5

Anime Studio has been renamed to Moho. Document types associated with Moho 13.5 are as follows:

- **.moho**: The compressed project file extension (formerly **.anime**)



Anime Studio 11 will not recognize documents created with the .moho or .mohoproj extensions. You will get an error when trying to open a .moho document in the modern format.



*Legacy **moho** documents created in older versions of Anime Studio will generate an error message when you try to open them in Moho 13.5. To open them, change the file of the legacy **moho** document to **anme**. Moho 13.5 will then treat it as a legacy Anime Studio document and will prompt you to update it to the new format.*

- **.mohoproj**: The uncompressed project file within the above-mentioned .moho project (formerly **.animeproj**)
- **.mohobrush**: Brushes saved from the Brush Settings dialog will be saved with this extension.
- **.mohostyle**: Styles that are exported with the File > Export Styles command
- **.mohoaction**: Actions that are exported from the Actions window.

New in Moho Debut and Pro

- **Tool Improvements**: The Freehand, Blob Brush, and Paint Bucket tools have improved smoothing algorithms and allow you to specify the amount of smoothing each tool will perform. See ["Freehand" on page 49](#), ["Blob Brush" on page 54](#), and ["Paint Bucket" on page 67](#).
- **New GUI**: The Moho interface has been enhanced with new cleaner look, and includes easier options for personalization. Improvements have been implemented for both standard and ultra high resolution monitors.
- **Switch Selection window**: Switch layers can be selected more quickly and easily through the use of a separate window. See ["Using the Switch Selection Window" on page 193](#).
- **Auto-Freeze keys**: Adds a keyframe for every bone in a character when any part is adjusted. See ["Auto-Freeze Keyframes" on page 472](#).
- **Pin Bones**: The Bone tool now allows you to add "Pin Bones" (bones that have a zero length). See ["More about Pin Bones" on page 90](#).
- **Auto colored bones**: Points are automatically colored to match the bone that they are bound to. See ["Bind Points" on page 100](#) for more information.
- **More bone and layer colors**: Moho allows you to assign one of eleven different colors to the layers in your projects. See ["Using Layer Colors" on page 177](#).
- **New library**: The Moho library has a new interface, displaying content information in several different user-definable columns. A search pane allows you to find content more easily. For more information, see ["Chapter 14: The Library Window" on page 289](#).
- **New Layers window**: The Layers window has been enhanced with columns that can be shown or hidden by preference. Content can be sorted in forward or reverse order by clicking a column header. For more information about the new Layers window, see ["Chapter 10: Layers Window" on page 165](#).

- **Absolute and relative path for file handling:** All paths saved in a document are saved with a relative path and a full path whenever possible. Relative paths are relative to locations known by the application at runtime. If Moho is run on another machine that uses the same locations, Moho will be able to resolve the relative paths and find content, even though the full paths are different on both machines.

New in Moho Pro only

- **Bezier handles for vectors:** Moho now supports Bezier handles (found in programs such as Adobe Illustrator). Bezier handles are editable in Pro only, but are readable in Moho Debut. For more information, see [“Editing Bezier Curves \(Pro only\)” on page 34](#).
- **Smart Warp** for images and vectors: Allows you to specify a triangulated vector layer that can be used to warp another vector or image layer. Because Moho now supports Bezier handles (found in programs such as Adobe Illustrator), vector import is improved because SVG files can now be imported without having to approximate curves. See [“Smart Warp Layers \(Pro only\)” on page 236](#).
- **Vector Export:** Moho now allows you to export sequential SVG files that can be edited in vector editing software (such as Adobe Illustrator). See [“Exporting Sequential SVG Files \(Pro only\)” on page 417](#).
- **Edit multiple layers in the timeline:** Multiple layers can be displayed in the timeline, and they will all be displayed in the timeline along with their designated color labels (if applicable). See [“Editing Multiple Layers” on page 205](#) and [“Displaying Multiple Layers in the Timeline” on page 362](#).
- **Mute Channels:** Animation channels can be muted in the timeline so that you can focus on the areas you want to work on. See [“Muting Animation Channels \(Pro only\)” on page 363](#).
- **Separate channel dimensions:** You can now separate several types of channels so that you can work with each individually. For more information, see [“Separating Timeline Channels \(Pro only\)” on page 121](#).
- **Import/Export actions:** The Actions window allows you to import and export actions so that you can share them between [rojects. See [“Actions Window \(Pro Only\)” on page 366](#).
- **Transform action to relative:** A context menu in the Actions list includes a Convert to Relative command, which helps refit skeletons to characters with entirely different proportions. See [“The Actions List Context Menu” on page 368](#).
- **Smart actions naming:** If you have a bone selected before creating a smart bone, Moho 13.5 automatically names the action the same as the bone that is selected. See [“Creating a Smart Bone Action” on page 105](#) and [“Creating a Second Smart Bone Action” on page 108](#).
- **Ignore IK constraint:** The “Ignored by Inverse Kinematics” bone constraint option allows you to specify bones that will be ignored by the IK solver. For more information, see [“Ignoring Inverse Kinematics \(Pro only\)” on page 88](#).

- **Personalize workspace templates:** The **File > New Workspace** command allows you to choose a workspace template as a starting point for your new project. See [“New Workspace \(Pro Only\)” on page 379](#).
- **XMP metadata for projects and assets:** Metadata such as tags, comments, and other categories can be added to project files and library items. The library allows searching for items based on these metadata strings. See [“Adding Metadata \(Pro Only\)” on page 302](#), and [“Other Settings” on page 390](#).
- **Add personalized root folders to the library:** Use the Location Menu in the Library to add custom locations to your library. Folders beneath that custom location will be assigned relative paths so that files can easily be located on two different computers. For more information, see [“Adding Custom Locations \(Pro only\)” on page 292](#).
- **Moho Exporter:** The Batch Exporter from previous versions of Anime Studio has been renamed to Moho Exporter, and offers an easier to use interface. Projects, layer comps, and actions can be added to the export queue directly from the Library as well as dragged and dropped from Windows Explorer or Mac Finder. For more information, see [“Moho Exporter” on page 420](#).
- **Comments and tags for layers:** Comments and tags can be added to one or more selected layers in the General tab of the Layer Settings dialog.
- **Filters for easy layer search:** The Search feature in the Library allows you to search and filter items based on several different types of metadata. See [“Metadata Searches \(Pro Only\)” on page 295](#).
- **Realistic motion blur:** Motion blur has been enhanced to more accurately produce motion blurs that you get from a real world camera. Legacy motion blur is also provided as an option. See [“Enhanced Motion Blur \(Pro Only\)” on page 223](#).
- **Export with Previous Settings:** Save time with re-rendering animations by using the File > Export Animation with Previous Settings command to render an animation using the same settings as previously used. See [“Export Animation with Previous Settings” on page 418](#).

System Requirements

Windows:

- Windows® 10
- 64-bit OS required
- 2.0 GHz Intel Core i3 or higher
- 4 GB RAM or higher
- 1.6 Gb free hard drive space or higher
- OpenGL 4.1 supported graphics card required (1920x1080 recommended) **
- Online connection required to perform online activation

Macintosh:

- macOS® X 10.15, 10.16 or higher
- 64-bit OS required
- 2.0 GHz Intel Core i3 or higher
- 4 GB RAM or higher
- 1.6 GB free hard drive space or higher
- OpenGL 4.1 supported graphics card required (1920x1080 recommended) **
- Online connection required to perform online activation

** For high pixel density displays, minimum resolution will vary according to the operating system recommended scaling level. For example, if the OS recommends a scaling level of 200%, the minimum requirement may be as high as 2736x1824 resolution. Or if the OS recommends a scaling level of 150%, the minimum requirement may be as high as 2160x1440 resolution.



During installation, the Moho installer checks to see if a previous installation of the same installer exists on your system. The installer will prompt you to uninstall the previous version before continuing (recommended).

Installing Moho

Windows Installation

1. Start the Moho installation executable file.
2. The Welcome to the Moho Setup Wizard screen appears. Click **Next** to continue.
3. The License Agreement screen appears. After you read the license agreement, click **I accept the agreement**. Then click **Next** to continue.
4. The Select Destination Location screen appears. The 64-bit version of Moho is automatically selected for installation by default. You can optionally install the 32-bit version by checking **Install 32-bit files**. After you confirm or select your installation folders, click **Next** to continue.
 - The default installation location for the 64-bit version of Moho is c:\Program Files\Moho 13.5. Click the **Browse** button to select another folder on your hard drive, if desired.
 - The default installation location for the 32-bit version of Moho is c:\Program Files\Moho 13.5. Click the **Browse** button to select another folder on your hard drive, if desired.
5. The Select Start Menu Folder screen appears. By default, Moho files are placed in the Lost Marble\Moho 13.5 startup folder. Click **Browse** to choose another folder of your choosing. After you make your choice, click **Next** to continue.


6. The Select Additional Tasks screen prompts you to choose whether or not you want to create a desktop icon. After you make your choice, click **Next** to continue.
7. The Ready to Install screen displays a summary of your choices. You can click the Back button to make changes to your settings. After you verify your choices, click **Install** to copy the installation files to your system as specified.
8. After the files are installed, you will be prompted to restart the computer. Choose **Yes** to restart the computer, or **No** to restart later. Then click **Finish**.

Macintosh Installation


1. Double-click the installer package to open the Moho installer.
2. The Introduction screen appears. Click Continue.
3. The installer displays the readme file, which contains updated information about Moho 13.5. After you read, print, or save the document, click Continue.
4. The End User License agreement appears. If you click Continue, you will be prompted to agree to the license before installation is completed. Click Agree.
5. The Installation Type screen appears. You will be notified how much space the installation will require. Click Install to continue.
6. If you have user control enabled in OSX, you will be prompted to enter your username and password to authorize installation on your system. After entering the information, click Install Software.
7. After the files are written to your hard disk, you will be notified that installation is complete. Click Close to exit the dialog.

Activating Moho

After installing Moho, you will need to activate within a seven day grace period. If you do not activate Moho during the seven day grace period, it will not start until activated. You will need to reactivate in order to use the product.

 *If you try to run Moho after the seven day grace period has expired without activation, the application will not run. You will need to enter your serial number again when prompted to activate the application.*

 *Moho Debut and Moho Pro have been unified into the same application. Initially, Moho will run as Moho Debut, until it is licensed to use Moho Pro features. After licensing as Moho Pro, the application will relaunch with Pro features enabled.*

 If you initially purchase Moho Debut 13.5 and later upgrade to Moho Pro 13.5, you can use the **Help > Update License** command to enter your Pro serial number and enable the Moho Pro features.

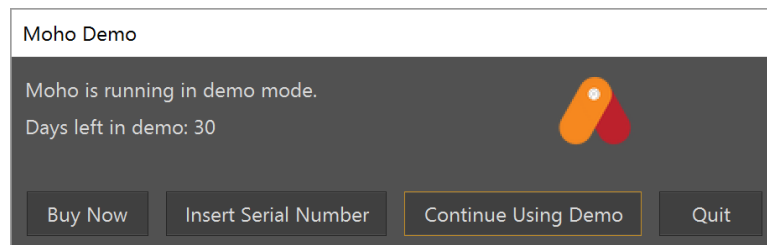
There are two modes of activation:

- If you have installed Moho on a computer that has an internet connection, see “Automatic Activation” on page 8.
- If you have installed Moho on a computer without an internet connection, see “Manual Activation” on page 9.

Automatic Activation

If your computer has an Internet connection, Moho can be activated as follows.

1. Start Moho. If the program is running in demo mode you will see the Moho demo dialog, which presents the following options.

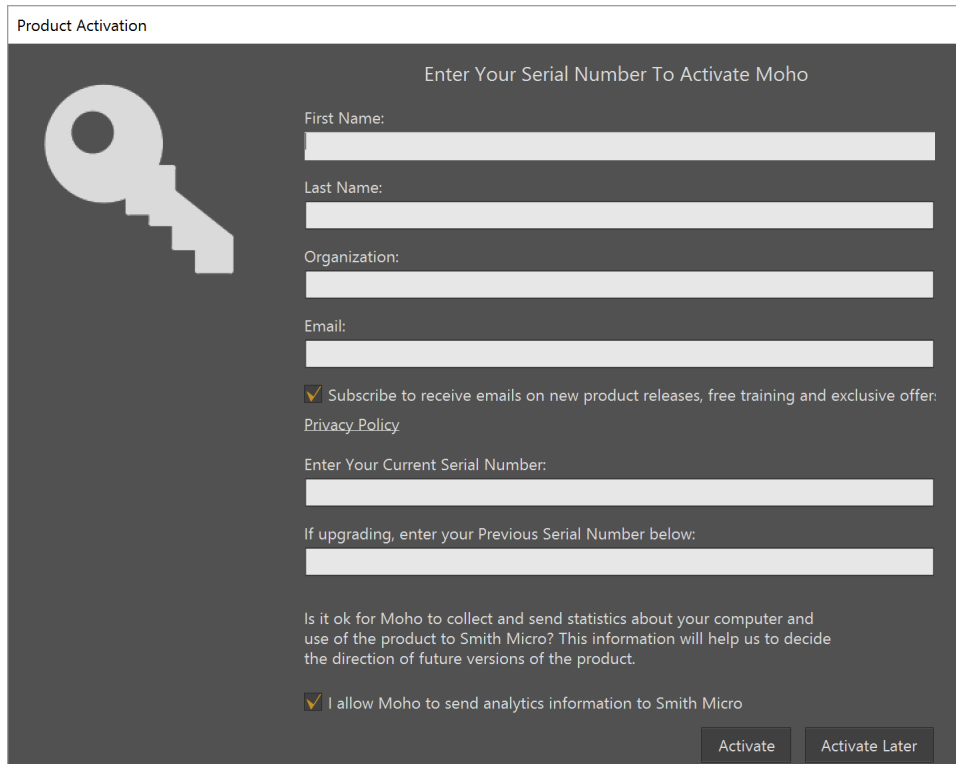


Moho Demo screen.

- **Buy Now:** Opens your web browser to the Lost Marble online store, where you can purchase a licensed copy of Moho.
- **Insert Serial Number:** Click this button to open the Product Activation screen. Note that serial numbers do not contain the letter O, but instead use the number 0.
- **Continue Using Demo:** If the trial period has not been exceeded, click this button to continue using Moho in demo mode. The button will be disabled if the trial period has been exceeded.
- **Quit:** Click this button to exit the Moho Demo screen and quit the application.

 If you do not want to activate Moho when the Product Activation screen appears, click **Activate Later**.

2. In the Product Activation screen, enter your **Registration Name**, **Registration Email**, and Moho **Serial Number** (along with your **Previous Serial Number** (if upgrading)). Note that serial numbers do not contain the letter O, but instead use the number 0.

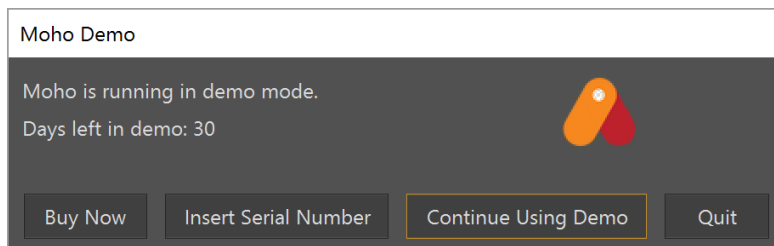
The image shows a 'Product Activation' window with a dark gray background. On the left is a large white key icon. The title bar says 'Product Activation'. The main heading is 'Enter Your Serial Number To Activate Moho'. Below this are several text input fields: 'First Name:', 'Last Name:', 'Organization:', 'Email:', 'Enter Your Current Serial Number:', and 'If upgrading, enter your Previous Serial Number below:'. There is a checkbox labeled 'Subscribe to receive emails on new product releases, free training and exclusive offer:' with a link to 'Privacy Policy' below it. Another checkbox is labeled 'I allow Moho to send analytics information to Smith Micro'. At the bottom right are two buttons: 'Activate' and 'Activate Later'.

Product Activation screen.

3. Check or uncheck other options such as receiving product announcements or allowing analytics information to be sent to Lost Marble.
4. Click **Activate** to activate your copy of Moho.

Manual Activation

1. Start Moho. If the program is running in demo mode you will see the Moho demo dialog, which presents the following options.

The image shows a 'Moho Demo' dialog box with a dark gray background. The title bar says 'Moho Demo'. The text inside says 'Moho is running in demo mode.' and 'Days left in demo: 30'. On the right is a Moho logo (two overlapping circles, one orange, one red). At the bottom are four buttons: 'Buy Now', 'Insert Serial Number', 'Continue Using Demo' (which is highlighted with a yellow border), and 'Quit'.

Moho Demo screen.

- **Buy Now:** Opens your web browser to the Lost Marble online store, where you can purchase a licensed copy of Moho.
- **Insert Serial Number:** Click this button to open the Product Activation screen. Note that serial numbers do not contain the letter O, but instead use the number 0.

- **Continue Using Demo:** If the trial period has not been exceeded, click this button to continue using Moho in demo mode. The button will be disabled if the trial period has been exceeded.
- **Quit:** Click this button to exit the Moho Demo screen and quit the application.



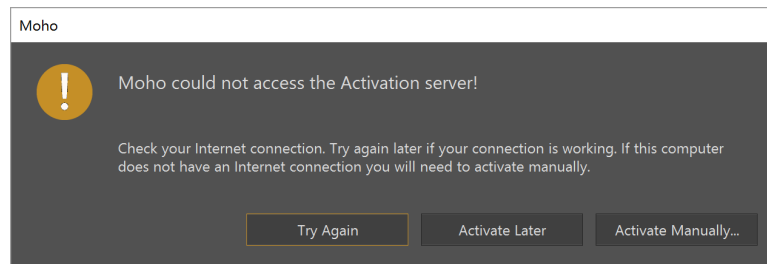
*If you do not want to activate Moho when the Product Activation screen appears, click **Activate Later**.*

2. In the Product Activation screen, enter your **Registration Name**, **Registration Email**, and Moho **Serial Number** (along with your **Previous Serial Number** (if upgrading). Note that serial numbers do not contain the letter O, but instead use the number 0.

The screenshot shows the 'Product Activation' window. It has a dark grey background with a large white key icon on the left. The title bar says 'Product Activation'. The main heading is 'Enter Your Serial Number To Activate Moho'. Below this are several input fields: 'First Name:', 'Last Name:', 'Organization:', 'Email:', 'Enter Your Current Serial Number:', and 'If upgrading, enter your Previous Serial Number below:'. There are two checkboxes: one for 'Subscribe to receive emails on new product releases, free training and exclusive offer:' with a link to 'Privacy Policy', and another for 'I allow Moho to send analytics information to Smith Micro'. At the bottom right are two buttons: 'Activate' and 'Activate Later'.

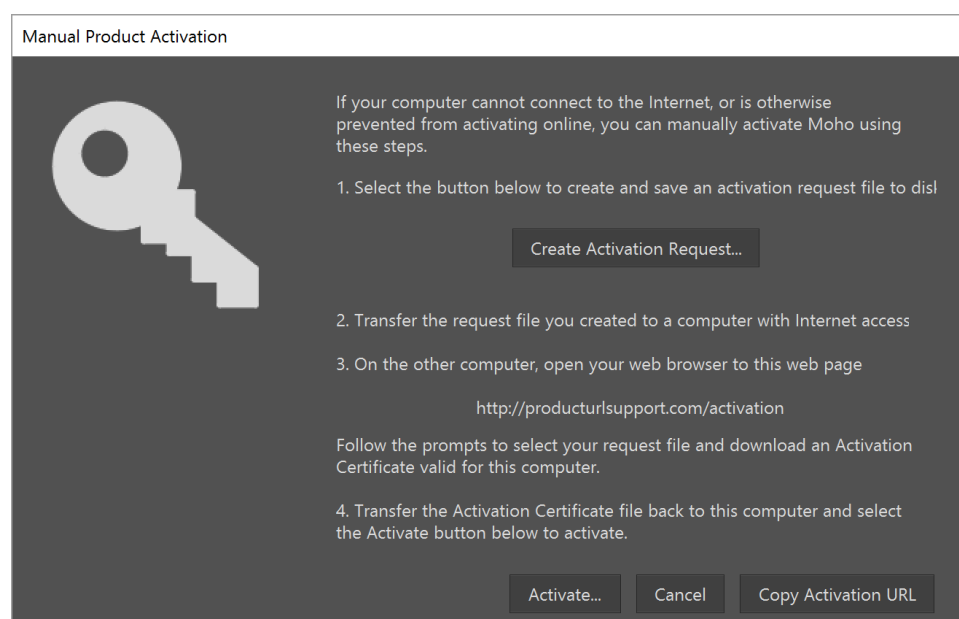
Product Activation screen.

3. Check or uncheck other options such as receiving product announcements or allowing analytics information to be sent to Lost Marble.
4. Click **Activate** to activate your copy of Moho. If an Internet connection is not detected, a dialog will prompt you to **Try Again** (used if you fixed an issue with an Internet connection that was temporarily not working); to **Activate Later** (which will exit the activation process), or to **Activate Manually** if you want to proceed with the activation process.




*If an Internet connection is not detected, click **Activate Manually**.*

5. The Manual Product Activation dialog appears. Click the **Create Activation Request** button to generate a text file named **Moho_ActivationRequest.txt**. This file contains the necessary activation information.



Manual Product Activation screen.

6. Locate a folder and click **Save** to save the info.

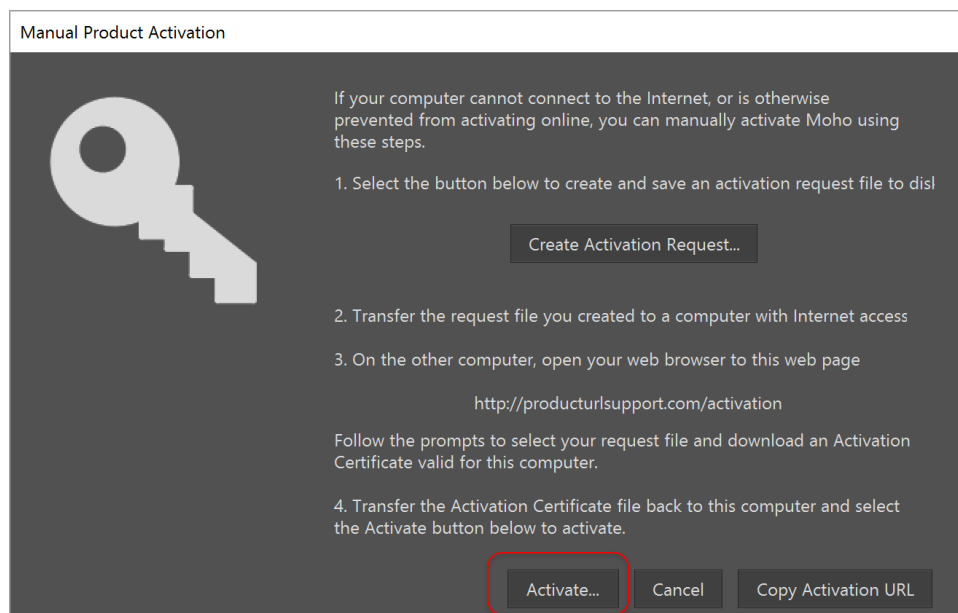
 *It is recommended that you leave the Manual Product Activation dialog open while you generate the activation certificate on a computer that has an Internet connection.*

 *Use the **Copy Activation URL** button to copy the activation URL to your clipboard. The URL will navigate you to the Offline Activation Page at <http://lostmarble.com/activation>. Then create a new text file, and save it to your flash drive under a different filename (such as **ActivationURL.txt**). You can use this text file to retrieve the URL on your other computer.*

7. Copy the activation request file that you saved in Step 6 onto a flash drive, so you can transfer it to a computer that does have an internet connection.

Transfer the files from the flash drive to the hard disk on a computer with an internet connection.

8. Open your web browser and go to the www.lostmarble.com web page.
9. From the Activation page, click the button to activate Moho.
10. From the Moho Offline Activation page, click the **Choose File** button to open the File Upload dialog. Locate the Activation Request file on your computer's flash drive and click **Open** to return to the Activation web page.
11. Click the **Submit** button on the Activation web page. An **activation_certificate.txt** file will be downloaded to your computer.
12. Copy the activation certificate file onto the flash drive, and then copy it back to the computer that doesn't have an internet connection.
13. In the Manual Activation screen, click the **Activate** button to select the activation certificate file.



Completing manual activation.

14. After you return to the Manual Product Activation dialog, click **Activate**.

Deactivating Moho

Activated licenses of Moho can also be deactivated automatically (see "[Automatic Deactivation](#)" on page 13), or manually (see "[Manual Deactivation](#)" on page 13). Typical reasons for deactivation include the following:

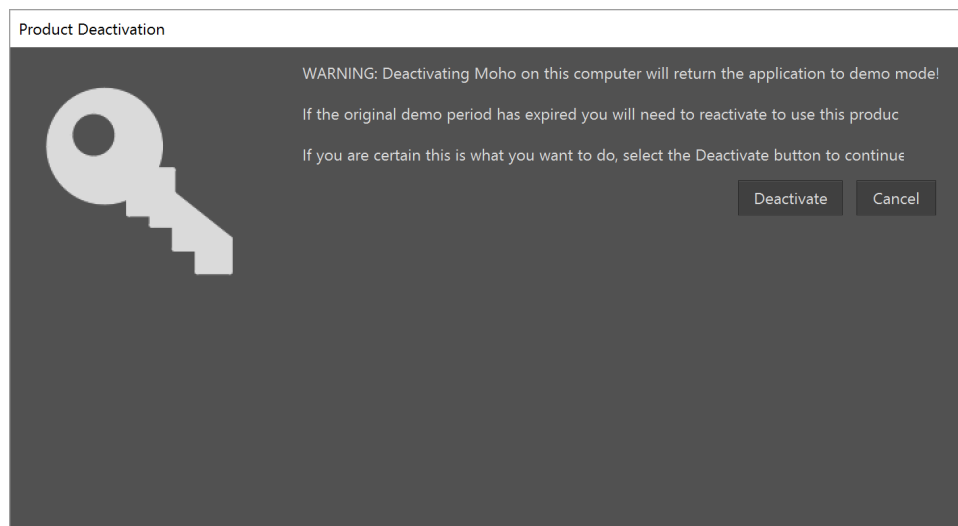
- If you are planning on upgrading your operating system, we recommend that you deactivate Moho before the upgrade.
- If you have exceeded the number of activations per license (three) you will need to deactivate one of the installations in order to install and activate it on another computer.

After you deactivate your license, Moho will then display a dialog that tells you that your license is deactivated and that your copy of Moho will shut down.

Automatic Deactivation

If Moho is installed on a computer that has an internet connection, proceed as follows:

1. Choose **Help > Deactivate License**.
2. A dialog informs you that you are about to deactivate the license on your current computer.
 - Choose **Cancel** to return to Moho without deactivating:
 - Choose **Deactivate** to deactivate your license. A dialog informs you that deactivation has occurred, and that Moho will shut down. Click **OK** to exit Moho.

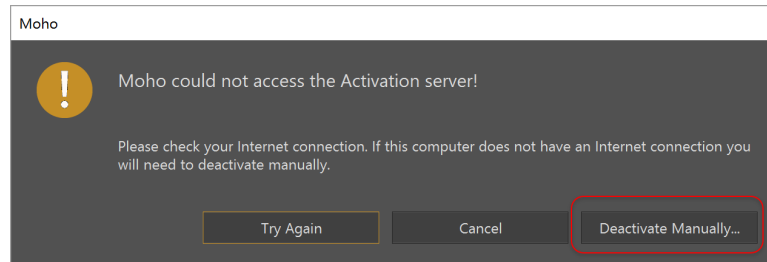


Completing automatic deactivation.

Manual Deactivation

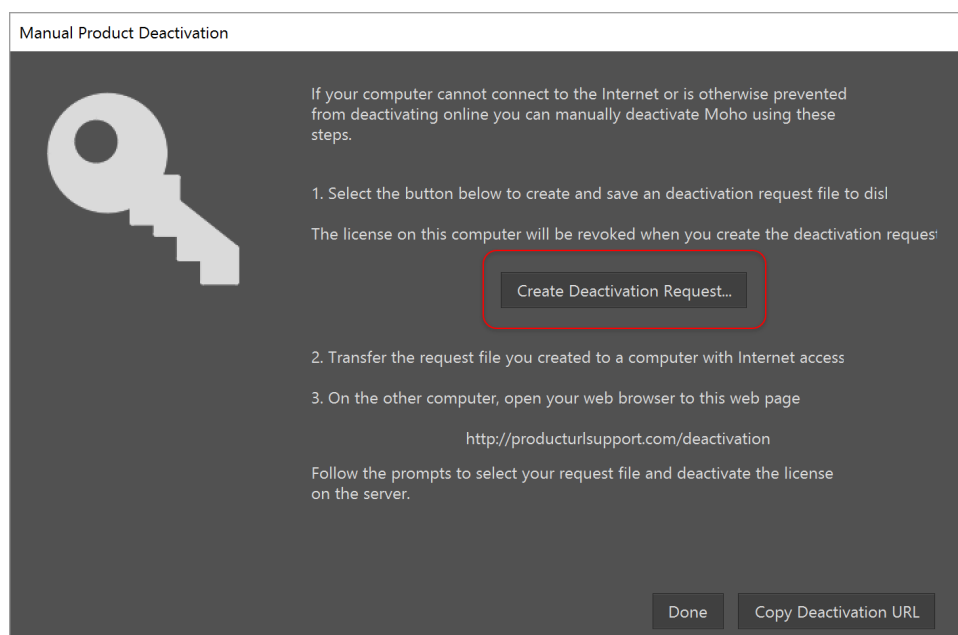
If Moho is installed on a computer that does not have an internet connection, you will need to use the manual deactivation, as follows:

1. Choose **Help > Deactivate License**. Moho reminds you that you will need to reactivate Moho if you want to use it on the same computer. If you are sure you want to deactivate. Click **Deactivate** to continue.
2. You are again asked to confirm your decision. Click **OK** to continue.
3. Moho displays a dialog if it detects that you are not connected to the Internet. Click **Deactivate Manually** to continue.



Click **Deactivate Manually** to continue.


4. The Manual Product Deactivation dialog appears. Click the **Create Deactivation Request** button to generate a text file named **Moho_DeactivationRequest.txt**. This file contains the necessary deactivation information.



Create Deactivation Request button.

5. Locate a folder and click **Save** to save the deactivation request file.

 Use the **Copy Deactivation URL** button to copy the deactivation URL to your clipboard. This saves a link that takes you to the Offline Deactivation page at <http://lostmarble.com/deactivation>. Then create a new text file, and save it to your flash drive under a different filename (such as **DeactivationURL.txt**). You can use this text file to retrieve the URL on your other computer.

 It is recommended that you leave the Manual Product Deactivation dialog open while you complete the process on a computer that has an Internet connection.

6. Copy the **Moho Pro_DeactivationRequest.txt** file onto a flash drive, so you can transfer it to a computer that does have an internet connection. Transfer the

files from the flash drive to the hard disk of a computer that has an internet connection.

7. Open your web browser and go to the www.lostmarble.com web page.
8. From the Deactivation page, click the icon to deactivate Moho.
9. From the Moho Deactivation page, click the **Choose File** button to open the File Upload dialog. Locate the Moho_DeactivationRequest.txt file on your computer's hard drive and click **Open** to return to the Deactivation web page.



*You can use the **Remove All Activations** link on the bottom of the Offline Deactivation web page to deactivate your Moho license on every computer on which it is in use.*

10. After the file is uploaded, click the **Submit** button on the Deactivation web page. You will receive a message when deactivation is successful.
11. Return to the Manual Product Deactivation dialog on the original computer and click **Done**. Deactivation is complete.

Activation and Analytics Logging

Generally, it is not necessary or beneficial to create a verbose log file. This data is beneficial for developers that are trying to diagnose problems. Verbose logging should only be done when requested by technical support.

To send the file to technical support, first launch Moho to reproduce the issue. After you quit Moho, go to the folder that is applicable for your version of Moho. Zip the .log file and send to technical support.

You can enable verbose activation or analytics error logging by placing a dummy text file named `enable_activation_log.txt` in the same folder where your activation license data is saved. Remove or rename the .txt file to disable verbose logging.

Locations are as follows:

- **Windows:** C:\ProgramData\Lost Marble\Moho Pro\13
- **Mac:** /Users/Shared/Library/Application Support/Lost Marble/Moho/13/License

When Moho launches, it will delete any files that have a .log extension at these locations. If the folder contains an Enable Activation Log.txt file, Moho will enable verbose logging for the activation/analytics library.

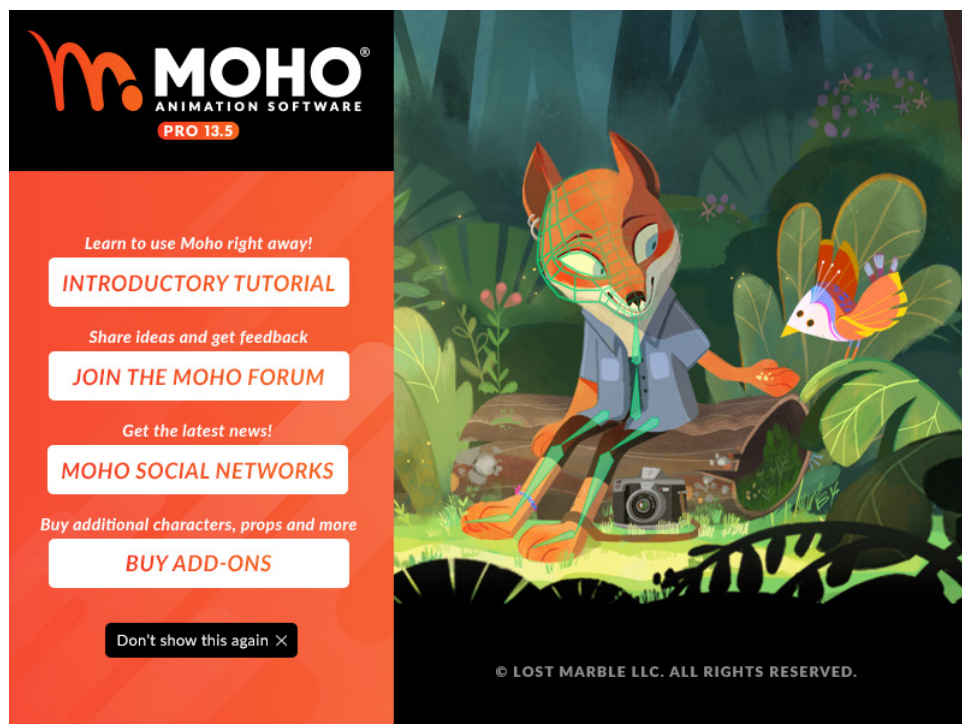
Getting Started

After you install Moho, you might want to familiarize yourself with the many features contained in the program.

When you start Moho, a splash screen presents the following options:

- **Introductory Tutorial:** Opens the Tutorial Manual, which you can also open using the **Help > Tutorial Manual** command from the Moho menu.


- **Join the Moho Forum:** The Moho community is one of its biggest advantages. It's full of great users and it's growing bigger everyday. You can learn from other peoples' experiences, ask for help and feedback, share your work and ideas and contribute with the knowledge! The developers are also very active in the Official Forum. Visit it here: www.lostmarble.com/forum
- **Moho Social Networks:** Get the latest news on Moho and Lost Marble and share your creations in the official Moho Facebook, Instagram, Twitter and YouTube channels. Find like minded animators and keep the conversation going!
- **Buy Add-ons:** Save design time and fuel your creative power with characters, props, scenery, brushes and more, created specifically for use within Moho.
- **Don't Show This Again:** Choose this command to prevent the splash screen from opening each time you start Moho.



Splash Screen (Moho Pro shown)

Creating a Content Folder

When you first start a serialized installation of Moho, you will be asked if you want to create a folder to store your custom content.

 When you select the location for your custom content folder and Moho finds an existing content folder named *Anime Studio Debut* or *Moho Pro*, Moho will offer to rename the folders to *Moho Debut* or *Moho Pro*, depending on your licensed version.

After the content folder is created, a hierarchy of folders appears beneath it. Any content stored in these locations will appear in the "My ..." folders in the Library (such

as “My Characters” in the Characters library and so on. This allows you to store user-created word balloons, brushes, and other custom items that you can use in Moho.

The content library folder structure is as follows:

```
Moho Debut (or Moho Pro)
  brushes
  Character Wizard
  Extra Files
  Library
  Media Presets
  readme 12.0
  Render Cache
  Samples
  Scatter Brushes
  scripts
  Shared Resources
  Startup
  swatches
  Templates
  Tutorials
  Word Balloons
  Workspace Templates (Pro Only)
```

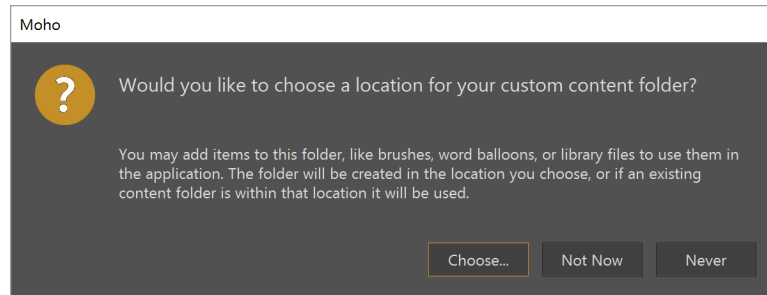


The Moho support files are also furnished in a similar version-specific folder structure as listed above. Common files will be located in `Resources/Support/common`, Debut support files in `Resources/Support/debut`, and Pro support files in `Resources/Support/pro`. Lua scripters that call the `AppDir()` function will need to update their scripts because the method now requires the Boolean parameter `const char AppDir(bool variantDir)`. If you pass `true`, you will get a path to the variant support folder for the version of Moho that is running (Debut or Pro). If you pass `false` you will get a path to the common support file (`Support/common`). You may need to scan both folders to suit the work of your script.*

The Custom Content folder also serves other important functions:


- The support files for the Tutorial manual are found in the Custom Content **Tutorials** folders.
- Autosave information and files are stored in the Autosave subfolder. If you do not create a custom content folder, autosave information will not be stored.
- If you open a file in Moho that contains a reference to a project file that is not found in its original location, Moho will look in your Custom Content location to try to find a file of the same name in its Shared Resources folder, or one of its subfolders. These folders must exist at launch, or when the Custom Content folder is included in your search paths. If there are multiple files of the same name in your Shared Resources folder or subfolder, Moho will match against the first one it finds.

When Moho prompts you to create a custom content folder, the choices are as follows:




Choosing a content folder.

- **Choose:** Select this option to browse to the folder that you want to use for your Moho content. After you select/create the folder, choose OK.

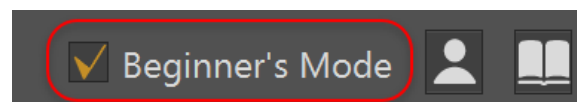
 *If you choose to never show the dialog that prompts you to create a content folder, you can specify its location at any time to in the General tab of the Preferences dialog. See "General Tab" on page 435 for more information.*

- **Not Now:** Choose this option if you want to set up the folder at a later time. You will be prompted with this dialog the next time you start Moho.
- **Never:** Choose this option if you do not want to set up a folder, and no longer want to receive this prompt when you start Moho.

 *When the User Content folder is created or updated, Moho appends the version number of the application to the name of the Readme folder.*

Choosing Your Startup Mode (Debut Only)

You can also switch to and from Beginner Mode by checking or unchecking the Beginner Mode option in the upper-right corner of the Moho user interface. When you check that option, the tool box on the left side displays the most commonly used tools as shown in the next figure.



Beginner Mode option

Standard Mode

If you choose Standard mode, various tools appear in the tool bar at the left side of the interface. If the number of tools feels overwhelming to you as a new user of

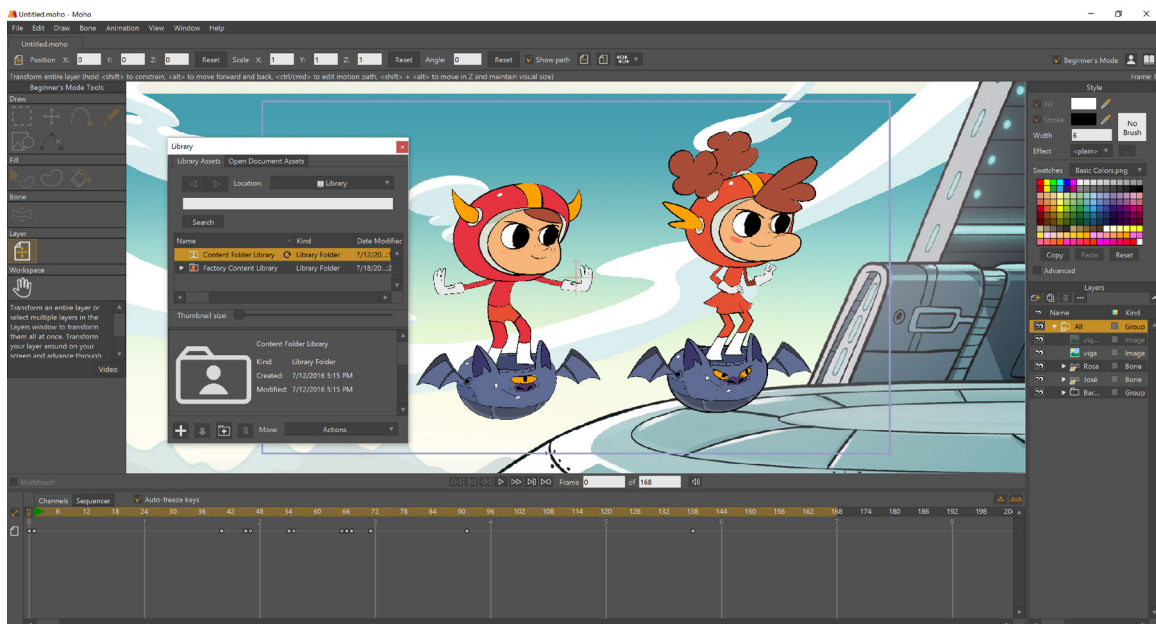
Moho, you can configure Moho to display the most commonly used tools, along with introductory videos that show you how to use them.



Standard UI

Beginner Mode

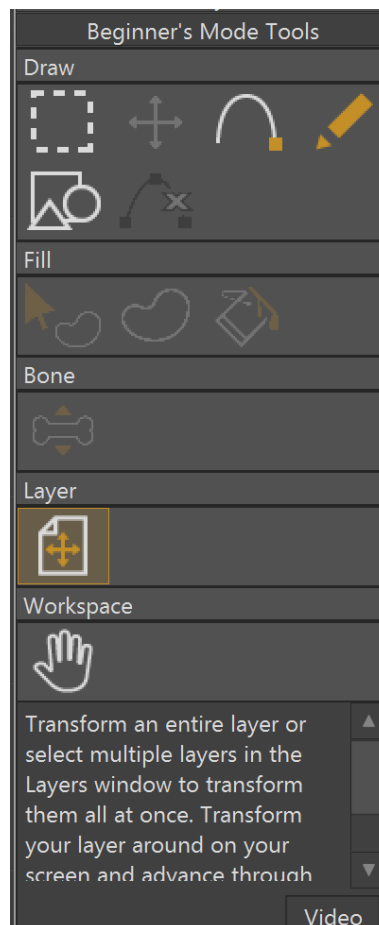
If you are new to Moho, you may find that the beginner's interface will be a good place to start.



Beginner Mode UI

When in the Beginner Mode, the tool box displays the following:

- **Draw Tools:** Displays the **Select Points**, **Transform Points**, **Add Point**, **Freehand**, **Draw Shape** and **Delete Edge** tools. For more information on these tools, see “Chapter 3: The Draw Tools” on page 32.
- **Fill Tools:** Displays the **Select Shape**, **Create Shape**, and **Paint Bucket** tools, all discussed in “Chapter 4: Fill Tools” on page 62.
- **Bone Tool:** Displays the **Manipulate Bones** tool, discussed in “Chapter 5: Bone Tools” on page 82.
- **Layer Tools:** Displays the **Transform Layer** tool, discussed in “Chapter 6: Layer Tools” on page 117.
- **Workspace Tools:** Displays the **Pan** tool, discussed in “Chapter 7: Camera and Workspace Tools” on page 138.
- **Tool Tip:** As you hover the mouse over any tool, a Tool Tip displays the name of the tool, along with a keyboard shortcut that you can use to select the tool at any time.
- **Tool Help:** When a tool is selected, an extended description of the tool appears in the lower section of the tool box. The description also includes basic instructions on how to use the selected tool.
- **Video Button:** Click the **Video** button in the extended description area to watch a video that shows you how to use the selected tool.



Beginner Mode Tools

Automatic Update Checking

If you want to configure Moho to automatically check for updates, you can open the Preferences dialog, and check the **Automatically check for updates** option in the General tab. To manually check for updates, choose the **Help > Check for Updates** command.

Chapter 2: License

Moho Debut 13.5

Moho Pro 13.5

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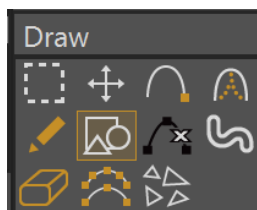
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Version: 20210209-Moho Debut/Moho Pro

Moho Tools

Chapter 3: The Draw Tools

Draw tools are used to draw and modify vector artwork. The following tools are available when you're working with a vector layer. Most of these tools are used by selecting them from the toolbar then clicking and dragging in the working area of the main window - a few are used simply by clicking on them, and this is noted below. If you hold the mouse over a tool, a tooltip will appear with the name of the tool if you need a quick reminder. Also, most tools have a shortcut key that can be used to activate them. If a tool has such a shortcut, this will show up in the tooltip as well.



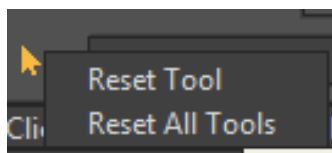
Draw Tools (Moho Debut)



Draw Tools (Moho Pro)

 *Moho has a smart tool palette, which shows and hides tools based on their need. The position of the tool shown in the screenshots may differ, depending on the selected layer in the Layers Window, and the current time in the timeline.*

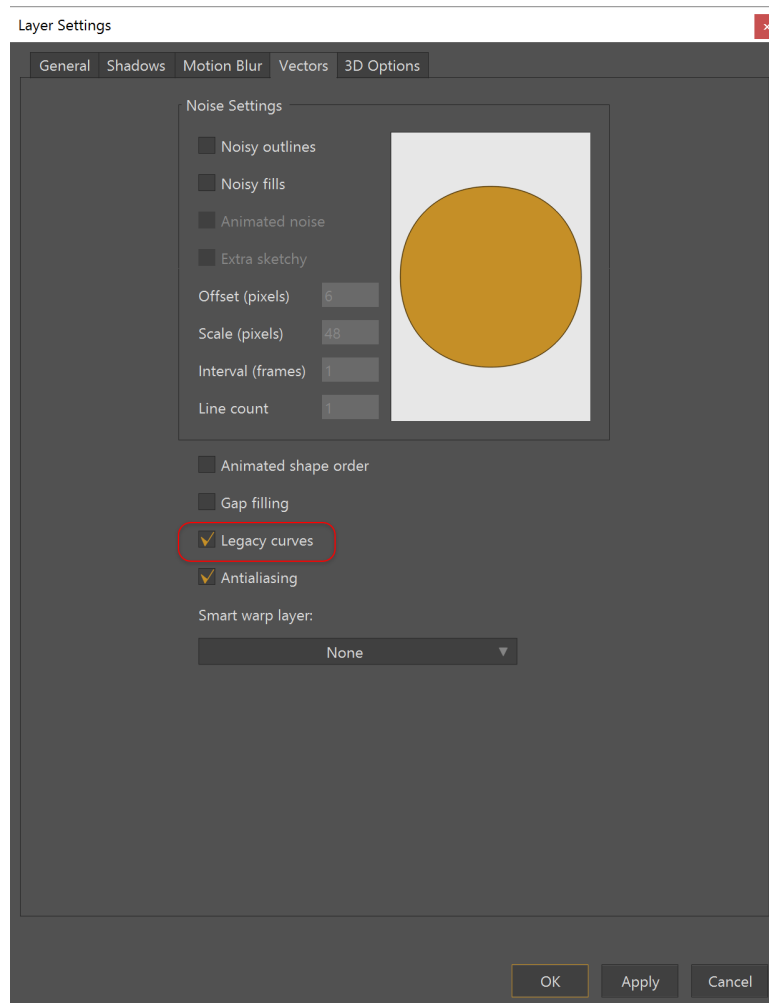
 *Click the tool icon in the properties bar to display a submenu. Choose Reset Tool to reset the current tool to its default settings. Choose Reset All Tools to reset all tools to their default settings.*



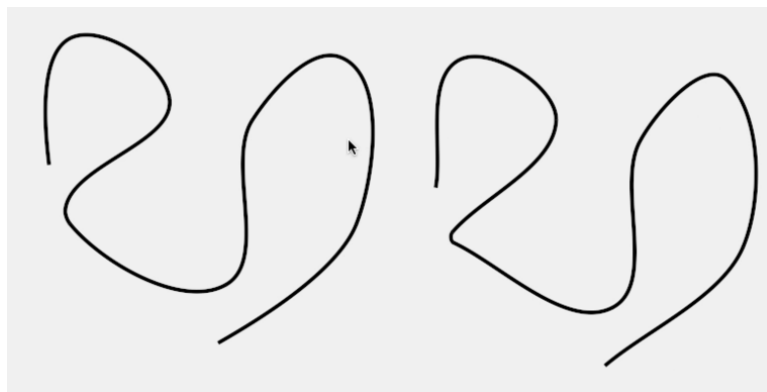
Reset tool options.

When drawing with the draw tools, you can manually choose to use legacy curves (such as those used in Anime Studio 6 and earlier) in the **Layer Settings** dialog. Select the layer you want to change in the Layers Window, and open the Layer Settings

dialog to the Vectors tab. In Moho Pro, you can check the **Legacy Curves** option to use the old method of rendering curves.



You can choose legacy curves in Moho Pro for compatibility with older scenes created in Anime Studio 6 and earlier.



Normal curves (left) vs Legacy curves (right).

Working with Bezier Curves

Previous versions of Moho have always worked with Bezier curves behind the scenes, but the control handles have been hidden. Moho 13.5 offers improved support of Bezier Curves. Bezier curves improve the appearance of vector and text objects because they are more accurate and use fewer points. The Freehand, Blob Brush, and Paint Bucket tools use a new algorithm that utilizes Bezier curve technology to create less points on each stroke.

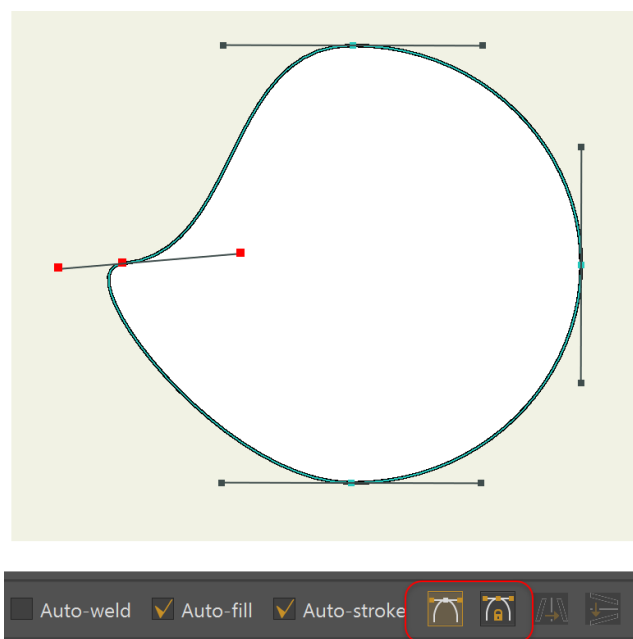


Bezier handles are read-only in Moho Debut. Moho Pro allows you to read and edit bezier curves.

Bezier curves are read-only in Moho Debut 13.5. You will be able to see the curve, but you will not be able to modify it because the handles will not be visible. The vector creation tools in Moho Debut 13.5 will remain the same as those found in Anime Studio 11, and you will still be allowed to increase or decrease the curvatures.

Editing Bezier Curves (Pro only)

Beginning in Moho Pro 13.5, you can display the Bezier handles to modify the shapes of the curves. When you import vector formats such as SVG, the number of points in the imported object are reduced because Moho uses the Bezier curves from the objects that you are importing.



You can choose legacy curves for compatibility with older scenes created in Anime Studio 6 and earlier.

Two Bezier handles options appear with the Add Point tool (described in “Add Point” on page 45) and the Transform Points tool (described in “Transform Points” on page 41).

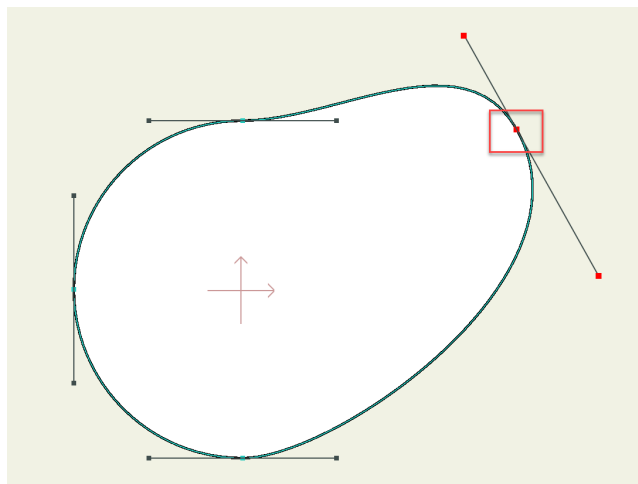
- **Show Bezier Handles:** Displays the Bezier Handles so that you can manipulate them. Note that whenever you move a point in a curve, the Bezier handles automatically adjust to reshape the curve.

- You will need to click the Show Bezier Handles button in order to edit the curves.
- After displaying the handles, use the Transform Points tool to tweak the position of the handles.



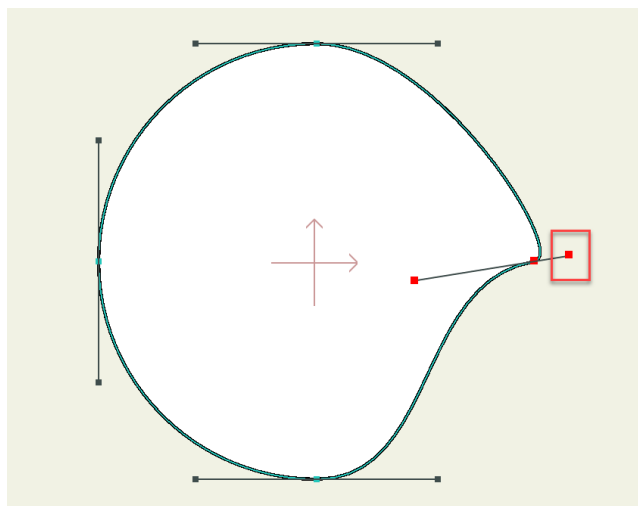
You can also use the Curvature tool to reshape the end handles on the Bezier curve.

- Drag the center point in the handle to reposition the point. The handles at the end of the bezier curve will automatically adjust as necessary to create a smooth curve.



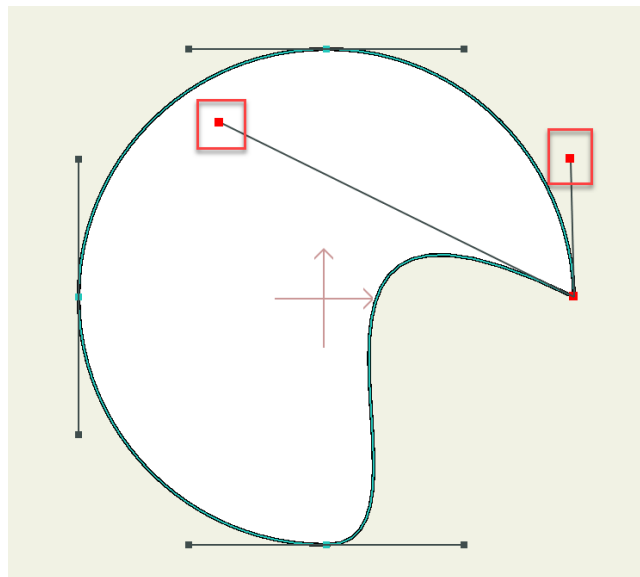
Drag the center point in the handle to reposition the point.

- Drag either end of the handle to reshape the curve directly.



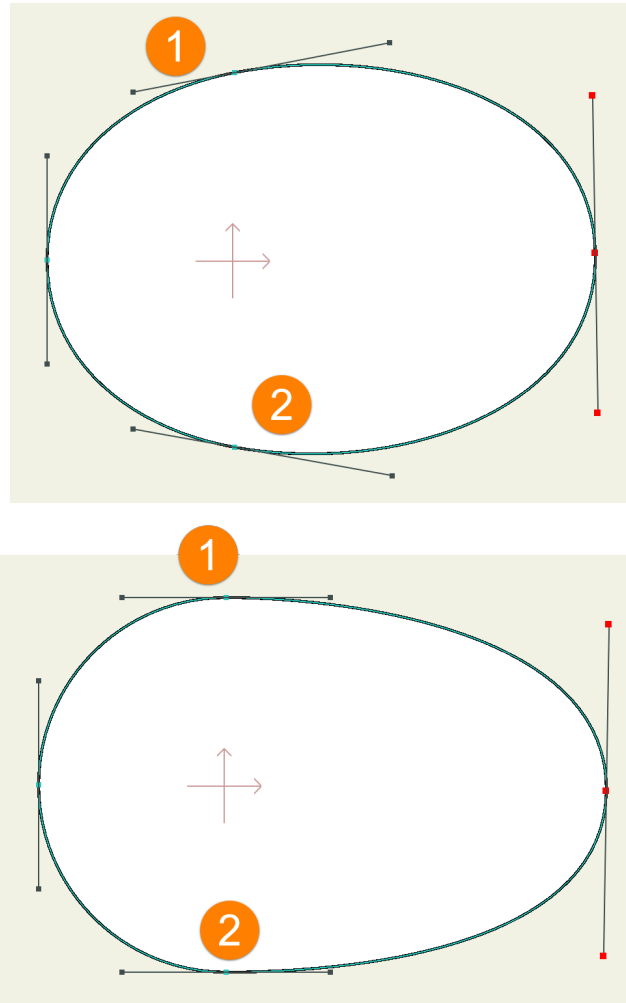
Drag the end point in the handle to reshape the curve.

- Press the **Alt** key while moving one of the bezier handles to create a curve that has a corner point. This allows you to create curves that previously were impossible to create with three points in earlier versions of Anime Studio.



Press the Alt key while dragging to create a sharp point in the curve.

- You can edit the shapes of a Bezier curve on one frame, and then move to a later frame to reshape the curve. Moho will animate those changes over time.
- **Fixed Bezier Handles:**
 - When **Fixed Bezier Handles** is off, Moho will automatically adjust the shapes of the handles when you move a point (in a circle, for example). This in turn changes the shape of the object. This option is generally more desirable if you want to reshape the handles for animation. When you move points with Fixed Bezier Handles off, the shape is more blobby and the handles automatically adjust to maintain the shape of the object.
 - When **Fixed Bezier Handles** is on, the Bezier handles work more like those in Adobe Illustrator. When you move one point, it tries not to move the other points in the shape, to keep their shapes relatively unchanged. It is more difficult to animate curves with Fixed Bezier Handles on, because you can create shapes that appear distorted. If you add points to a curve that has Fixed Bezier Handles on, Moho preserves the shapes of the other curves much better. You can add and transform a point with the Add Point tool to reshape a single segment.



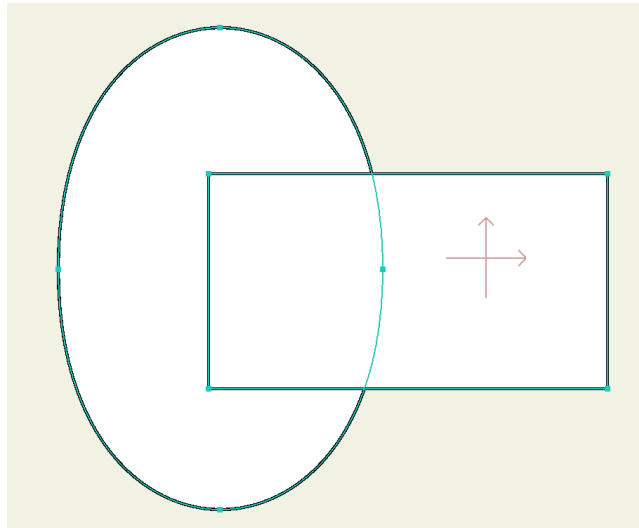
With Fixed Bezier Handles off, curves 1 and 2 adjust to maintain a smooth shape. When on, curves 1 and 2 maintain their shape.

Creating Boolean Shapes

Because Moho 13.5 has introduced improved handling of Bezier curves and handles, a side benefit is that it becomes much easier to create boolean shapes in Moho 13.5. In addition, the Delete Edge tool has also gotten smarter. When you delete an edge, the shapes of the remaining curves are maintained.

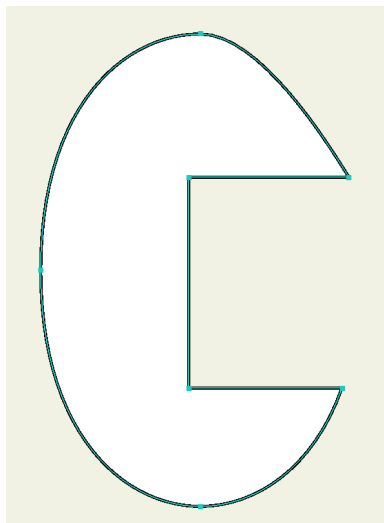
To create boolean shapes in Moho 13.5, proceed as follows:

1. Create two shapes. In this example an oval and a rectangle are created on the same layer.



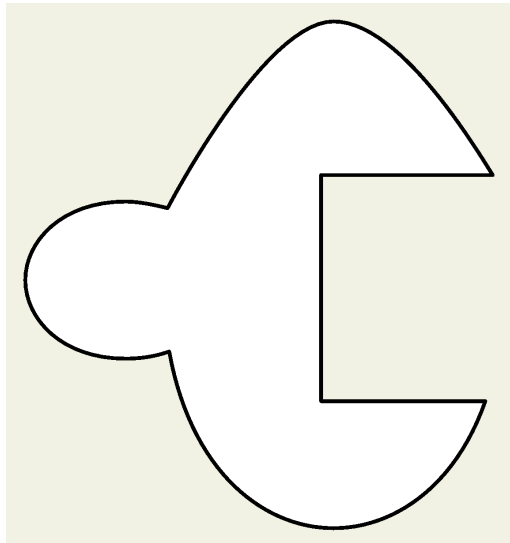
Start with an oval and a rectangle.

2. Select all of the points with the Select Points tool, and click the Weld Crossings button.
3. Now, choose the Delete Edge tool. Trim away the edges that you don't want to keep.



After welding crossings, extra edges are deleted.

4. You can continue to build upon this shape. Add another shape that crosses the previous result, and then repeat steps 2 and 3 to create another boolean of the two current shapes.



Repeat the process to add additional shapes.

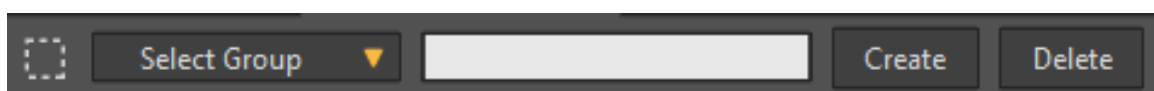
Select Points

Shortcut: G



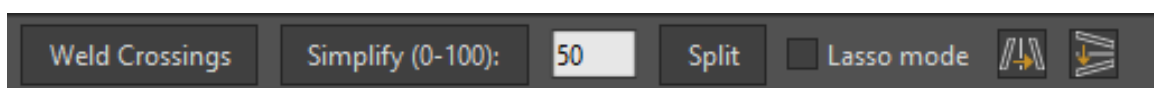
Many of the following tools work only on the currently selected points. This is the tool you use to select/de-select points. This tool can be used in a few different ways.

Select Points Tool Options



Select Points options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Text Field:** Assigns a name to the currently selected group of points.
- **Create:** Creates a group from the selected points.
- **Delete:** Deletes the currently selected group from the selection list.



Select Points options

- **Weld Crossings:** Click the **Weld Crossings** button to weld points or curves together at points where they cross.

- **Simplify:** Click the **Simplify Curve** button to reduce the number of unnecessary points in a curved shape. By default, points are reduced by a factor of 50%. You can change this value in the field provided.
- **Split:** Adds mid-point curve points to selected points. Select two or more points and then click the **Split** button.

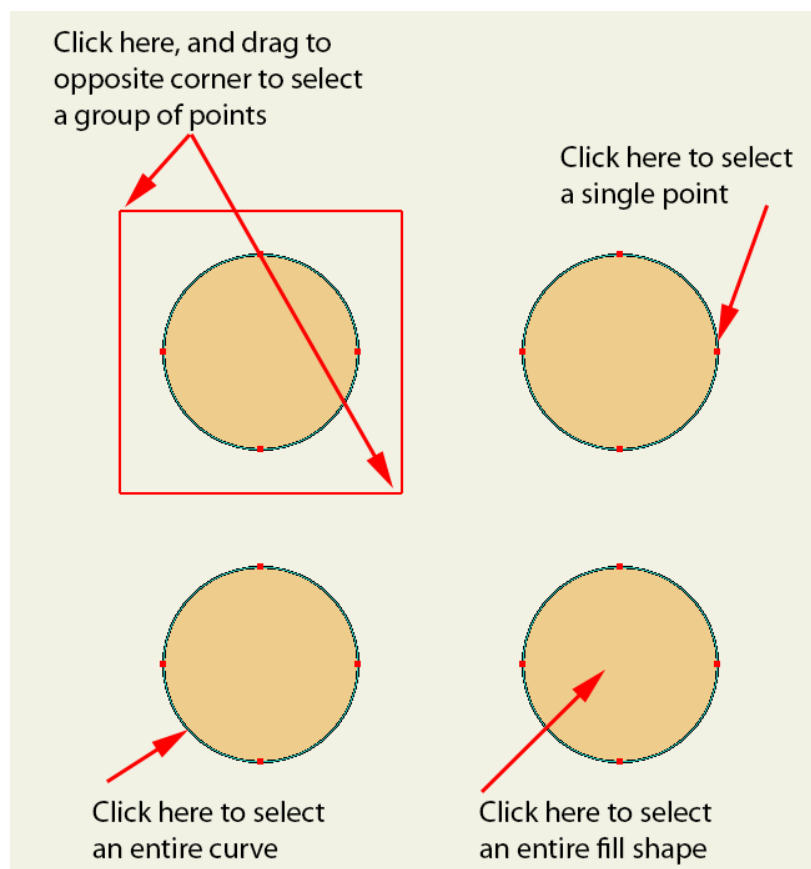


*You can also split curves using the **Scripts > Draw > Split Curve** command.*

- **Lasso Mode:** When checked, allows you to draw a lasso around the points you want to select. When unchecked, selects a rectangular area.
- **Flip Horizontally:** Click this button to flip horizontally.
- **Flip Vertically:** Click this button to flip vertically.

Using the Select Points Tool

The most basic way to select points is to drag a rectangle around them. Also, using this tool you can click on a single point to select it. The third method of selection is to click on a curve to select the entire curve. Finally, clicking on a filled-in area will select an entire object. Each of these selection methods is illustrated below:



Selection methods



Click [this link](#) to view a brief video in your browser that shows the different methods of point selection.

Modifier keys:

- By holding the **Shift** key, you can add to a selection. Otherwise, you will always start a new selection when using this tool.
- Holding the **Alt** key will remove from the selection.
- If you hold down the **Ctrl** key (Windows) or **Cmd** key (Mac), this tool will work in lasso style. (You can also activate lasso style selection by turning on **Lasso mode** in the tool options area.)

The selection commands in the Edit menu are also very useful for managing selections. These are described in "[Chapter 19: Edit Menu](#)" on page 427.

The currently selected points may be deleted by pressing the **Delete** or **Backspace** keys.

Transform Points

Shortcut: T

Animatable: Yes

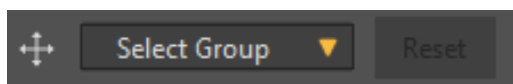


The Transform Points tool is used to move, scale, or rotate a group of selected points. It operates only on the currently selected points, unless fewer than two points are selected - then it operates on the nearest point to where you clicked.

It's important to note that this tool, like most of the Moho drawing tools, modifies points, not curves. If you select all the points in an object and use this tool, the entire object will move, scale, or rotate. However, if you only select some of the points, then you'll end up distorting the object (which can be very useful).

General Options

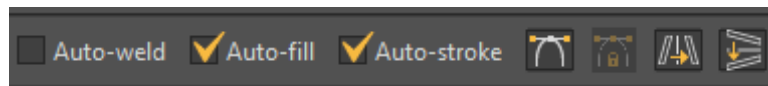
The following options appear in the left portion of the options toolbar when the Transform Points tool is selected:





Transform Tool general options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

The following options appear in the right portion of the options toolbar when the Transform Points tool is selected:

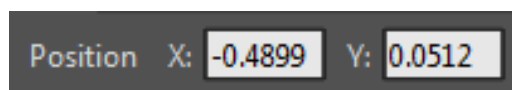


Transform Tool general options

- **Auto Weld:** When checked, automatically welds a new point to an existing point. The existing point is highlighted when the mouse hovers over a point that can be welded.
- **Auto Fill:** When checked, automatically fills a closed shape when you create it.
- **Auto Stroke:** When checked, automatically creates a stroke around the shape that you create. Uncheck this option to create a shape that has no outline.
-  **Show Bezier Handles:** Displays the Bezier Handles so that you can manipulate them. Note that whenever you move a point in a curve, the Bezier handles automatically adjust to reshape the curve.
-  **Fixed Bezier Handles:** When you move a point (in a circle, for example), Moho automatically adjust the shape of the handles, which in turn changes the shape of the object. When you check the Fixed Handles option, the Bezier handles work more like those in Adobe Illustrator. When you move one point, it tries not to move the other points in the shape.
- **Flip Horizontally:** Click this button to flip horizontally.
- **Flip Vertically:** Click this button to flip vertically.

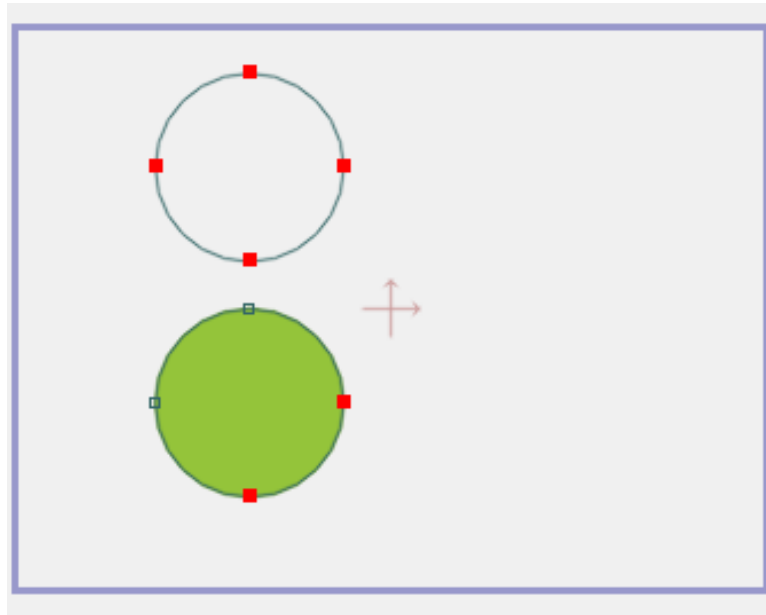
Translating Points

The following toolbar options are associated with translating points:

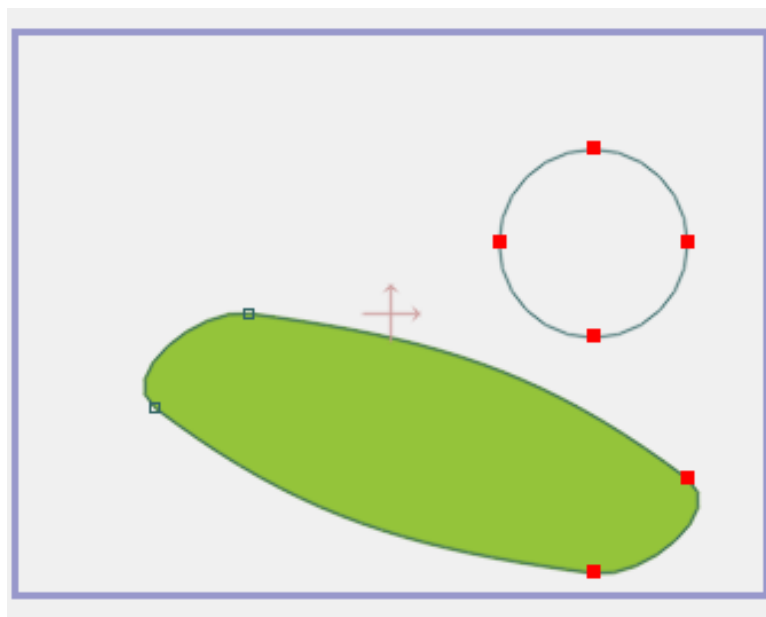


Transform Points options for translating

- **Position X:** Allows you to numerically enter a value for the X coordinate.
 - **Position Y:** Allows you to numerically enter a value for the Y coordinate.
- In the pictures below, the selected points are highlighted in red. Notice the effect of using the Transform Points tool on these points.
- **To constrain vertically or horizontally:** Hold the Shift key while dragging the selected points left, right, up, or down.
 - **To nudge:** You can nudge the selected point(s) by small increments by holding down the **Ctrl** key (Windows) or **Cmd** key (Mac) and pressing the arrow keys. Hold down **Shift** in addition to **Ctrl/Cmd** to nudge the point(s) by a greater increment.



Top circle fully selected. Bottom circle partially selected



After translation

- **To weld points:** The steps differ depending on whether the Auto Weld option in the toolbar is enabled or disabled:
 - **When Auto Weld is off:** To weld two points together, use the Transform Points tool to drag one point on top of another (you must drag just one point to weld, not a group of points). While dragging the first point on top of the second, press the Enter key to weld them together into one point.

 Previous versions of Anime Studio used the Spacebar to manually weld points. If you prefer to use legacy shortcuts, open the Preferences dialog to the Tools tab and check the **Classic point editing keyboard shortcuts** option. This option is off by default in Moho.

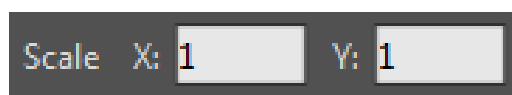
- **When Auto Weld is on:** Moho can automatically weld points for you. Only the endpoint of a curve can be automatically welded. To automatically weld the endpoint of a curve, just drag it on top of another point and let go of the mouse. Below is a movie demonstrating auto-welding. After dragging each endpoint into place, it becomes welded to the existing point, and the two can be moved around.

 Click [this link](#) to view a brief video in your browser that shows examples of using transform points and auto-weld.

Scaling Points

The Transform Points tool also allows you to scale the currently selected group of points. Two or more points must be selected.

The following toolbar options are associated with scaling points:



Transform Points options for scaling

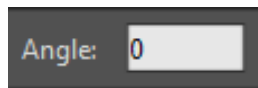
- **Scale X:** Allows you to enter a numeric value for scaling along the X axis.
- **Scale Y:** Allows you to enter a numeric value for scaling along the Y axis.

When this tool is active, a red box will appear around the currently selected group of points. The handles around the edges of this box allow you to resize the points.

- Drag a corner handle in and out to scale the points while maintaining their proportions. Scaling will be relative to the opposite corner. Press the Shift key while dragging a corner to perform a non-proportional scale.
- Drag one of the side handles to change the horizontal scale, or the top or bottom handle to change the vertical scale.
- If you hold the **Shift+Alt** keys while dragging a side handle, Moho will resize the selected points in such a way to maintain the overall volume of the object - this can be useful for squash and stretch.

Rotating Points

The Transform Points tool can also rotate the currently selected group of points. Two or more points must be selected to use this tool. The following toolbar options are associated with rotating the selected points:




Transform Points options for rotating.

- **Angle:** Allows you to enter a numerical value for rotation.

Click near the outer boundary of the selected group of points. Next, drag the mouse in a circle around the selection to rotate the points. Holding the **Shift** key while using the Transform Points tool will constrain the rotation to 45 degree increments.

Bezier Handle Options

-  **Show Bezier Handles:** Displays the Bezier Handles so that you can manipulate them. Note that whenever you move a point in a curve, the Bezier handles automatically adjust to reshape the curve.



You can use the Transform Points tool to drag one of the handles to reshape the curve.




Hold down the Alt key to drag one of the Bezier handles to make a corner sharper or smoother.



You can return the Bezier handles to their original shape by applying the Smooth command.



The Curvature tool also allows you to click and drag the end handles to adjust the curve shape.

-  **Fixed Bezier Handles:** When you move a point (in a circle, for example), Moho automatically adjust the shape of the handles, which in turn changes the shape of the object. When you check the Fixed Handles option, the Bezier handles work more like those in Adobe Illustrator. When you move one point, it tries not to move the other points in the shape.

Add Point

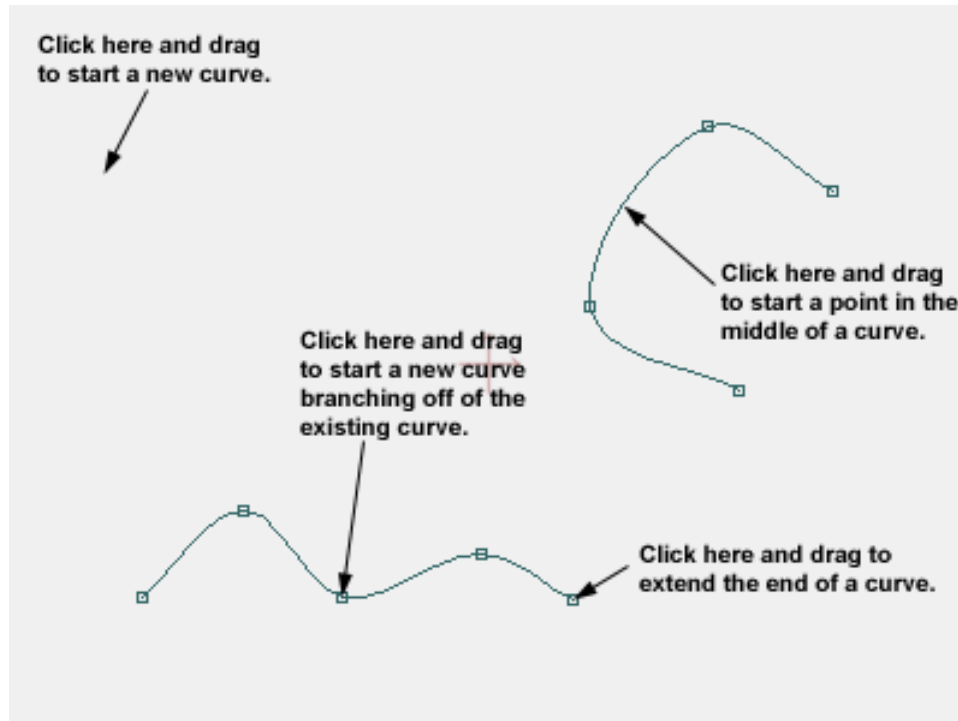
Shortcut: A



The Add Point tool is what you use to draw most curves in Moho. Just click and drag in the working area of the main window to create a new curve segment. There are four variations to using the Add Point tool - they differ in where the original click takes place.

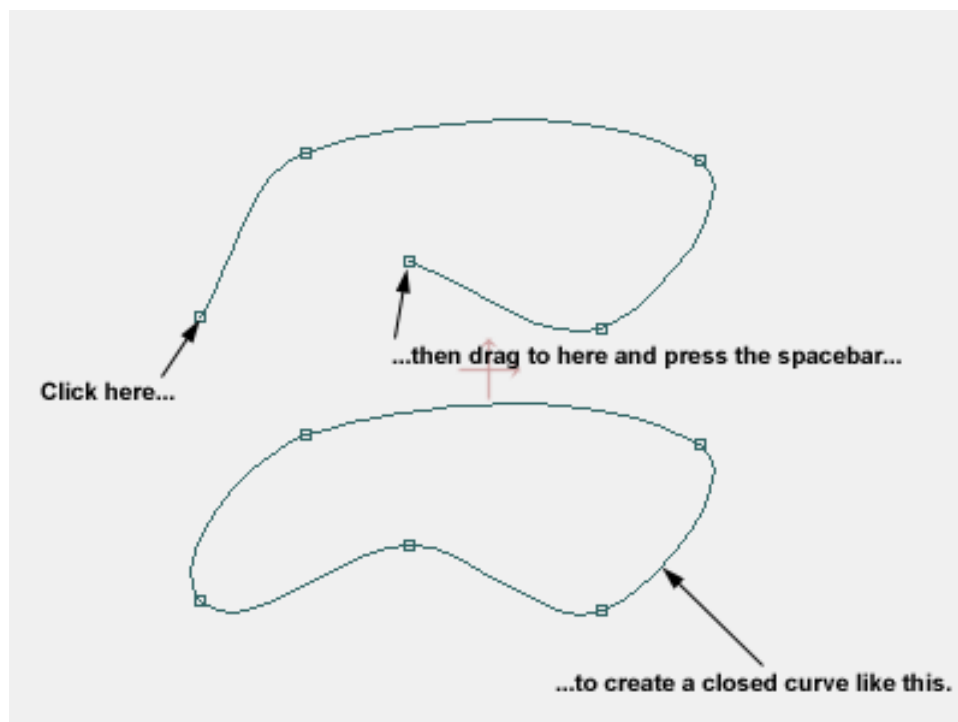
- The first way to use this tool is to click in empty space and drag - this will start a new curve.
- The second technique is to click on the end of an existing curve to add another segment to that curve.

- Third, click on a curve segment to add a point there, then drag it to the final desired position.
- Finally, click on a curve midpoint to add a new branching curve that is welded to the existing point. Each of these uses of the Add Point tool is shown below.



Uses of the Add Point tool

The Add Point tool can also be used to weld two points. Click and drag in one of the ways described above to add a new point. Drag the new point on top of an existing point. If Auto Weld is enabled the new point will weld to the existing point. If Auto Weld is off, press the Enter key before releasing the mouse. An example is shown below. (This works just like the Transform Points tool, above. Read about that tool for more details on welding.)



Closing a curve

To prevent the Add Point tool from adding on to an existing curve regardless of where you click, hold the **Alt** key to force the tool to start a new line segment.

The movie below demonstrates the Add Point tool. Notice how clicking on different parts of an existing curve causes the new point to be added in different ways.





Click [this link](#) to view a brief video in your browser that shows examples of using the Add Point tool.


Add Point Tool Options



Add Point Options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Auto Weld:** When checked, automatically welds a new point to an existing point. The existing point is highlighted when the mouse hovers over a point that can be welded.
- **Auto Fill:** When checked, automatically fills a closed shape when you create it.
- **Auto Stroke:** When checked, automatically creates a stroke around the shape that you create. Uncheck this option to create a shape that has no outline.


- **Sharp corners:** When checked, creates sharp corners when changing the angle of a line. When unchecked, creates smooth transitions when changing the angle
-  **Show Bezier Handles:** Displays the Bezier Handles so that you can manipulate them. Note that whenever you move a point in a curve, the Bezier handles automatically adjust to reshape the curve.
-  **Fixed Bezier Handles:** When you move a point (in a circle, for example), Moho automatically adjust the shape of the handles, which in turn changes the shape of the object. When you check the Fixed Handles option, the Bezier handles work more like those in Adobe Illustrator. When you move one point, it tries not to move the other points in the shape.

 *If you hold down the Command key (Mac) or Ctrl key (Windows) while you add a new point, it will reverse the Sharp Corners option that you have selected in the Options toolbar. This allows you to change between peaked and smoothed points without interrupting your workflow.*

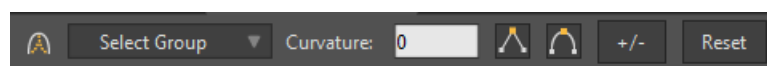
Curvature

Shortcut: C



Animatable: Yes

 This tool works on the currently selected points, or on the nearest point if less than two points are selected. It adjusts the level of smoothness of the curves passing through the selected points. Drag to the left to make the curves less smooth, and drag to the right to make the curves rounder.

Curvature Tool Options



Curvature Options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Curvature:** Enter a positive or negative value for the amount of curvature that you want to apply to the selected curves.
-  **Peak:** Creates a peaked (or hard) transition between the curves at the point that you click.
-  **Smooth:** Smooths the transition between the curves at the point that you click.
- **+/-:** Click this button to toggle the value in the Curvature field between negative and positive values.
- **Reset:** Returns the Bezier handles and associated curves to their default shape.

Freehand

Shortcut: F



The Freehand tool lets you draw complex shapes by just dragging the mouse around. Moho will attempt to simplify the curves that you draw with the Freehand tool, by removing unnecessary points. Straight lines will be preserved as accurately as possible.

While drawing with the Freehand tool, you can use the Trim Start and Trim End options to automatically delete unwanted dangling edges from the beginning or end of a line that crosses another line.



After using the Freehand tool, you can also go back and use the Delete Edge tool to delete unwanted lines. For more information about the Delete Edge tool, see "Delete Edge" on page 53.



You can also use the Transform Points tool to modify the result, delete unnecessary points, and weld points together.

If you have a drawing tablet, the Freehand tool can also use the pen pressure from your tablet to control the thickness of the lines you draw.



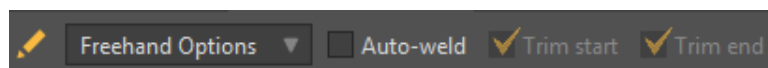
Press the Alt key while dragging the Freehand tool to resize the brush.

When using the Freehand tool, you don't have to draw shapes precisely. If you cross a line, the new line automatically welds to the line that is crossed if the Auto Weld option is selected. This allows you to quickly sketch out shapes without worrying about stopping your stroke at precise locations. When you're using the Freehand tool, you are primarily interested in seeing an accurate display of what you are drawing. For this reason, control points are automatically hidden when Freehand tool is selected so that you can focus on your drawing. You'll also see a more accurate preview of the strokes that you draw, especially when drawing wider strokes. When you release the mouse, you'll notice the strokes change slightly due to automatic smoothing.





To display the control points, select one of the other tools, such as the Transform Points tool.

Freehand Tool Options



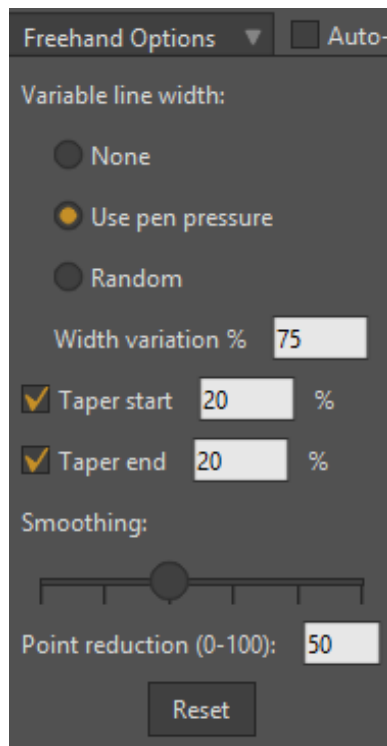
Freehand Options (part 1)

 The Freehand tool has been improved to give much smoother looking curves. As you draw with the Freehand tool it looks like you are creating a lot of points, but as you let go it only keeps the points that are necessary to represent the curve smoothly.

 You don't have to be concerned with ending a line exactly on a point, or using the Transform Points tool to weld points together. Instead, sketch as you normally would sketch with a pencil. Any lines that cross will automatically weld together, easily allowing you to create closed shapes. You can then use the Delete Edge tool to delete the unwanted straggling ends that cross the lines you want to weld. This allows you to create closed shapes quite easily that you can fill later.

Click the Freehand Options button in the Options toolbar to display the Freehand Tool options dialog. The options are as follows:

- **Freehand Options:** Click this button to display the following options



Freehand options

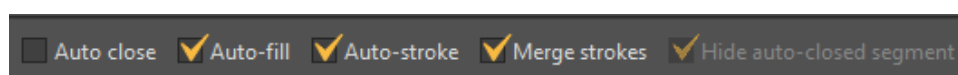
- **Variable line width:** When set to **None**, does not vary line width between the start and end of the line. **Use Pen Pressure** varies line width based on pen pressure when using a pen tablet. **Random** varies line width randomly when using a mouse.
- **Width Variation:** Controls the amount of difference between the narrowest part of the stroke and the widest part of the stroke.
- **Taper Start:** When checked, tapers the start of the line. Enter the starting width of the line in the field provided.

- **Taper End:** When checked, tapers the end of the line. Enter the ending width of the line in the field provided.



Tapering is applied live, not just on mouse-up.

- **Smoothing:** Use the Smoothing slider to increase or decrease the amount of smoothing that is applied to the curve. The default setting of 2 corresponds to the amount of smoothing used in Anime Studio 10. Decrease the setting to apply less smoothing, making the shape closer to the way it was originally drawn. Increase the setting to apply more smoothing. You will see some effects of the smoothing algorithm in real time while you draw.
- **Point Reduction:** Allows you to enter a percentage value for point reduction. By default, points will be reduced by a factor of 50 percent.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.
- **Auto Weld:** When checked, automatically welds a new point to an existing point. The existing point is highlighted when the mouse hovers over a point that can be welded. When you draw two lines that cross, the point at which they cross will automatically be welded together when this option is on.
- **Trim Start:** When checked, dangling edges that are drawn before the stroke crosses another stroke will automatically be removed when you complete the stroke.
- **Trim End:** When checked, dangling edges that appear at the end of a stroke that crosses another stroke will automatically be removed when you complete the stroke.



Freehand Options (part 2)

- **Auto close:** When unchecked, closes a shape when the cursor is released over the beginning of the shape. When checked, connects the shape from the current position to the start point when you release the mouse button.
- **Auto Fill:** When checked, automatically fills a closed shape when you create it.
- **Auto-stroke:** When checked, automatically creates a stroke around the shape that you create. Uncheck this option to create a shape that has no outline.
- **Merge Strokes:** Check this option to merge strokes made with the same brush, color, and stroke width into a single shape. All strokes that are made while the option is checked will be placed in a single object. Uncheck the option when your sketching is complete.
- **Hide auto-closed segment:** When checked (default), the segment that automatically closes the curve in a Freehand shape is hidden.

Draw Shape

Shortcut: E



The Draw Shape Tool provides a way to quickly draw commonly used shapes: squares, ovals/circles, triangles, stars, arrows, and spirals. Each of the shape options are shown later in this section.

Draw Shape Tool Options



Draw Shape Options

- **Auto Fill:** When checked, automatically fills a closed shape when you create it.
- **Auto-stroke:** When checked, automatically creates a stroke around the shape that you create. Uncheck this option to create a shape that has no outline.

Rectangle



The Rectangle tool is a shortcut for creating a rectangular shape. Just click and drag to draw a rectangle. Hold the **Shift** key to constrain the shape to a square. Hold the **Alt** key to make the click point the center of the rectangle, instead of one of its corners. There's nothing special about rectangles created with this tool - they're just four points and four curve segments and can be manipulated just like anything else. You could create the same shape with the Add Point tool, but for a simple rectangle, this tool is quicker.

Oval



The Oval tool is a shortcut for creating an oval shape. Just click and drag to draw an oval. Hold the **Shift** key to constrain the shape to a circle. Hold the **Alt** key to make the click point the center of the circle. There's nothing special about ovals created with this tool - they're just four points and four curve segments and can be manipulated just like anything else. You could create the same shape with the Add Point tool, but for a simple oval, this tool is quicker.

Triangles



The Triangle tool is a shortcut for creating a triangle shape. Just click and drag to draw a triangle. Hold the **Shift** key to constrain the shape to an equilateral triangle.

Stars



The Stars tool is a shortcut for creating a star shape. Just click and drag to draw a star. The star will be drawn from the upper point of the star, and all five points of the star will be equal in size.

Arrow



Click and drag to draw an arrow shape. Press the **Shift** key to constrain the arrow to a horizontal or vertical line.

Spirals



Click and drag to draw a spiral shape. The number of windings increase as you drag outward. By default the spiral radiates in a clockwise direction from the center. Press the **Alt** key to create a counter-clockwise spiral.

Grid

The Grid option allows you to easily draw grids, with defined horizontal and vertical segments. Enter the number of **Horizontal** and **Vertical** divisions in the grid in the fields provided. This will be useful in Moho Pro as the first step in setting up a Smart Warp layer.



Grids are useful in Moho Pro as the first step in setting up a Smart Warp layer. For more information about the Smart Warp feature, see

Delete Edge

Shortcut: D



It's easy to delete points - just select them and press backspace or delete. However, sometimes you may want keep two points, but break the curve connecting them. To do this, use the Delete Edge tool. Just use it to click on the curve segment you want to delete and it will disappear.

You can use the Delete Edge tool to delete unwanted lines. For example, you can use the Freehand tool to quickly sketch out shapes, and the Freehand tool will automatically weld crossed lines together as you draw. You can then later clean up the shapes by deleting unwanted hanging lines with the Delete Edge tool.



If the edge you delete makes up part of the outline of a fill shape, that shape will also be deleted.



The Delete Edge tool is also useful when used in conjunction with the Freehand tool. Due to the improved welding capabilities of the Freehand tool, you can freely sketch a character without having to worry about exact placement of lines. Any lines that cross will be welded together. You can then use the Delete Edge tool to remove unwanted straggling ends, simply by clicking on them with the Delete Edge tool.

Magnet (Pro Only)

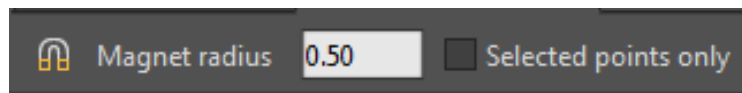
Shortcut: X

Animatable: Yes



The Magnet tool is similar to the Transform Points tool - it is used to move points around. However, instead of moving the selected points, it moves points based on the strength of the magnet. When you click with this tool, the region of strength is displayed. Any points within this region will move with your mouse, but the points closer to the center of the mouse click will move the most. (The radius of the magnet's strength region can be adjusted in the tool options area.)

This tool is most useful for artwork that has lots of points. For example, the Freehand tool can create curves with many points - the Magnet tool can then move them around smoothly. Imported Adobe Illustrator files and text objects can also be sources of many control points.



Magnet Options

Magnet Tool Options

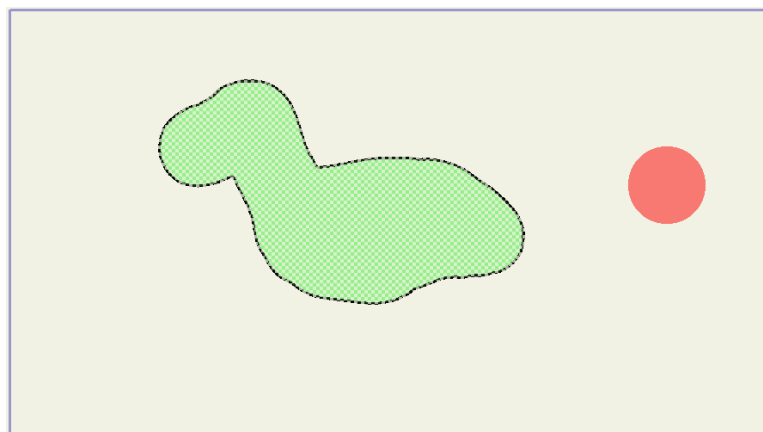
- **Magnet Radius:** Sets the radius of the magnet.
- **Selected Points Only:** When unchecked, the Magnet Tool will select and move points that are initially clicked with the Magnet tool. When checked, the Magnet will only affect points that are preselected.

Blob Brush



The Blob Brush tool allows you to block shapes out very quickly. Straight lines are preserved as accurately as possible, and quality of shapes are preserved as accurately as possible over multiple strokes.

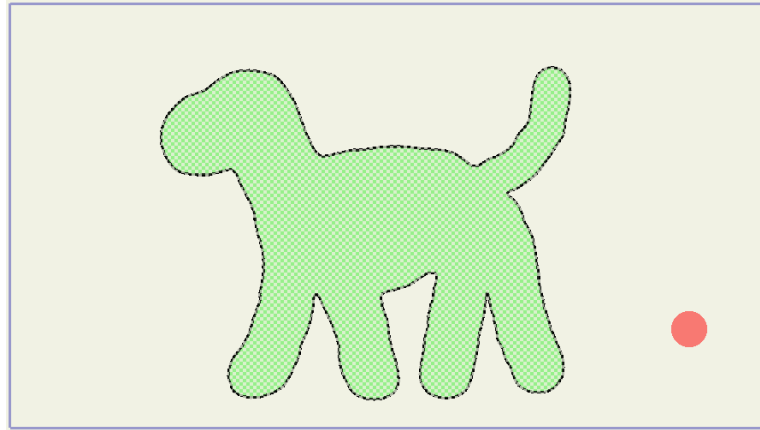
For example, you can start by blocking in part of the character as shown below.



The first pass of the Blob Brush Tool

You can add additional strokes to refine or add to the shape. In the following example, additional strokes with different brush sizes add legs and arms to the previous shape.

If you change fill color, line color, line width, or other brush settings while you have the Blob brush selected, the currently selected shape will get deselected. The next stroke you add with the Blob brush will use the new properties.




Additional passes of the Blob Brush Tool add to the previous shape.

You'll get an accurate preview of the shape as you draw. When you release the mouse, a vector outline will be generated for the shape. Moho will attempt to simplify the curves by removing unnecessary points. When you choose this tool, a red circle gives you a preview of the brush size.

The following keyboard shortcuts can be used with the Blob Brush tool:

- You can adjust the size of the brush by using the Brush Radius setting in the tool options area, or by pressing the **Alt** key and dragging to resize the brush.
- If you hold down the **Command/Ctrl** key you can erase from the shape, or use the Eraser tool. See "Eraser" on page 56 for more information.

 *The brush tool can create a lot of extra points. You can use the new Point Reduction Tool to reduce the number of points. See "Point Reduction" on page 58 for more information.*

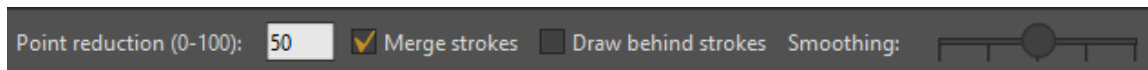
 *You might notice the viewport jump at times when using the Blob Brush tool. This happens when you extend your drawing outside the boundary of the work area. The viewport resizes to bring that additional area into view to ensure that the object that you drew will fit on the screen.*

Blob Brush Tool Options



Brush Options (part 1)

- **Brush Radius:** Sets the radius of the brush. A red circle gives you a preview of the brush size. You can also adjust the radius by pressing the **Alt** key and moving your mouse left or right.
- **Use Pen Pressure:** Check this option if you are using the brush with a pressure-sensitive stylus and tablet.
- **Auto Stroke:** Check this option to automatically create strokes around the shapes that you create with the Blob brush.



Brush Options (part 2)

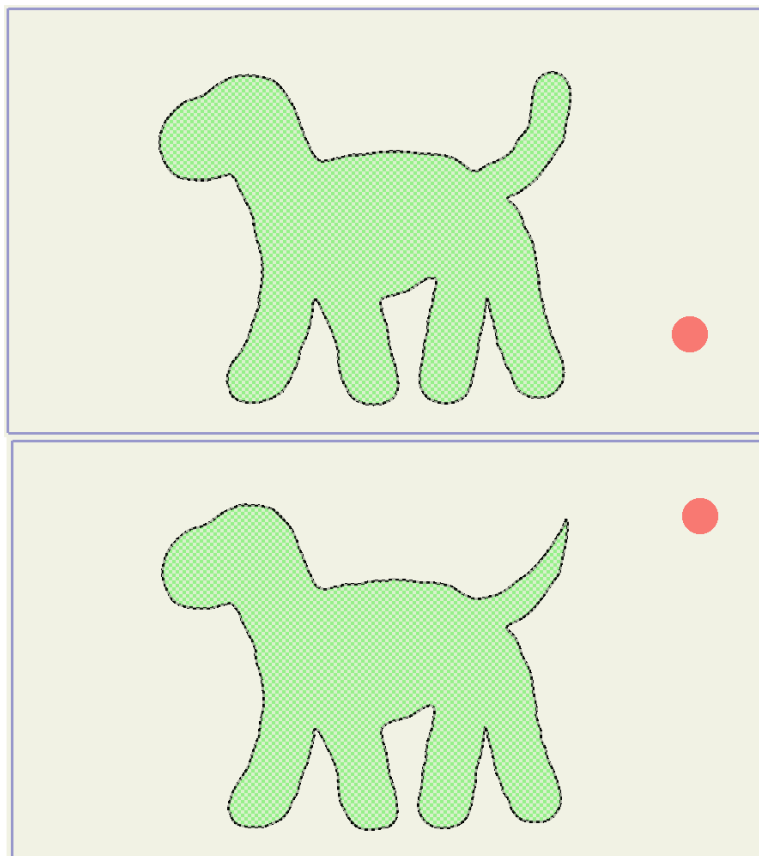
- **Point Reduction:** Check this option to remove unnecessary points in the shapes that you draw while the option is checked. By default, points will be reduced by a factor of 50%. You can enter a different value in the Point Reduction field.
- **Draw Behind Strokes:** When this option is checked, the Blob brush will be allowed to draw behind existing stroke shapes. This is useful for frame-by-frame drawing.
- **Merge Strokes:** When checked, merges all strokes made with the Blob brush into a single object. Uncheck this option to create separate objects with each stroke.
- **Smoothing:** Use the Smoothing slider to increase or decrease the amount of smoothing that is applied to the curve. Decrease the setting to apply less smoothing, making the shape closer to the way it was originally drawn. Increase the setting to apply more smoothing. You will see some effects of the smoothing algorithm in real time while you draw.

Eraser




The Eraser tool allows you to cut holes in any shape. If no filled shapes are selected, the first filled shape that you click on will become selected, and you can begin erasing immediately. You can also hold the Ctrl/Cmd key to go into selection mode and manually select the shapes you want to work with. Press the Shift key to select multiple shapes.

In the following example, the Eraser Tool is used to modify the shape of an animal's tail.

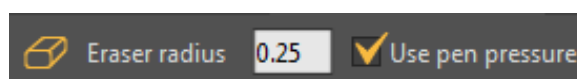


The Eraser Tool is used to modify the shape of an animal's tail. Before (top) and after (bottom)

 You might notice the viewport jump at times when using the Eraser tool. This happens when you extend your drawing outside the boundary of the work area. The viewport resizes to bring that additional area into view to ensure that the object that you drew will fit on the screen.

Eraser Tool Options

- **Eraser Radius:** Sets the radius of the eraser. You can also adjust the radius of the brush by pressing the **Alt** key and moving your mouse left or right.
- **Use Pen Pressure:** Check this option if you are using the eraser with a pressure-sensitive stylus and tablet.



Eraser Options

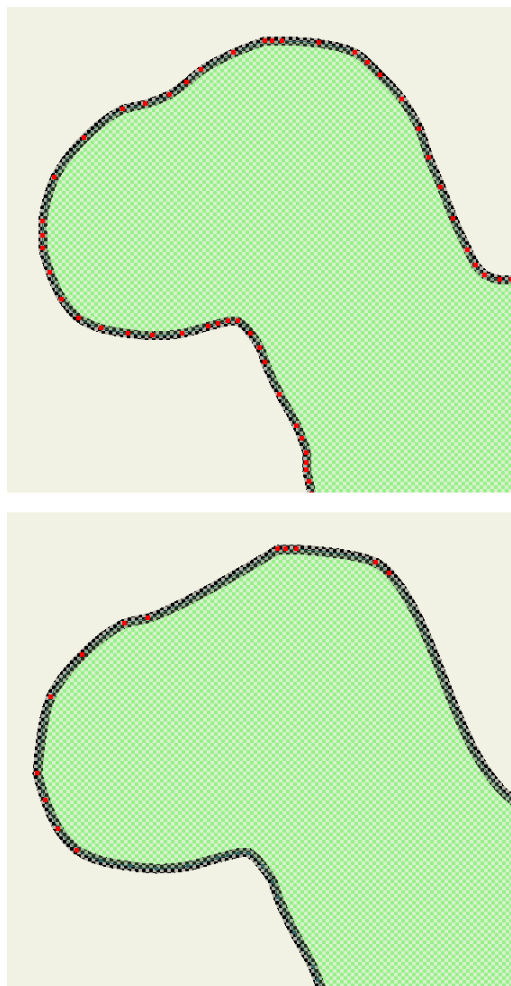
Point Reduction



The Blob Brush, Eraser, and Paint Bucket tools can generate a lot of extra and unnecessary points. The Point Reduction tool helps you reduce the point count in any vector object so that the shapes are easier to animate.

When the Point Reduction tool is selected, the red circle gives you a preview of the brush size. You can set the radius in the options toolbar, or press the **Alt** key while dragging to resize the brush.

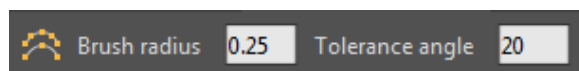
To use the tool, simply paint along the area where you want to reduce the number of points. As you paint, the brush will leave a trail behind where you have painted. The areas that you paint over will be simplified.



Before (top) and after (bottom) Point Reduction

Point Reduction Tool Options

- **Brush Radius:** Sets the radius of the brush.
- **Tolerance Angle:** If you want to reduce the number of points but not change the shape so much, reduce the tolerance angle. Lowering the tolerance angle will not remove as many points, but it will keep the shape closer to what you originally drew.



Point Reduction Options

Scatter Brush



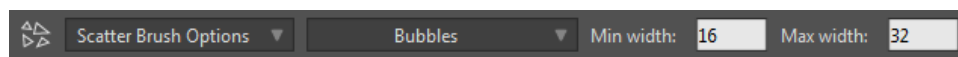
The Scatter Brush allows you to spray shapes into your scene. There are a number of preset shapes, or you can also copy any shape to your clipboard and spray multiple copies of that shape into your scene. The Scatter Brush also scatters animated sample objects with animated point position, curvature and line widths. The animations in scattered objects is automatically cycled.

To use the Scatter Brush tool, try the following:

Copy a vector object into your clipboard, or select one of the preset options from the Preset menu.

1. Choose the vector layer that you want to paint into.
2. Set the Min and Max Width settings appropriately for the scale of the objects.
3. Set other options in the Scatter Brush Options panel if you want to increase or decrease variation in the angle, spacing, or color of the objects you are spraying.

Scatter Brush Tool Options



Scatter Brush Options

- **Scatter Brush Options:** Click this button to display the following options
 - **Angle Jitter:** Specifies the maximum amount of angle variation in the objects that you spray.
 - **Spacing:** Specifies the minimum amount of space between the objects that you spray.
 - **Fill Color Jitter:** Specifies the maximum amount of color variation for the objects that you spray.
 - **Stroke Color Jitter:** Specifies the maximum amount of color variation for the objects that you spray.
 - **Flip X:** Check this option to flip the objects being sprayed along the X axis.
 - **Flip Y:** Check this option to flip the objects being sprayed along the Y axis.
- **Preset Menu:** Click the Preset menu to choose from a number of different presets that you can spray into your scene. If you choose **Use Clipboard**, the Scatter Brush tool sprays the contents of your clipboard into the scene.

- **Min Width** and **Max Width**: Sets the minimum and maximum width of the objects that you spray. If you want all of the objects to be the same size, set both values the same. Higher values create larger objects.

Perspective Points (Pro Only)

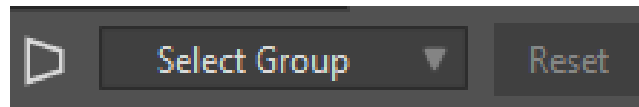
Animatable: Yes



Click and drag side-to-side to add horizontal perspective to the selected group of points. Click and drag up and down to add vertical perspective to the selected group of points.

Although Moho is not a 3D program, the effect of this tool is similar to rotating the points around a vertical pivot, so that one half of the group rotates into the screen and the other half out of the screen. If you want to do a true 3D rotation, you should use the Rotate Layer Y tool to apply true 3D perspective to a layer.

Perspective Points Tool Options



Perspective Points Options

- **Select Group**: Used to select a group that was previously created with the Select Points tool.
- **Reset**: If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

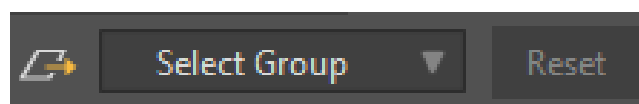
Shear Points (Pro Only)

Animatable: Yes



This tool works on a group of two or more selected points. Click and drag left, right, up, or down to shear, or slant the group of points.

Shear Points Tool Options



Shear Points Options

- **Select Group**: Used to select a group that was previously created with the Select Points tool.
- **Reset**: If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

Bend Points (Pro Only)

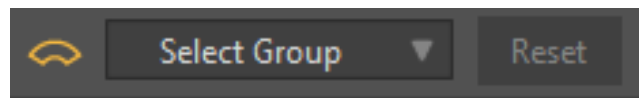
Animatable: Yes



To use the Bend Points tool, drag your mouse up and down to bend the selected group of points up and down. For best results, the selected group of points should be wider than it is tall.

Drag your mouse side to side to bend the selected group of points side to side. For best results, the selected group of points should be taller than it is wide.

Tool Options



Bend Points Options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0:

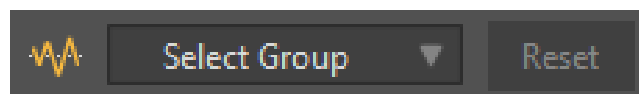
Noise (Pro Only)

Shortcut: N



The Noise tool works on a group of selected points. Click and drag to move the points around in random directions. This tool can be used for example when you want to duplicate an object using Copy and Paste, but you don't want the new object to look exactly like the original. Just use this tool to distort it a little bit.

Tool Options



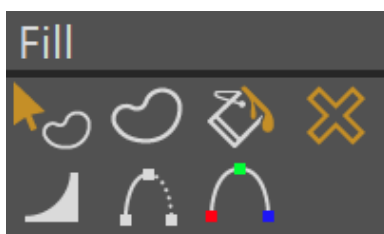
Noise Options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

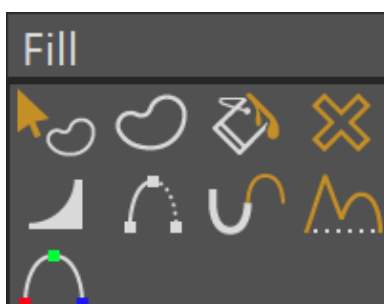
Chapter 4: Fill Tools

Using the Fill tools for vector layers, you take the drawings you created with the Draw tools, and you tell Moho which areas should be filled with color, where outlines should be placed, and what fill and line styles to use.

The drawings created with Draw tools are only guides. As far as Moho is concerned, they're invisible and they won't show up in the final rendered output. That's where Fill tools come in. Draw tools define the **shape** of objects, while Fill tools define the **appearance** of those objects. Of course, you're always free to switch back and forth between any of Moho's editing tools at any time.



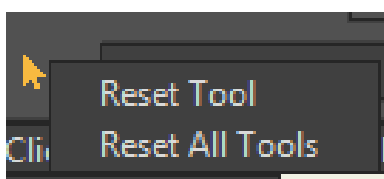
Fill Tools (Debut)



Fill Tools (Pro)

 Moho has a smart tool palette, which shows and hides tools based on their need. The position of the tool shown in the screenshots may differ, depending on the selected layer in the Layers Window, and the current time in the timeline.

 Click the tool icon in the properties bar to display a submenu. Choose **Reset Tool** to reset the current tool to its default settings. Choose **Reset All Tools** to reset all tools to their default settings.



Reset tool options.

Select Shape

Shortcut: Q



This tool is used to select one or more existing shapes (fills or outlines).

To select a shape, just click on the desired shape and it will be selected.

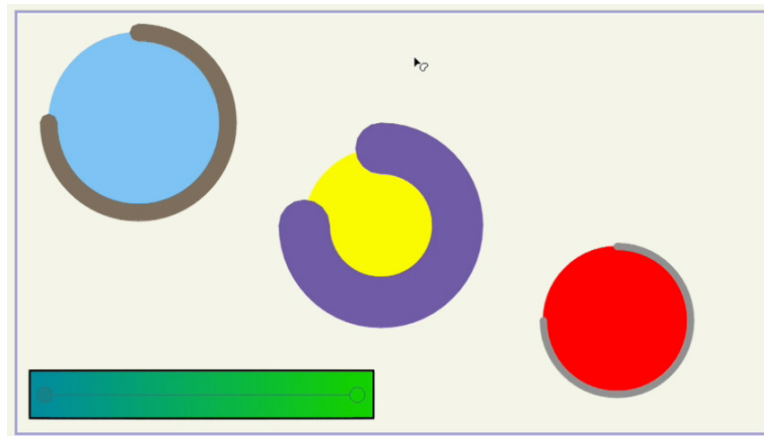
- **To select additional shapes**, press the **Shift** key while you click and drag the mouse over each additional shape to add to the selection.
- **To deselect a shape**, press the **Alt** key while you click the shape(s) you want to remove from the selection.

After your shape or shapes are selected, you can press the **Delete** or **Backspace** keys to delete the shapes, or adjust their properties in the Style Window (see ["Chapter 13: Style Window" on page 256](#)). Options also appear in the properties bar to change the color of the fill or stroke in the selected shapes.

After clicking on a shape to select it, you then have the option to select shapes lower in the stacking order. Just hold down the **Ctrl** key (Windows) or **Cmd** key (Mac) and press the down arrow key to select the next shape lower down at the point you clicked the mouse. Hold **Ctrl/Cmd** and press the up arrow key to select the next shape higher in the stacking order at that same point.

When you change the properties of multiple selected shapes, the changes that you make will be applied to all selected shapes. For example, you can select shapes that have different color fills, and then change the fill color in the style window so that all of the shapes are filled with the same color.

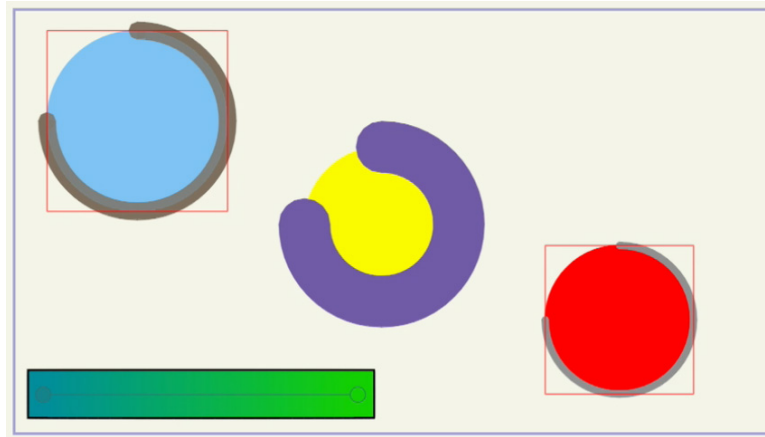
To illustrate, the following figure shows four different shapes, each with different fill and stroke properties.



Four different layers, each with objects that have different shape properties.

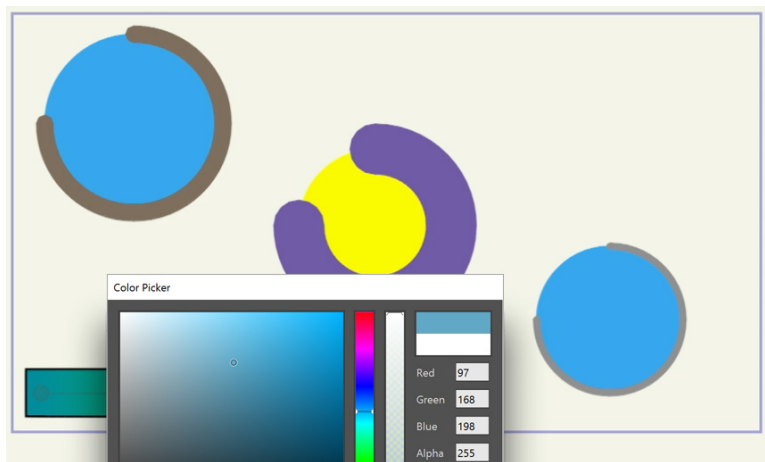
If you click on one of the shapes with the Select Shape tool, the Style window updates to display the fill and stroke properties of the shape that you clicked (color, stroke width, brush settings and effects, and so on).

If you hold down the **Shift** key while using the Select Shape tool, you can select multiple shapes. Pressing the **Alt** key will remove a shape from the selection.



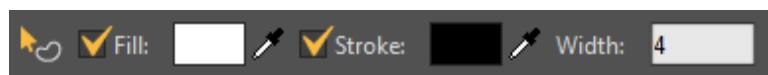
Multiple shapes selected with the Select Shape tool.

The properties of the first shape that you selected will appear in the Style window. Any changes that you make in the Style window will be applied to all of the selected shapes. The preview window will update as you make your style selections.



The preview updates as you make changes in the Style window.

Tool Options



Create Shape Options

- **Fill:** Check this option to change the fill of the selected shape(s).
- **Fill Color:** Click the color square to select a fill color for the selected shape(s). You can also use the Fill eyedropper to select a color from your scene, or from any other point on your screen.
- **Stroke:** Check this option to change the stroke of the selected shape(s).

- **Stroke Color:** Click the color square to select a stroke color for the selected shape(s). You can also use the Stroke eyedropper to select a color from your scene, or from any other point on your screen.
- **Width:** Allows you to set a numerical value for the width of the stroke. Fractional values are allowed.

Create Shape

Shortcut: U

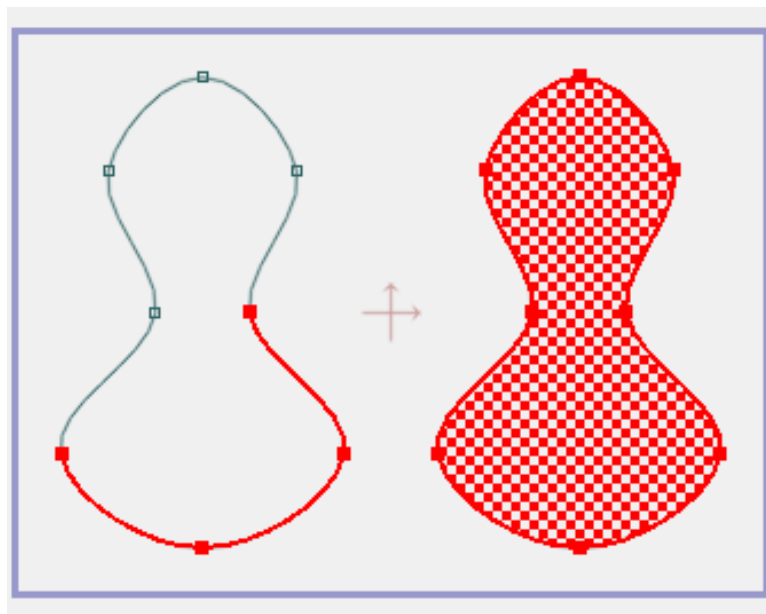


The Create Shape tool is used to select a region to be filled with color, or a set of edges to be drawn as an outline. It operates exactly like the Select Points tool described in ["Select Points" on page 39](#).

Using the Create Shape tool, select all the points that form the outer border of the shape you wish to create. If you select a set of edges that completes an enclosed shape, a highlighted checkerboard will show you the extent of the region you are creating. Otherwise, you will just see a highlighted outline on the selected edges.

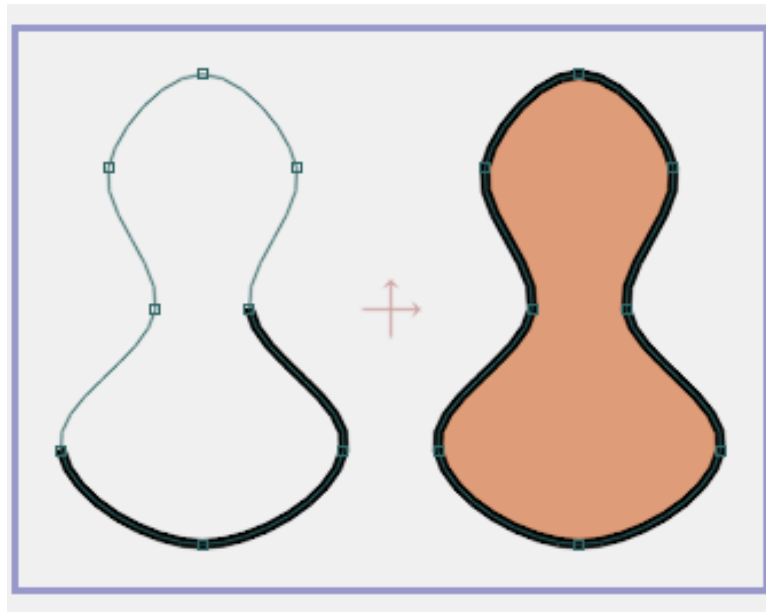
When you have the desired region selected, press the spacebar or press the Create Shape button in the status bar to actually create a shape from the selected edges. The Style Window (see ["Chapter 13: Style Window" on page 256](#)) can now be used to choose the shape's color, line width, style, etc. **This is a very important step - until you press the spacebar or use the Create Shape button, you are only preparing the selection. A shape is only created when the spacebar or button is pressed.**

The picture below shows a selection in progress using the Create Shape tool. Note that the figure on the left is not filled with a checkerboard because its border points are not all selected. The checkerboard area indicates the region that would be filled if the user hit the spacebar at this particular moment. The left figure would only receive a partial outline and no fill, since then entire border has not been selected.



Selecting the curves to make up a shape

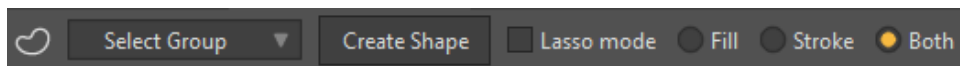
The next figure shows the result of pressing the spacebar to actually create the two shapes that were being prepared in the figure above.



The two resulting shapes

After creating a shape, if you decide that you only want a fill, and not an outline, you can uncheck the **Stroke** box in the Style window. Similarly, uncheck the **Fill** box in the Style window to make your shape have only an outline, and no fill color.

Tool Options



Create Shape Options

- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Create Shape:** Press the Create Shape button to complete the shape. This is the same as pressing the Spacebar after your selection is made.
- **Lasso Mode:** The Create Shape tool selects a rectangular area by default. Check this option to select points by drawing a lasso around the desired area.
- **Fill:** Select this option if you only want to change the fill of the selected object(s).
- **Stroke:** Select this option if you only want to change the stroke of the selected object(s).
- **Both:** Select this option if you want to change both the fill and stroke of the selected object(s).

Paint Bucket

Shortcut: P

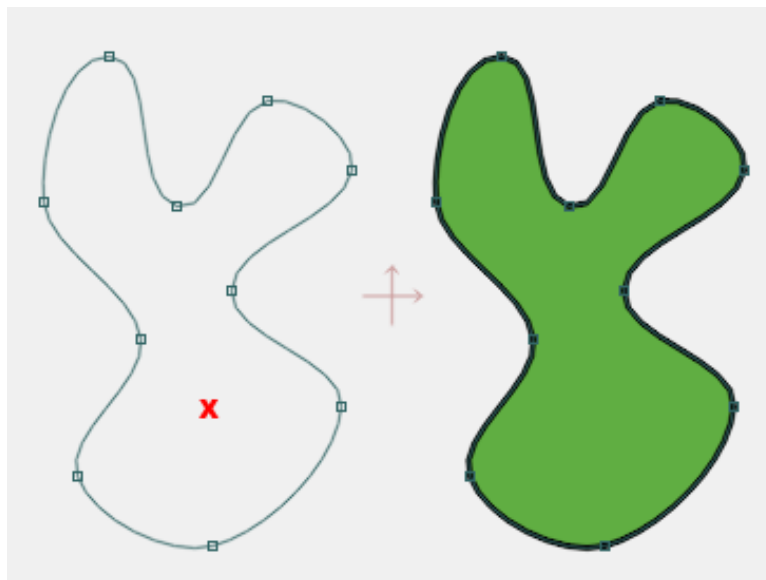


The Paint Bucket tool is used to fill a closed area with color. Just click inside a closed shape to fill it with the current combination of colors and styles. This can make it much easier and quicker to fill shapes than with the Create Shape tool, but keep in mind you're still working with the same requirements - a shape must be completely closed in order to be filled.

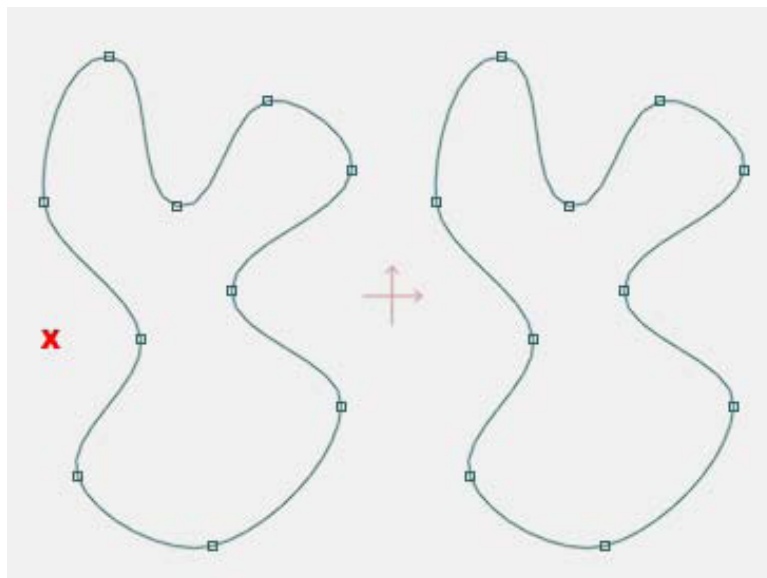


The lines that create the closed shape do not have to be welded. For example, you can draw four overlapping lines with the Freehand tool with Auto Weld off, and then fill the inside of the lines with the Paint Bucket tool.

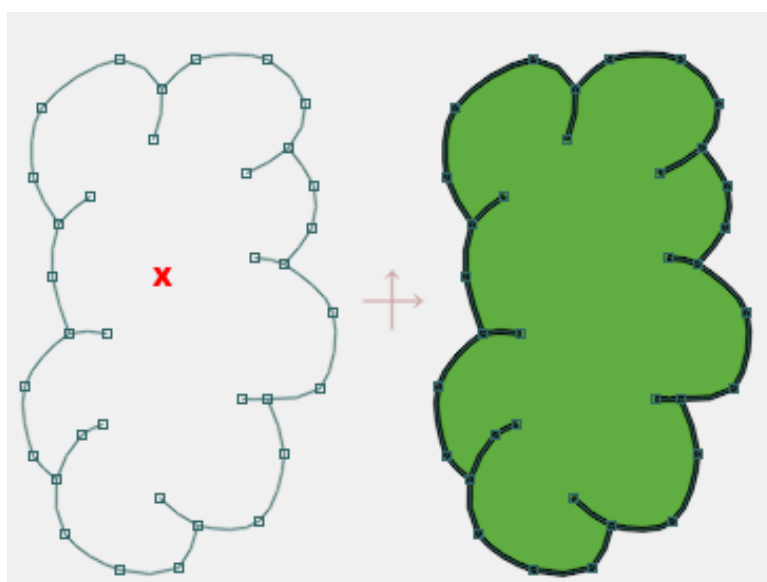
Below are some examples of sets of curves in Moho, where the user might click with the Paint Bucket tool, and the resulting fills. In each case, the shape on the left is the starting shape, the red X indicates the point where the user clicked with the Paint Bucket tool, and the result is the shape on the right:



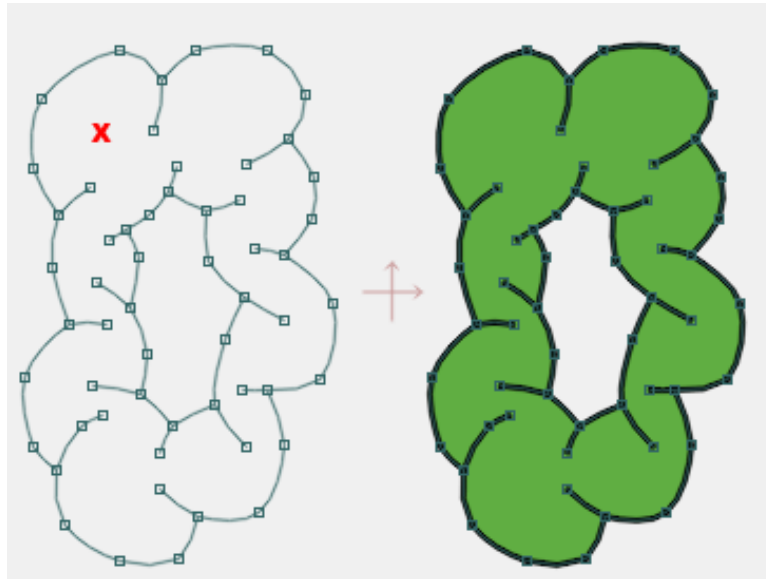
Filling a basic closed outline



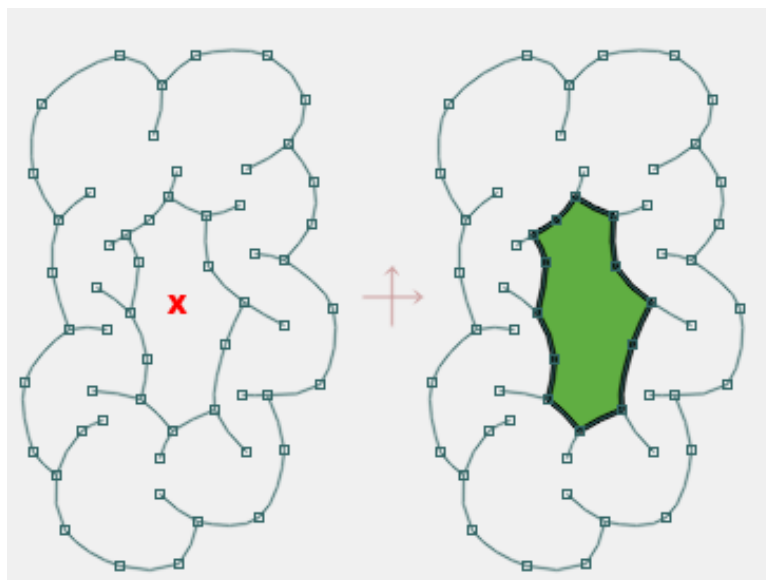
Clicking outside a closed outline (nothing happens - no fill).



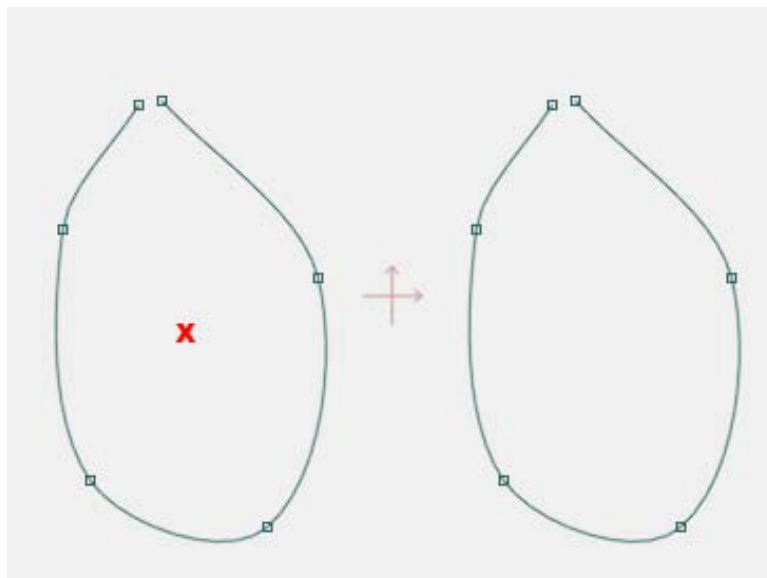
A more complex shape. There are some dead-end curves, but the overall shape is still closed.



A shape with a hole in it.

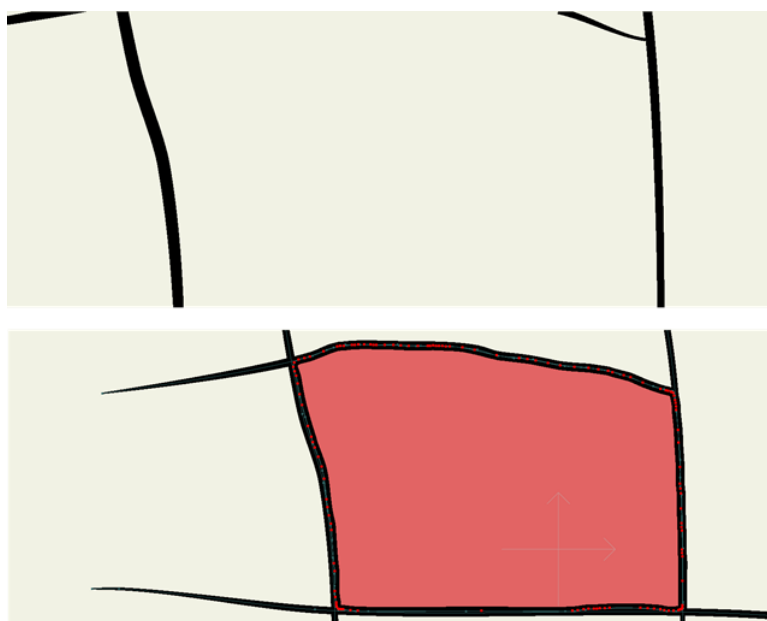


Clicking inside the hole fills just the hole



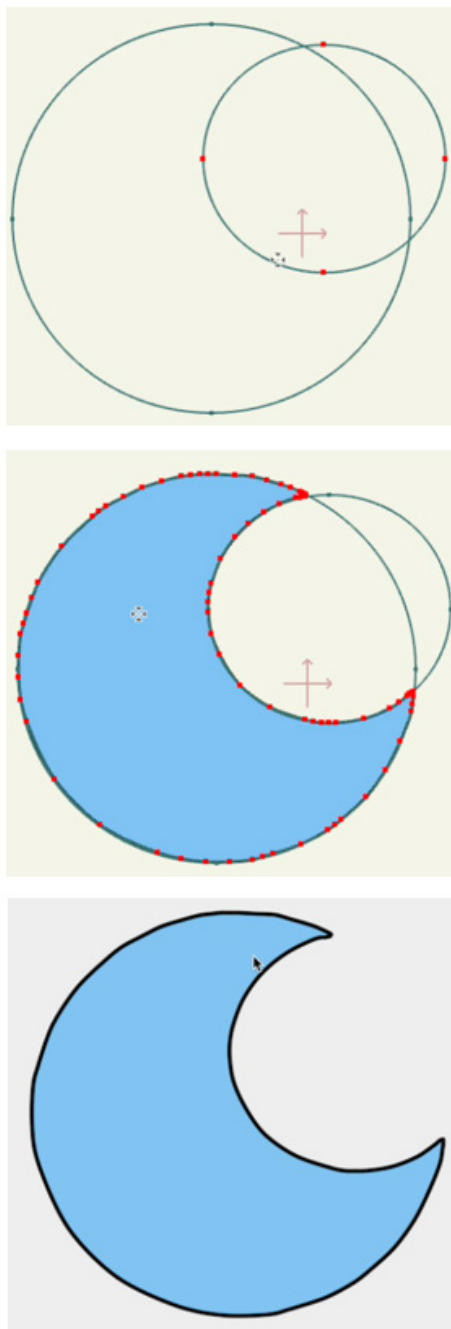
The shape is not closed (close, but not good enough) - no fill is created

If part of the shape is cut off on the edge of the editing window, the viewport will change to display the entire filled shape after you fill it with the Paint Bucket.



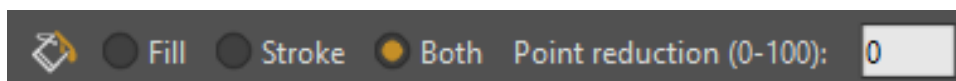
The viewport adjusts to display the entire filled shape after using the Paint Bucket.

You can also draw shapes that overlap, and use the Paint Bucket tool to fill within areas that overlap. This allows you to quickly create complex boolean shapes.



Two overlapping shapes are filled with the Paint Bucket to create a boolean shape.

Tool Options



Paint Bucket Options

- **Fill:** Select this option to affect fill only.

- **Stroke:** Select this option to affect stroke only.
- **Both:** Select this option to affect both fill and stroke.
- **Point Reduction:** Allows you to enter a percentage value for point reduction. Default setting is 0, for no point reduction.

Delete Shape



To use the Delete Shape tool, click on a fill or outline to delete it from the project. Remember, in Moho, the **shape** of an object is separate from its **appearance**. If you use this tool to delete a fill, the underlying points and curves will remain. If you want to delete those as well, go back to the Draw tools to work with the points and curves.

Line Width

Shortcut: W



The Line Width tool is used to adjust the width of a line as it passes through a particular point. Using this tool, you can create lines that taper at the ends, get thinner in the middle, or change width several times along their length.



Line widths are stored internally in Moho as percentage values. For example, a value of 100% represents the original line width, and a value of 200% represents double line width. The width of the line smoothly varies from the 100% (no custom width) value.



You can superimpose two strokes, each with a different line width, to create parts for characters that are made of very few points, making them much easier to animate. For more information refer to “Tutorial 2.4: Varying Line Widths” on page 65 in your Moho Tutorial Manual.

To use it, just click on the point you want to adjust, and drag the mouse left and right to adjust line thickness. (Be sure you first either set up an outline through the point, or a fill shape with a non-zero line width - otherwise this tool won't do you much good.)

You can adjust more than one point at a time by selecting multiple points with the Select Points tool from the Draw tool group.

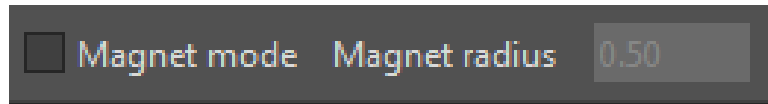
Tool Options



Line Width Options

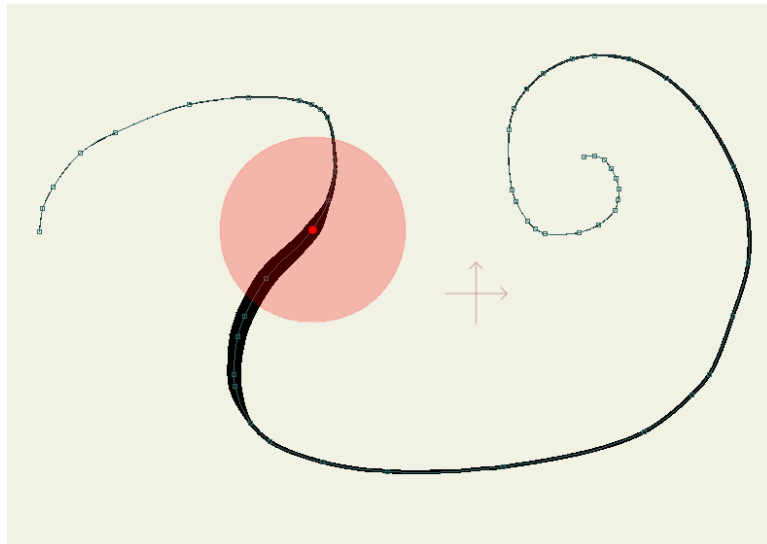
- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Width:** Allows you to enter a numerical value for the line width.

You can also enable the Magnet Mode option and enter a radius that determines the area that the magnet will affect.



Line Width Magnet Mode Options

- **Magnet Mode:** Check this option to display the cursor as a red semi-transparent circle.
- **Magnet Radius:** The points that appear within the red circle area will be affected when you use the Line Width tool. Use the Magnet Radius setting to increase or decrease the affected area.



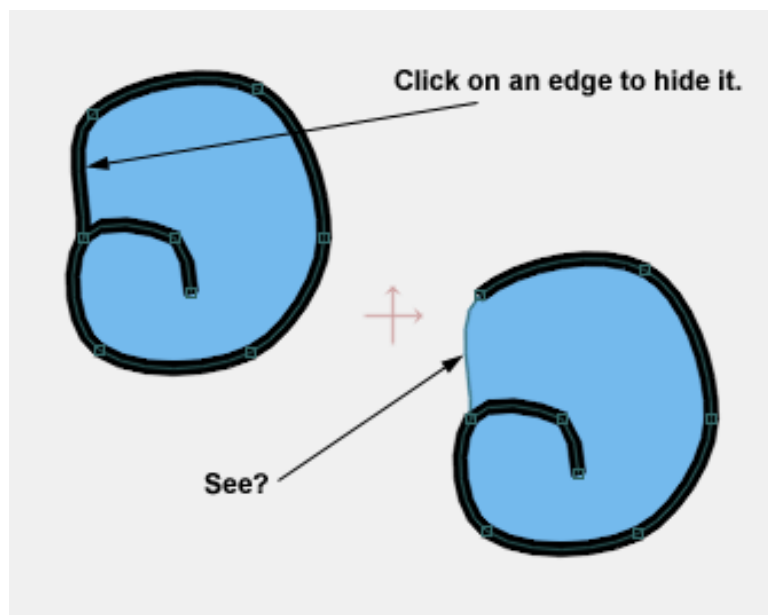
You can set a magnet radius to affect all vertices beneath the magnet.

Hide Edge

Shortcut: H



Sometimes, you will have the need to create a fill shape with only a partial outline. The Hide Edge tool makes it easy to accomplish this. After creating the fill shape and setting the desired line width, simply click on the edge(s) that you want to hide - those edges will simply disappear from the outline, without affecting the fill. Below is a before and after example:



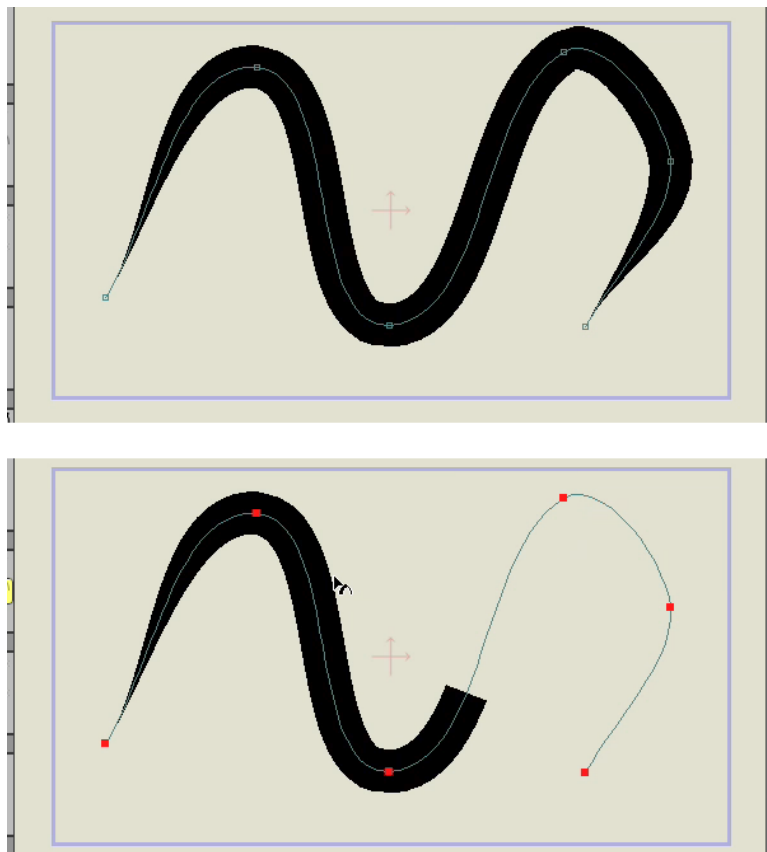
The Hide Edge tool in action

Stroke Exposure (Pro Only)



The **Stroke Exposure** tool is located in the **Fill** section of the tool box. Normally, when you apply a stroke to a curve, you see the stroke along the entire curve. With the Stroke Exposure tool, you can click and drag on a curve that has a stroke and control where the curve starts and ends.

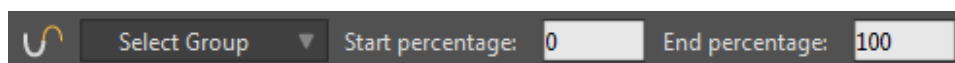
- Click and drag back and forth to set the end point of the stroke on the curve. Dragging toward the left exposes less of the curve's end, while dragging toward the right exposes more of the curve's end.
- Alt-Click and drag back and forth to set the start point of the stroke on the curve. Drag toward the right to expose less of the curve's end, and drag toward the left to expose more of the curve's end.



Exposing less of the curve's end

This parameter can be animated so that you can expose the curve over time, making this feature a good option for creating things like handwriting or water flowing through a pipe. Rounded end caps are also supported with the Stroke Exposure tool.

Tool Options



Stroke Exposure options

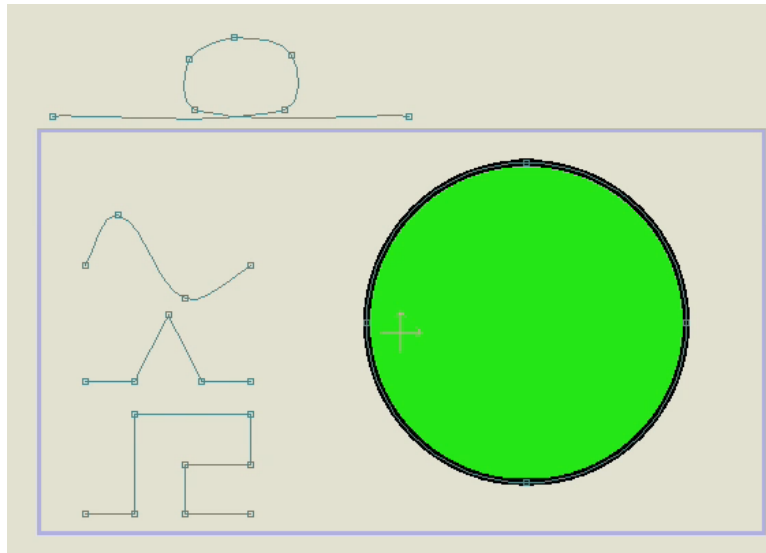
- **Select Group:** Used to select a group that was previously created with the Select Points tool.
- **Start Percentage:** Allows you to enter a numerical value for the start of the curve, based on its distance from the start point
- **End Percentage:** Allows you to enter a numerical value for the end of the curve, based on its distance from the end point

Curve Profile (Pro Only)



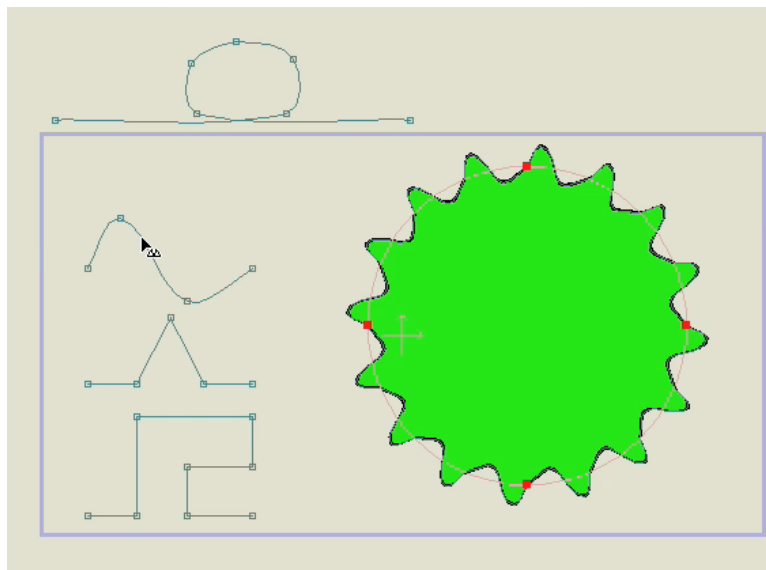
Curve profiles provide a way to add interesting detail to a shape. You use the Curve Profile tool to create these details on a shape. You select a shape on a layer. Additional curves that define the profile can appear on the same layer.

Curve profiles can be of any shape, but the start and end of the profile should be along the same horizontal line. While you can create profile curves with or without a stroke applied to them, it makes sense to draw them with Auto Stroke off, since you will be applying a different pattern to the circle based on the style of the curve.



Shapes and curves are drawn on a single layer

After you select the shape you want to apply the profile to (a circle in this case, select the Curve Profile tool from the Fill section of the tool box. Then click on the curve that you want to use as the profile.



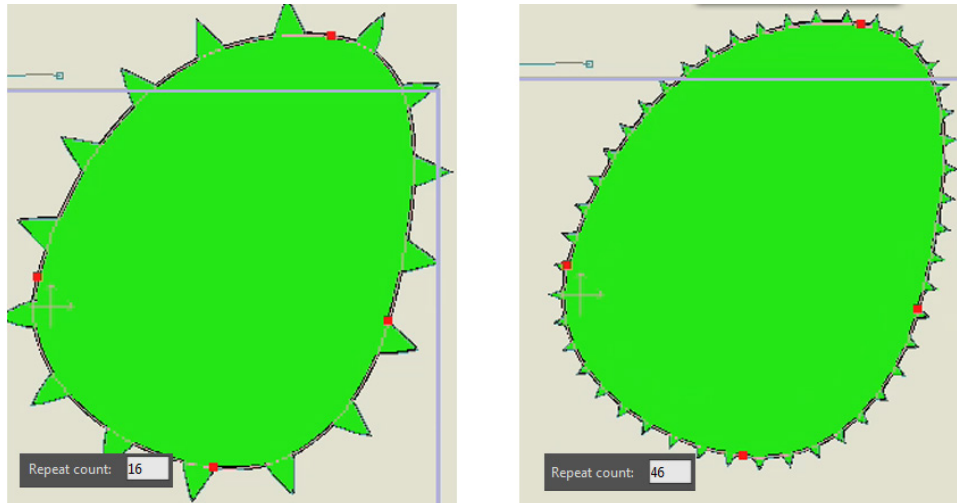
A shape with a profile curve applied.

Even though the resulting shape appears to have more detail, it still has the same number of control points as the original shape. For example, if you applied the curve profile to a circle, the resulting shape still has only the four original control points, even though it appears to have more. You can edit the shape by repositioning one or more of the original control points, and the curve profile will still be applied.



If you want to animate a shape that uses Curve Profiles you will need to animate the shape used for the profile. You cannot assign one profile shape on one frame in a timeline, and then reassign another profile shape on another point in the timeline. In addition, if you delete the curve that was originally used as a profile shape, the curve profile also gets deleted.

The **Repeat Count** setting in the options toolbar controls the number of times that the curve profile repeats along the path. You can increase or decrease this setting to add more or less detail to the shape.



The Repeat Count controls the number of times that the profile curve repeats along the path

To remove the curve profile from the shape, select the **Curve Profile** tool from the Fill section of the tool box and click on an empty background area.

Tool Options

- **Repeat Count:** Used to control the number of times that the profile shape repeats along the path.

Working with Fills

To define a region to be filled, you must first select all the points along its boundary. That's what defines a fill region - the set of points along its outer edge. We'll take a look at some examples later. You can also create outlines using these tools. Outlines are less restrictive than fills - an outline is not a set of points along an outer boundary. Instead, an outline can be any set of points you choose. The curve segments between these selected points will form the outline.

Fills and outlines are stacked on top of each other in the order you create them. This determines which fill or outline will be visible when two or more overlap. There are tools that allow you to change the stacking order of fills and outlines, but you'll learn that you can save yourself a lot of time by planning ahead and creating fills in the proper order to begin with.

There are a number of different ways to fill shapes in Moho:

- Use the **Select Shape** tool to select the shape you want to change. The color and fill properties will be "picked up" in the Style window. You can then change the fill colors in the Style window.
- Use the **Create Shape** tool to fill closed outlines that do not have any fill. You will need to select the points in the outlines before you use the **Create Shape** tool.
- You can also use the **Paint Bucket** to fill shapes that do not yet have a fill. For example, you can use the **Add Point** or **Freehand** tool to create a shape that has a stroke only, and then later use the **Paint Bucket** tool to add a fill.
- You can also change colors with the **Eyedropper**. Use the **Eyedropper** to select a color from any of the shapes that use the color you want to apply. Then press the **Alt** key and click other objects with the **Eyedropper** to push the selected color to other shapes.

Color Picking

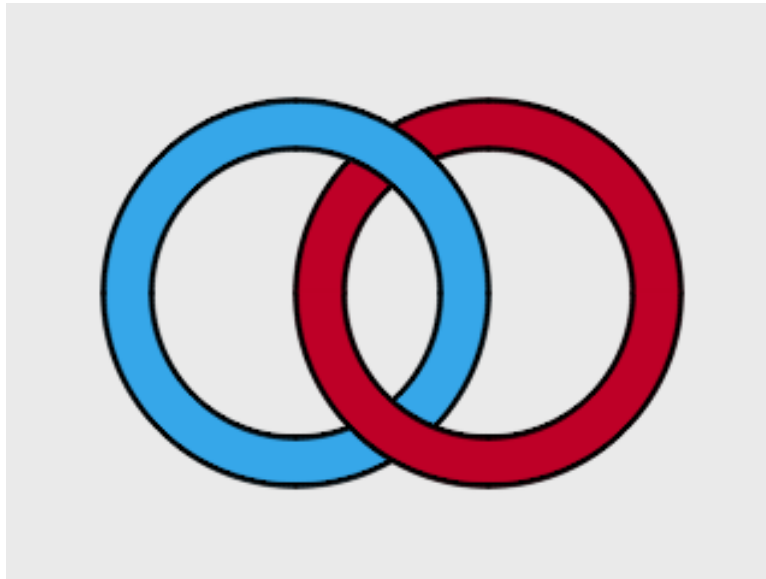
If the **Select Shape** or **Create Shape** tools are active and a shape is selected, you can quickly set the shape's color by picking it from another shape in the current layer. Just hold down the **Alt** key and click on the shape you want to copy the color from. The color (and style) will instantly be applied to the currently selected shape.

You can also push a shape's color and style onto other shapes. If you hold down **Alt + Ctrl** (Windows) or **Alt + Cmd** (Mac) and click on a second shape, the selected shape's color will be pushed onto the shape you click on. This is an easy way to propagate one shape's color and style onto several other shapes in the same layer.

There's no limit to the kinds of shapes you can create this way. By adding more boundary curves, you can create more and more complex fills - feel free to experiment.

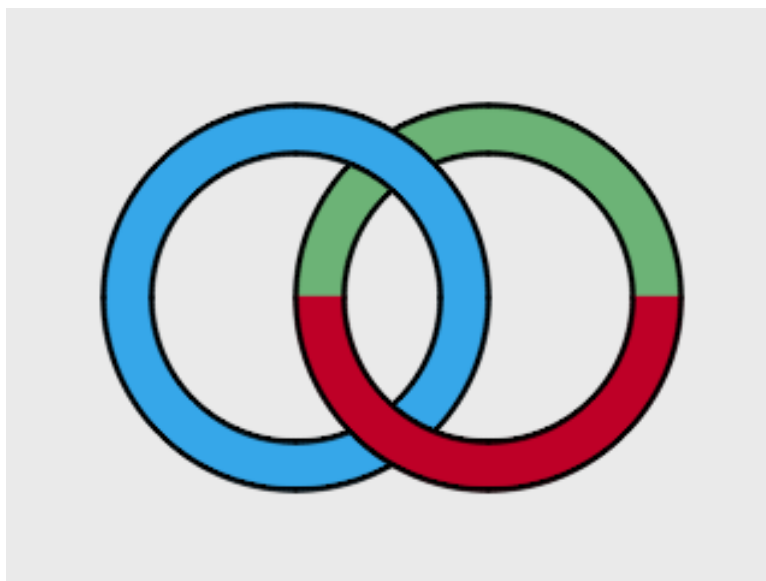
A Trick: Using Two Fills Instead of One

Sometimes you may want to create an object with parts that overlap in complex ways. Consider the image below:



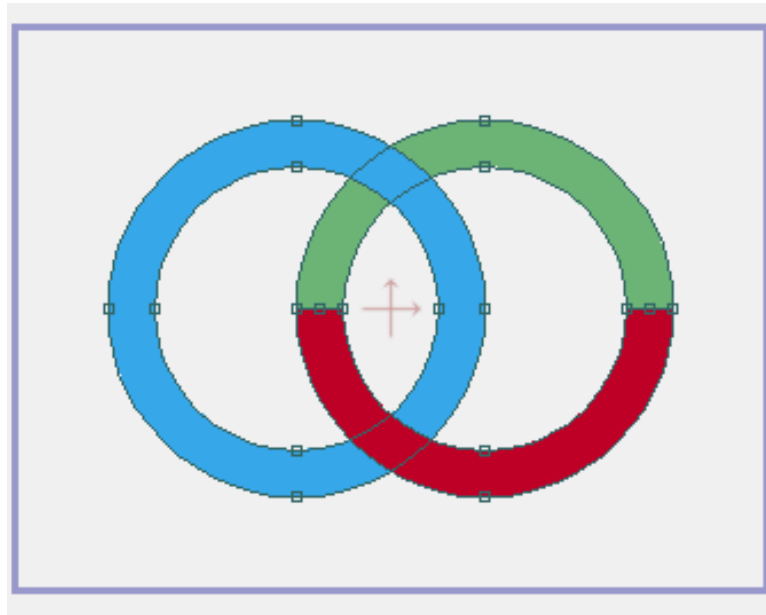
Two interlocking rings

The red ring is in fact two objects - one behind the blue ring, and one in front of it. The next image shows the same object, but colored differently so that the two parts of the red ring stand out.



The coloring shows three different shapes

It takes a little more work to set up an object when you have to split it into two (or more) parts, but sometimes it's the only way to achieve a certain effect. The picture below shows the project in a Moho window, so that you can see the arrangement of points and curves. Note how the ring on the right has some extra curves set up so that it can be split into two fills.



Point and curve arrangement.

This technique is also useful in animation, for when you want an object to bend backwards and overlap itself. Normally, this would cause the fill that defined the object to get seriously distorted, or even to break holes in itself. However, by building the object out of two or more parts and stacking them properly, you can achieve this type of effect with no problem.

Color Points

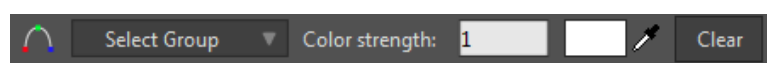


The Color Points tool allows you to create a gradient-type fill for the objects, based on point positions. After selecting the point or points that you want to assign a color to, you use the Color Points tool options to assign a color to the selected points. The assigned colors will then blend across the surface of the shape.

To use the Color Points tool, follow these steps:

1. Use the Select Points tool to select one or more points, or to select a predefined point group. Or, click one or more points with the Color Points tool.
2. Click the Color Swatch to choose a color for the selected points.
3. Adjust the Color Strength, if desired, by entering a numerical value in the Color Strength field. The default setting is 1.

Tool Options



Color Points tool options.

- **Select Group:** Allows you to choose a point selection by name, as saved with the Select Point tool. For more information on how to create a point group, see [“Select Points” on page 39](#).
- **Color Strength:** Increase or decrease the color strength by setting a numerical value in this field. The default setting of 1 applies the color at full strength.
- **Color Swatch:** Click the color swatch to assign a color to the selected point(s). You can also use the eyedropper to select a color from your scene, or from any other point on your screen.
- **Clear:** Click this button to clear the color assignments from the selected point(s).

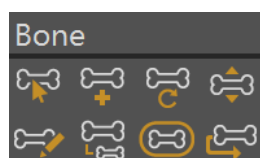
Chapter 5: Bone Tools

The following tools are available when working with Bone or Switch layers.

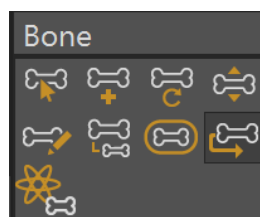
In general, tools that are used for bone setup can only be used when the time is set to frame 0 - others can be used at any time.

 *Moho has a smart tool palette, which shows and hides tools based on their need. The position of the tool shown in the screenshots may differ, depending on the selected layer in the Layers Window, and the current time in the timeline.*

 *Click the tool icon in the properties bar to display a submenu. Choose Reset Tool to reset the current tool to its default settings. Choose Reset All Tools to reset all tools to their default settings.*



Bone Tools (Debut)



Bone Tools (Pro)

Select Bone

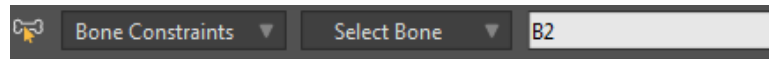


Using this tool, you can click a bone to select it. You can also draw a marquee or a lasso around multiple bones to select more than one bone with the Select Bone tool.

You might want to select a bone in order to delete it (press the **Delete** or **Backspace** keys - all of its children will be deleted too). You also might want to select a bone in order to add new child bones to it. Click anywhere besides a bone to de-select all bones.

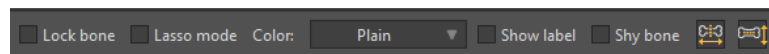
Tool Options

The following options appear in the Options toolbar when the Select Bone tool is active:



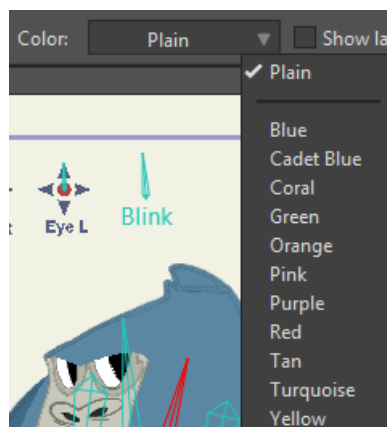
Select Bone Options (Part 1)

- **Bone Constraints:** Opens the Bone Constraints dialog, described in “**Bone Constraints**” on page 84.
- **Select Bone:** Use the Select Bone dropdown list to select a bone by name.
- **Bone Name field:** Displays the name of the selected bone. You can edit the bone name in this field.



Select Bone Options (Part 2)

- **Lock Bone:** When checked, prevents accidental changes to the current bone.
- **Lasso Mode:** When checked, allows you to select multiple bones by drawing a lasso around them. When unchecked, you can select multiple bones by drawing a rectangular selection around them.
- **Color:** Click the Color selector to choose a representative color for the bones: **Plain, Cadet Blue, Coral, Green, Orange, Pink, Purple, Red, Tan, Turquoise, or Yellow.** These colors can be representative of any category you choose and are provided for project organization. The keyframes for colored bones will show up in the timeline in specially colored channels that match the colors you assign.




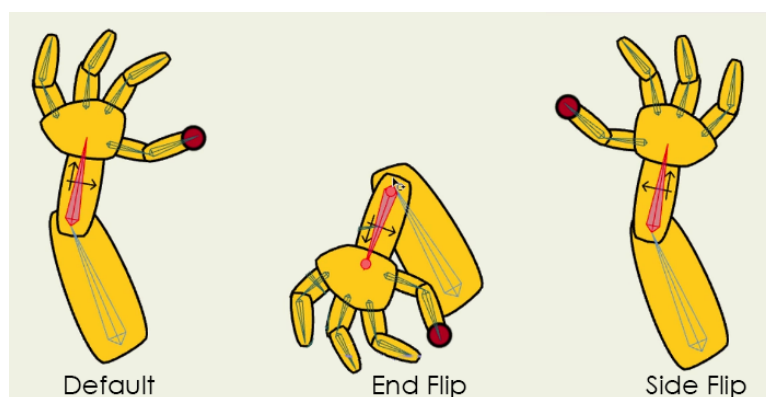
Color options

- **Show Label (Pro Only):** Check the **Show Label** option to display the name of the bone in the project window. The names displayed are those which are either automatically or manually assigned in the Select Bone list. User-assigned labels help you remember what a particular smart bone controls (eye blinks, mouth shapes, etc.) To change the name of the bone, enter a new name for the selected bone in the text field immediately to the right of the list.
- **Shy Bone (Pro Only):** Shy bones help reduce workspace clutter. To mark a bone as shy, select the bone(s) and check the Shy Bone option. All bones marked

as shy can then be displayed or hidden with the **Bone > Hide/Show Shy Bones** command, discussed in “**Hide/Show Shy Bones (Pro Only)**” on page 463.

- **End Flip (Pro Only):** Click to flip the selected bone end to end.
- **Side Flip (Pro Only):** Click to flip the selected bone side to side.

 Flipping bones can be essential to certain rigs in Moho. In the past, you could only flip a bone once. This would alter the position for the whole animation. Moho Pro brings a welcomed change to this workflow. Now when you flip a bone mid-animation, a keyframe will be created, allowing the effect to change at any time. This works with any bone setup you can think of: parents, targets, point binding and layer binding. You can even rig your Smart Dials to flip bones, adding more flexibility to any workflow.

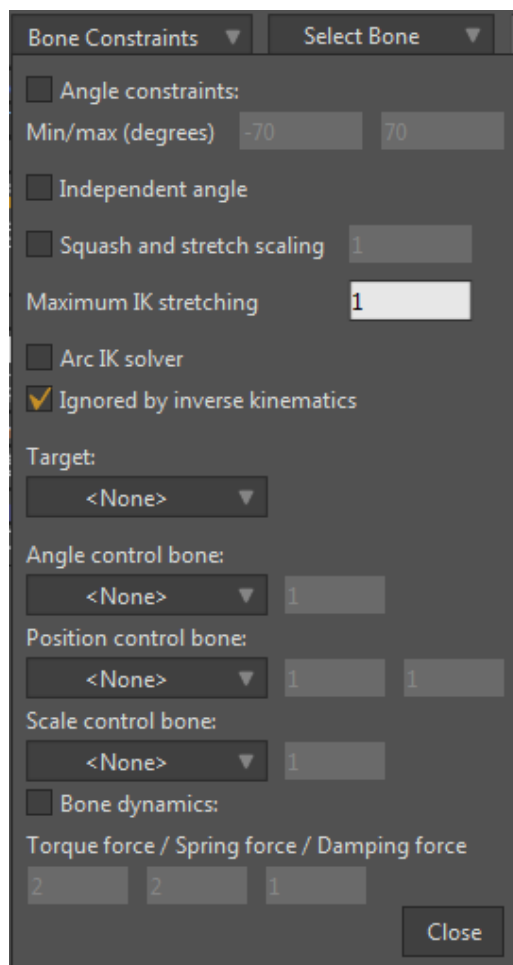


End Flip and Side Flip

Bone Constraints

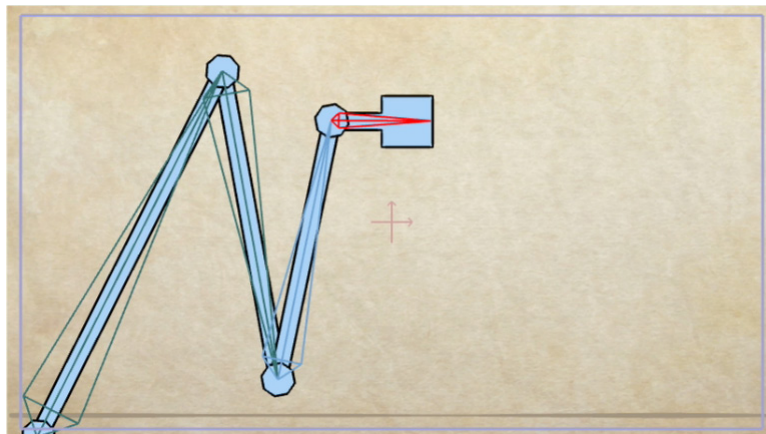
With the Select Bone tool selected, click the Bone Constraints button in the options bar to open the Bone Constraint options dialog shown below.

 For detailed instructions and examples of the options in this dialog, refer to the Angle Constraints section in “**Tutorial 3.2: Bone Constraints**” on page 111 in your Moho Tutorial Manual.

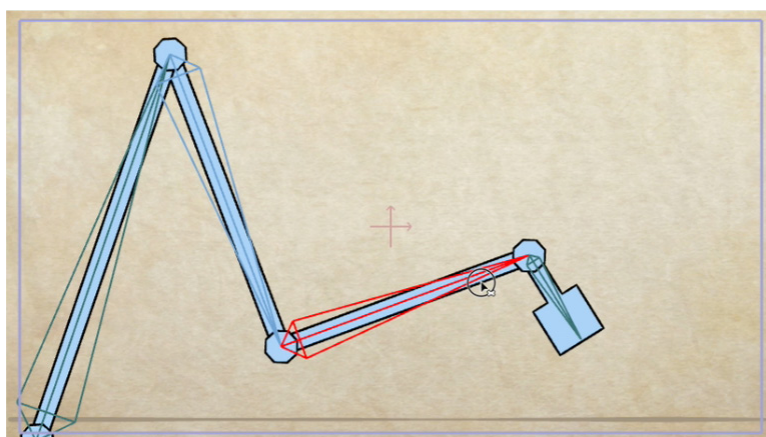


Bone Constraints Options

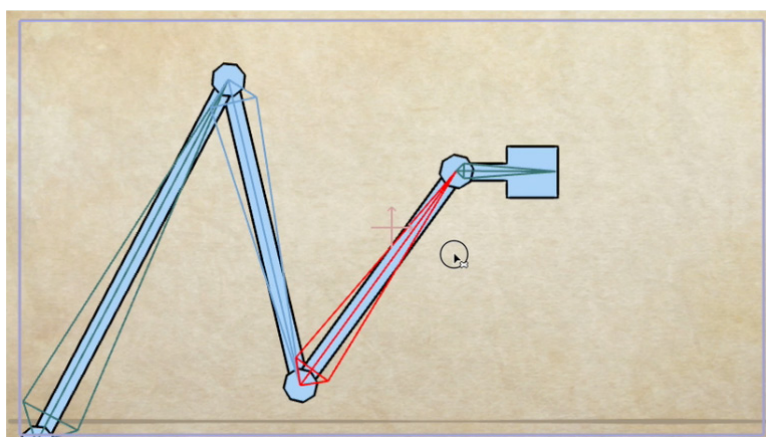
- **Angle constraints:** Check this option if you want to limit the movement of the bone within certain angles.
- **Min/max degrees:** Enter the maximum and minimum angle range that you want the bone to rotate. For example, if you only want the bone to rotate 10 degrees in either direction, enter -10 in the **Min** field, and 10 in the **Max** field.
- **Independent angle (Pro only):** Normally, if you move or rotate a parent bone, the child bone moves or rotates with it. If you check the Independent Angle option on a child bone, the child will keep the original angle. This is extremely helpful when rigging a character, as it can be used to keep the feet parallel to the ground as the legs move and rotate during a walk cycle. For more information about using independent angles, see **“Tutorial 3.6: Enhanced Bone Features (Pro Only)”** on page 140 in your **Moho Tutorial Manual**.



In the default position, the last bone is parallel to the ground.



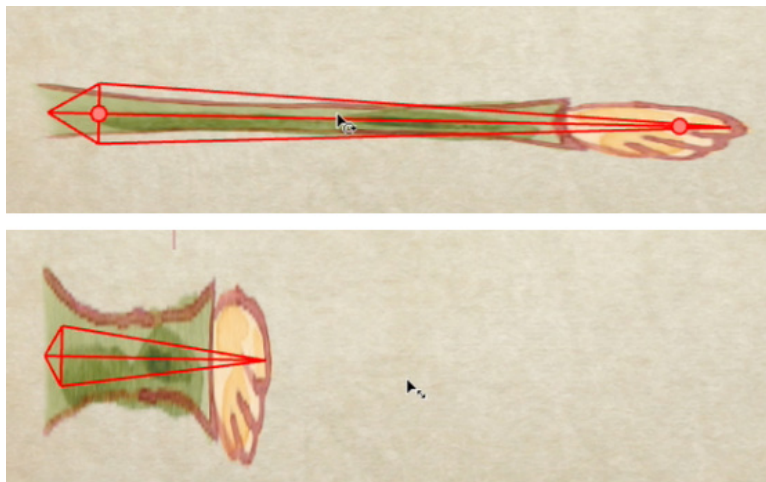
If you rotate its parent bone, the child also rotates.



If you set Independent Angle on the child bone, it will rotate independently of its parent.

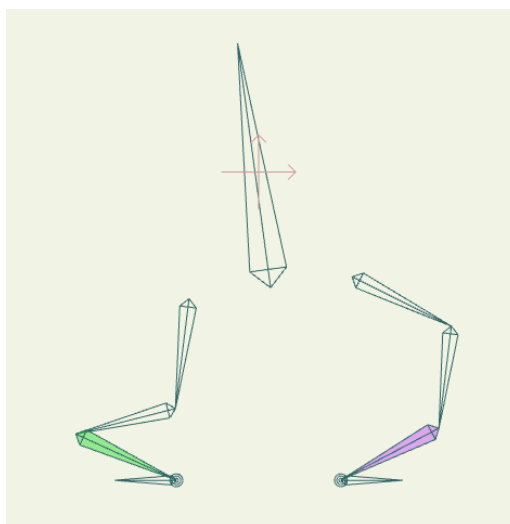
- **Squash and stretch scaling (Pro only):** When this option is checked, the objects that are controlled by the bone will maintain their volume when they are scaled. The height of the object will decrease as the length of the bone is increased, and the height of the object will increase as the length of the object is decreased. Enter the desired scaling factor in the field provided. For more

information, see “**Tutorial 3.6: Enhanced Bone Features (Pro Only)**” on page 140 in your **Moho Tutorial Manual**.



Squash and stretch scaling helps maintain the volume of an object as the bone is scaled.

- **Maximum IK stretching (Pro only):** Enter the maximum amount that you want to allow a bone to stretch with Squash and Stretch scaling.
- **Arc IK Solver (Pro only):** Check this option to use an alternative inverse solver for chains that have more than two bones. When turned off as on the green bone in the following figure, there are many possible ways for an IK target to reach the goal, and sometimes the movements cause the bones to fold upon themselves like an accordion. However, you will have more control over the bone this way. On the other hand, when the Arc IK Solver is turned on (as it is on the purple bone below), Moho will attempt to move the bones so that they line up as segments on a smooth arc. However, when the Arc IK solver is turned on it may be more difficult to move the bones into an S-curve.



Arc IK off (left) and on (right)

- **Ignored by inverse kinematics:** When checked, inverse kinematics will ignore the bone. This is useful for attaching accessory bones on arms and legs. For

more information about ignoring inverse kinematics, see [“Ignoring Inverse Kinematics \(Pro only\)” on page 88](#).

- **Target (Pro only):** Allows you to assign another bone as a target. The most common use for this is to set up Inverse Kinematics for a character so that you can more easily animate walk cycles. For more information about using target bones, see **“Tutorial 3.6: Enhanced Bone Features (Pro Only)” on page 140 in your Moho Tutorial Manual.**



*Bone parents and targeting can be animated. For more information, see **“Tutorial 3.7: Animated Bone Targets (Pro Only)” on page 150 in your Moho Tutorial Manual.***

- **Angle/Position/Scale control bone:** Allows one bone to control the motion of another. Click to select the bone that you want to be affected, and then use the drop-down menu to select the bone that you want to use as the controller. Enter the desired control angle (positive and negative values are accepted) in the Angle field, the X and Y coordinates in the Position fields, or the desired scale factor in the Scale field.
- **Bone dynamics:** Tells Moho to move the selected bone automatically, based on values entered in the **Torque Force**, **Spring Force**, and **Damping Force** values entered. See **“Tutorial 3.3: Bone Dynamics” on page 120 in your Moho Tutorial Manual.**
- **Close:** Closes the Bone Dynamics palette.

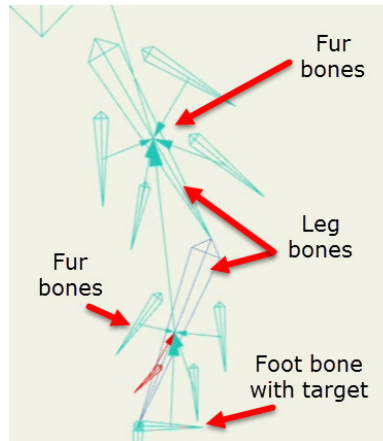
Ignoring Inverse Kinematics (Pro only)

When designing a character, a simple arrangement is to have two leg bones, as well as a foot that has an IK target.

Assume now that you want to attach other bones to the leg. For example, if you are rigging a furry character and you want to animate the fur on its upper and lower leg, you parent other bones to each of the leg bones as shown below; or you add other bones to animate muscles in a character.

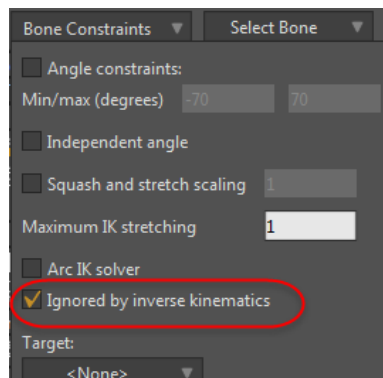


Pin Bones are automatically marked to ignore inverse kinematics.



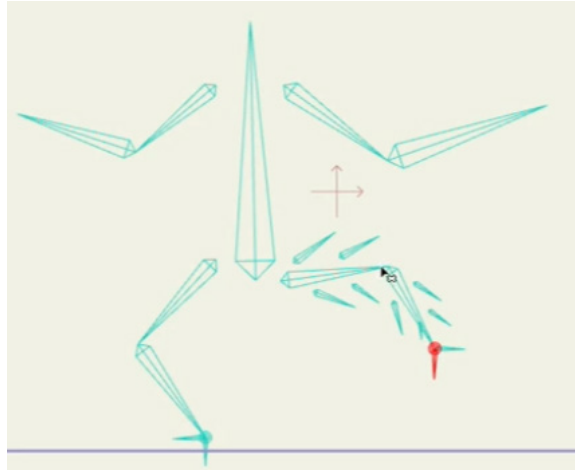
Two leg bones with additional child bones for animated fur.

When you animate the leg, you'll notice that it doesn't follow the IK target any longer. When Moho tracks IK chains, it stops when it encounters bones that have multiple children. If you select all of the fur bones that are parented to the legs, you can uncheck the **Ignored by inverse kinematics** option in the Bone Constraints popup.



Ignore by Inverse Kinematics option in the Bone Constraints popup.

After doing that, you will notice that the child bones will be ignored by Inverse Kinematics and the leg will animate and follow the target as expected. You can then go back and animate the fur bones by hand.



Extra leg bones (for fur) are ignored by IK and the leg follows the target as expected.

Add Bone



Use the Add Bone tool to add new bones to a skeleton. When you add a new bone, Moho automatically assigns a name to it. By default, the first bone you add is named B1, the second B2, and so on.

If another bone is selected before you click and drag, it will be the parent of the new bone you create. Otherwise, the new bone will be parentless, a root bone.

Note that bones don't have to be touching to have a parent-child relationship. In the example shown in **“Tutorial 3.4: Character Setup” on page 125 in your Moho Tutorial Manual**, the upper arm bones are children of the spine, even though they are separated from it by a small distance. This will often be the case - arms should rotate about the shoulders, not the neck, even though they move when the spine moves.

You can add bones in one of two ways:

- **Standard bones:** Click with the Add Bone tool to set the base of the bone (the point that it rotates around), and drag to set the end point.



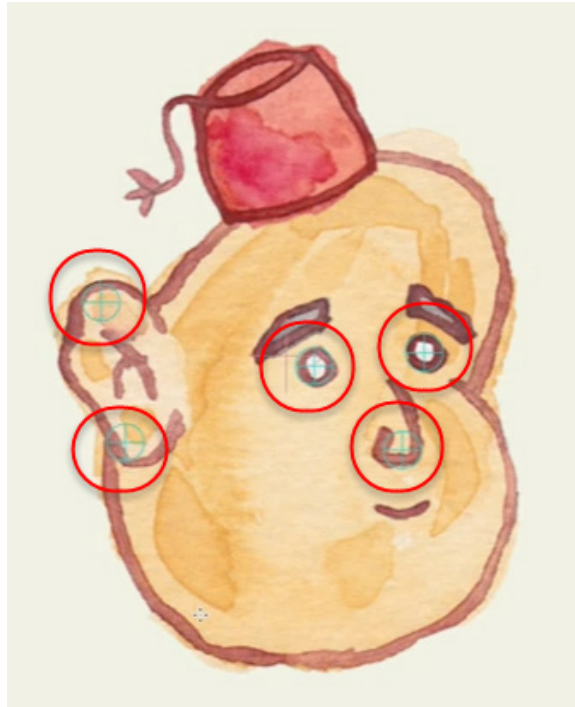
*Hold the **Shift** key to constrain the new bone to point in a direction that is a multiple of 45 degrees.*

- **Pin Bones:** Simply click the Add bone tool where you want to add a pin bone. When adding Pin Bones, do not parent them to each other. You should either parent them to a regular bone, or make them root bones.

More about Pin Bones

Pin Bones work with vector and image layers that are placed beneath a bone layer. When you use the Add Bone tool, you simply click in the spot where you want to add the Pin Bone. You will not need to drag your mouse to create the end point. Pin Bones are represented by a circle with crosshair.

 Zero length bones can be created with or without parents. If you don't want your zero-length bone to have a parent, make sure that you deselect all bones first.



A face with several Pin Bones to animate the features.

Pin Bones work like regular bones, except that they don't have a length. You can use the Bone Strength tool to adjust the area of influence that the zero-length bone has. You can translate and rotate Pin Bones and animate those transformations. Simply drag a zero-length bone to translate it to a new position, or press the Alt key while dragging to rotate it.



Pin Bones can be translated and rotated, and keyframed for animation.

Bone Snapping

When you add a bone, the next bone that you draw will automatically be a child of the previous bone. The new bone will automatically snap to the tip of the previous bone.

To connect a completely separate bone to the tip of another bone, use the Transform Bone tool to drag the disconnected bone toward the bone you want to connect it to:

- Dragging the bone to the tip of a bone will connect the two bones together at the tip of the destination bone.
- Dragging the bone to the central axis of a bone will connect the two bones together at the base of the destination bone.
- Hold down the Ctrl/Cmd key to disable snapping. The child bone will not automatically snap to the tip of the previous bone when working in this mode.

Tool Options



Add Bone Options

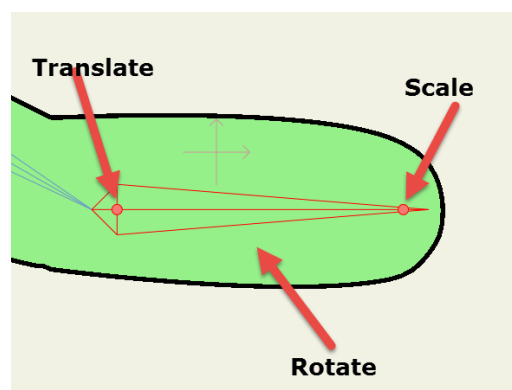
- **Select Bone:** Click this menu button to select a bone by name.
- **Text Field:** Allows you to assign a name to the currently selected bone, or to edit the name of the bone as automatically assigned by Moho.

Transform Bone



The Transform Bone tool allows you to translate, rotate, or scale a selected bone.

When the Transform Bone tool is selected, two dots appear at the ends of each bone. In addition, the cursor will change to display the type of transformation that will be applied:



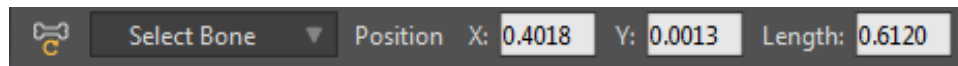
Transform Bone tool indications

- To rotate a bone: Click near the bone, but outside of the handles. A rotate cursor will provide indication when the mouse is placed correctly. Then drag the mouse to rotate the bone.
- To translate a bone: Click and drag the dot at the base of the bone. Translated bones will snap to existing bones as described in ["Bone Snapping" on page 92](#).
- To scale a bone: Click and drag the dot at the end of the bone.

The following key combinations work while the Transform Bones tool is selected:

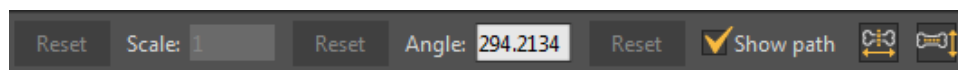
- Holding the **Shift** key will cause the bone to only translate horizontally or vertically relative to its parent (if you click near the base)
- Holding the **Shift** key while rotating will constrain the rotation to 45 degree increments.
- You can nudge the selected bone by small increments by holding down the **Ctrl** key (Windows) or **Cmd** key (Mac) and pressing the arrow keys. Hold down **Shift** in addition to **Ctrl/Cmd** to nudge the bone by a greater increment.
- If any objects in other layers have been bound to the bone, they will not move if the current frame is 0. At frame 0, you are modifying the bone layout - at later frames you are animating with this tool, and bound objects will move with the bone.

Tool Options



Transform Bone Options (part 1)

- **Select Bone:** Click this menu button to select a bone by name.
- **Position X:** Allows you to numerically enter a value for the X coordinate.
- **Position Y:** Allows you to numerically enter a value for the Y coordinate.
- **Length:** Allows you to view or enter a numerical value for the length of the bone.



Transform Bone Options (part 2)

- **Reset:** If pressed at Frame 0, resets a layer back to its default length. If pressed at any other frame, resets the layer to the value or values set at frame 0.
- **Scale:** Allows you to view or enter a numerical value for the scale of the bone.
- **Reset:** If pressed at Frame 0, resets a layer back to its default scale. If pressed at any other frame, resets the layer to the value or values set at frame 0.
- **Angle:** Allows you to view or enter a numerical value for the angle of the bone.

- **Reset:** If pressed at Frame 0, resets a layer back to its default angle. If pressed at any other frame, resets the layer to the value or values set at frame 0.
- **Show Path:** When checked, the document window will display the path(s) that the animated bone(s) follow.
- **End Flip (Pro only):** Click to flip the end to end positions of the selected bones.
- **Side Flip (Pro only):** Click to flip the side to side positions of the selected bones.

Manipulate Bones

Animatable: Yes



The Manipulate Bones tool has two purposes. First, when the current frame is set to 0, it is used to test whether a skeleton is set up and working properly. Although it moves bones and points around, the changes it makes are only temporary. When you switch to another tool, the skeleton is reverted back to its original shape.



When working inside a Smart Bone action, the Manipulate Bones tool can introduce extra unwanted bone motion in the Smart Bone action. For this reason, the Manipulate Bones tool will be disabled.

The second use of this tool is at frames greater than 0. If the current frame is greater than 0, then this tool will move the skeleton in the same way, but the move will introduce a keyframe for animation.

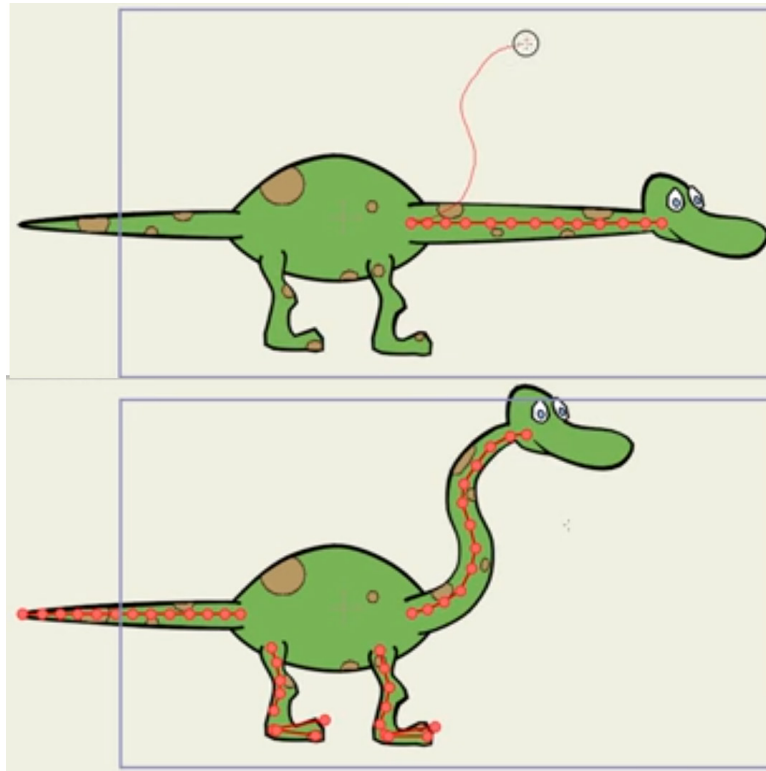
To manipulate a skeleton, just click and drag the various bones that make it up. If points or other layers have been bound to the bones, they will move as well. The way the skeleton and the bound points move with this tool is exactly the same whether at frame 0 or a later frame. If some part of the skeleton doesn't move correctly, you can find out with this tool and fix it before you start animating.

Note: If you only want to rotate a single bone, it's better to use the Rotate Bone tool. The Manipulate Bones tool will move a whole chain of bones, which is definitely **not** what you want if you plan to rotate a single bone.

Sketch Bones



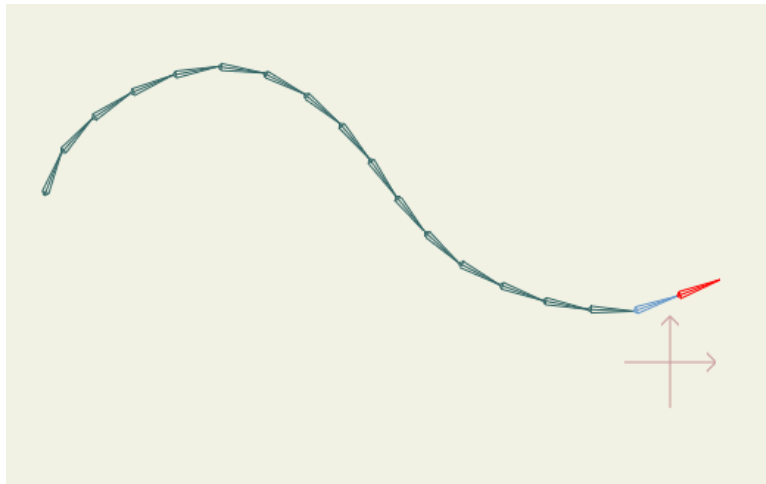
The Sketch Bones tool draws a chain of bones in freehand mode. It allows you create and animate bone chains very quickly, and is suitable for objects like long necks, tails, ropes, or other similar items that bend freely.



Animating a bone chain with the Sketch Bones tool.

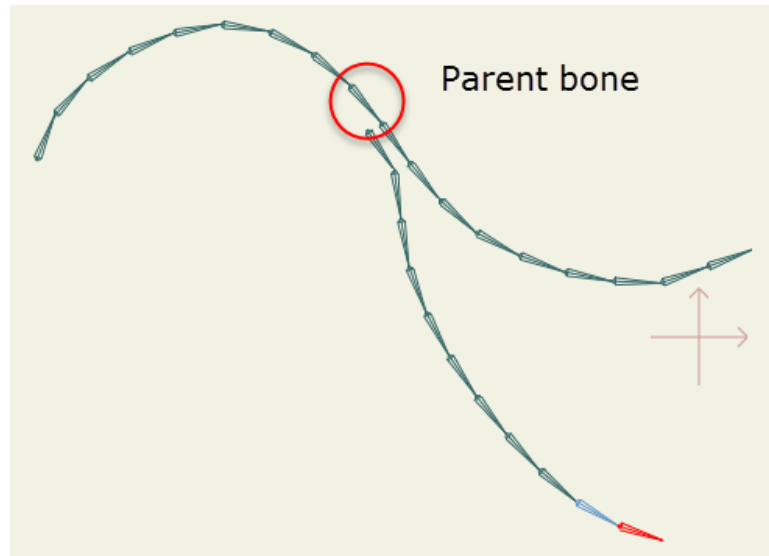
You initially draw the bones on frame 0. The length of the bones can be set using the New Bone Length option in the toolbar.

Press the **Shift** key while drawing to constrain the bone chain horizontally or vertically.



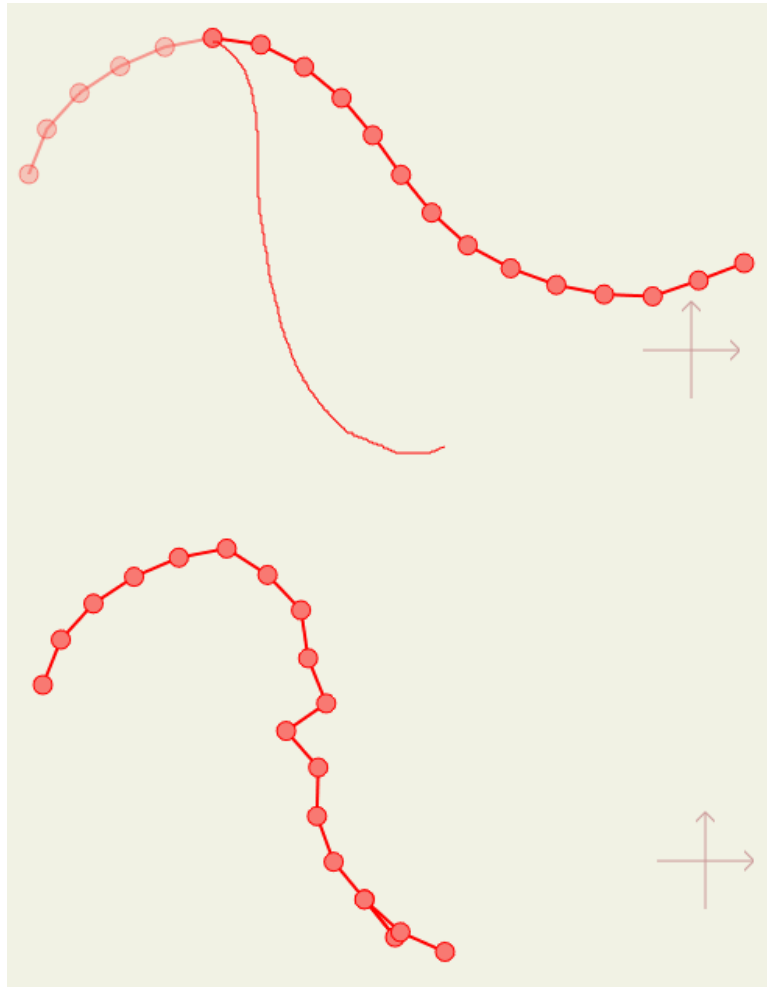
A chain of bones drawn with the Sketch Bones tool.

If you want to create another chain of bones that are a child of one of the bones in the previous chain, select the desired parent bone before adding the new chain.



Another chain with its parent set to an intermediate bone in the first chain.

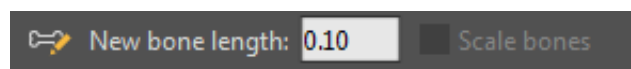
When you use the Sketch Bones tool on a frame other than 0, you can edit the bone chains that you drew on Frame 0. You'll notice that the display of bones is different. When you click on any bone in an existing bone chain and draw a new curve, you reshape the bone chain from that point on. A reference line appears to represent the total length of the chain while you draw the new shape. Once you reach the end of this reference line the Sketch Bones tool will not add additional bones, it will reshape the existing bones to the new shape that you created.



Use the Sketch Bone tool on any frame other than 0 to reshape a bone chain.


Tool Options

The following options appear for the Sketch Bones tool:



Sketch Bone Options

- **New Bone Length:** Enter a numerical value for the length of the new bones.
- **Scale Bones:** When turned on, the chain of bones will scale itself to fit the new curve that you draw while using the Sketch Bones tool on a frame other than 0. The number of bones in the chain will remain the same, regardless of whether the curve is shorter or longer than originally created.

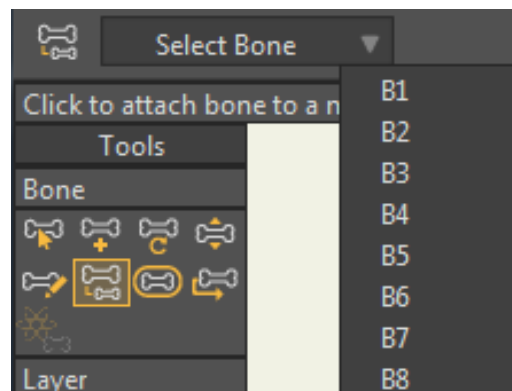
 You can assign Squash and Stretch behavior to selected bones and then use the Scale Bones option to lengthen or shorten the curve. As the curve shortens, the selected bones will “squash” and become fatter. As the curve lengthens, the selected bones will “stretch” and become thinner.

Reparent Bone



Sometimes when building a skeleton, you may accidentally add bones to the wrong parent. Later, when you discover the error, deleting bones and adding new ones is just too much work. Instead, use the Change Parent tool to change a bone's parent. First, select the bone whose parent you want to change (using the Select Bone tool). Then, using this tool, click on the new parent bone. (The new parent will become highlighted in blue.) If you want to turn the selected bone into a root bone (one that has no parent), just click on the background.

Tool Options



Reparent Bone Tool

- **Select Bone:** Click this menu button to select a bone by name.

Bone Strength



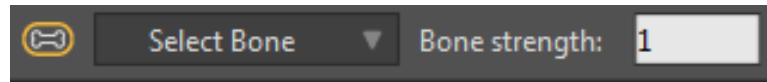
When using bones to control the points in a vector layer or to warp an image layer, by default every bone has some degree of influence over every point in the vector layer (or image). The Bone Strength tool lets you adjust how much influence each bone has. When this tool is activated, a semi-transparent region appears around each bone - this region indicates the strength of the bone. If you drag side to side on a bone with the Bone Strength tool, you cause the region of influence to shrink or grow. Points that are closer to the center of this region move more when the bone itself is moved.

Although by default, all bones have some influence over some points, you can change this behavior. In the Layer Settings dialog, under the Bones tab, there are two options, **Flexible binding** and **Region binding**. Flexible binding means that every bone will influence every point. Region binding, on the other hand, means that a point will only move under the influence of the bone(s) in whose region of influence it lies. If that point only lies in one bone's region, it will only move with that bone - if the point is overlapped by the regions of two bones, it will move with both of those bones.

Flexible binding is the default setting for new bone layers because it works reasonably well almost automatically. The downside is that it leads to rubbery movement of the attached vector artwork. Region binding will give you cleaner movement, but takes a little more work to set up. **“Tutorial 3.4: Character Setup” on**

page 125 in your Moho Tutorial Manual shows you how to use the Bone Strength tool together with both types of binding to quickly set up a character's skeleton.

Tool Options



Bone Strength Options

- **Select Bone:** Click this menu button to select a bone by name.
- **Bone Strength:** Allows you to view or enter a numerical value for bone strength.

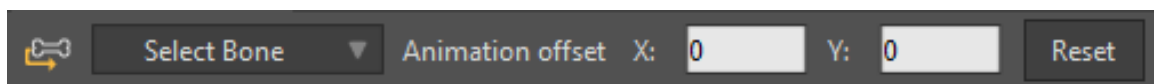
Offset Bone



The Offset Bone tool lets you add an extra amount of bone movement starting at frame 1 of your animation. The reason you might want to do this is to simplify the setup of a complex character. Often, parts of a character such as arms and legs overlap, making it difficult to set up bones and attach the proper parts of the character's body to them. The Offset Bone tool lets you draw the parts of a character in disconnected positions, set up bones, and then move them all back into position.

It's difficult to describe the usefulness of this tool without a hands-on example, so look in **“Tutorial 3.4: Character Setup” on page 125 in your Moho Tutorial Manual**.

Tool Options



Offset Bone Options

- **Select Bone:** Click this menu button to select a bone by name.
- **Animation Offset X:** Allows you to numerically enter a value for the amount of offset on the X axis.
- **Animation Offset Y:** Allows you to numerically enter a value for the amount of offset on the Y axis.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

Bind Layer



Other layers can be contained within a bone layer. For example, you could create a hand layer and place that within an arm layer. To bind the hand to the arm, use this tool. Just click on the bone in the parent layer that you want to

connect to, and the entire layer will move with that bone. In the arm/hand example, you would click on the bone nearest the wrist to bind the hand to the end of the arm.

Use this tool to bind an entire layer to a single bone. If you would rather bind certain points in a vector layer to certain bones, then you should use the Bind Points tool instead.


 *For more information on how to use the Bind Layer tool, see the Layer Binding section of “Tutorial 3.1: Bone Binding” on page 104 in your Moho Tutorial Manual.*

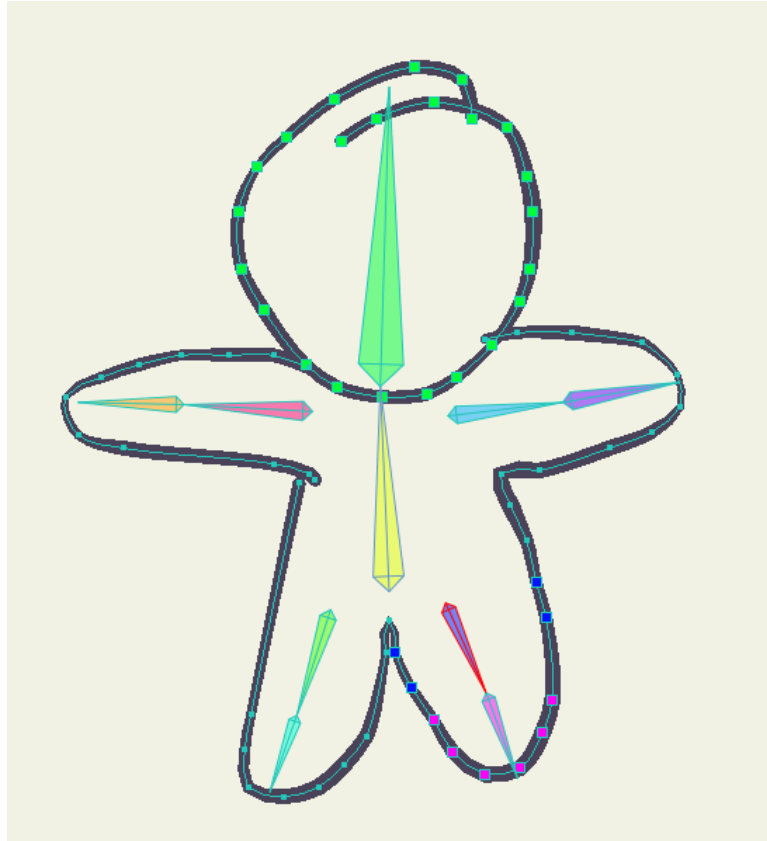
Bind Points



The Bind Points tool operates exactly like the Select Points tool described in “Select Points” on page 39. Use it to select a group of points to bind to a bone. In order to use this tool, you must be on Frame 0, and a bone must first be selected. When a bone is selected, the points that are currently bound to it are automatically selected as well. Use this tool to add or remove points from that selected group. When the correct group of points is selected that you want to bind to the bone, press the spacebar - this tells Moho to perform the binding. This technique is demonstrated in “Tutorial 3.1: Bone Binding” on page 104 in your Moho Tutorial Manual.

 *We don't usually recommend using the Bind Points tool. Instead, the best way to attach points to bones is to use automatic bone binding, together with the Bone Strength tool.*

 *When you use the Bind Points tool on a vector layer, the bones are colored automatically. When points are bound to a bone, they will have the same color as the bone. For example, the points in the head in the image below is bound to a bone, so the bound points are colored the same as the head bone. The other points, which are not yet bound to bones, are still colored with the default point color.*

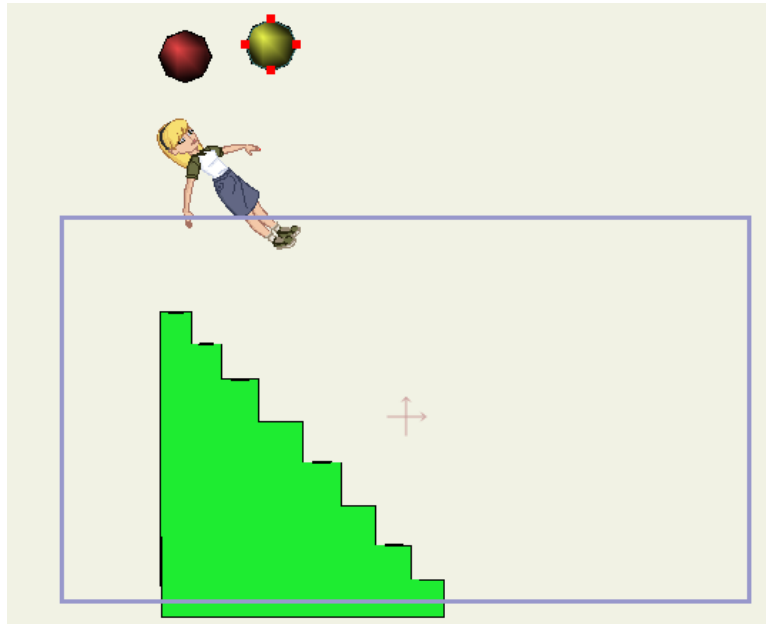


Points that are linked to bones display with the bone color.

Bone Physics (Pro Only)



When objects that have bones are added to a Group layer that has physics applied to it (as mentioned in **“Tutorial 5.9: Basic Physics (Pro Only)”** on page **214** in your **Moho Tutorial Manual**), the bones will respond to the physics properties that you have set for the object. Physics are applied to each bone based upon the bone's area of influence, as set by the Bone Strength tool.

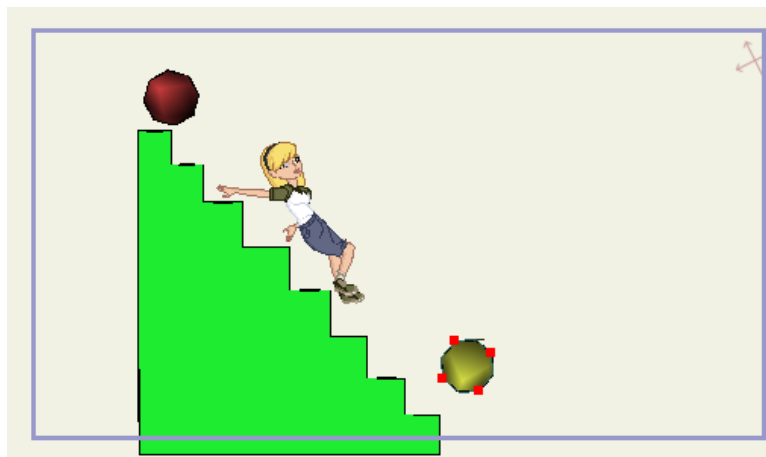


A boned character placed into a physics group

The Bone Physics tool is a setup tool and will only be available at Frame 0, and once a boned object is placed inside a Group layer that has physics enabled. The options mentioned in the following section become available in the Options bar. You can assign different physics properties to the bones by clicking each bone with the Bone Physics tool.

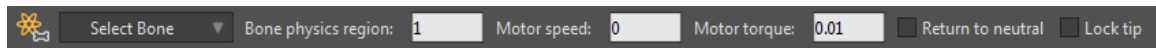
 For additional information on configuring groups and objects for physics, see **“Tutorial 5.9: Basic Physics (Pro Only)”** on page 214 in your Moho Tutorial Manual.

After you set up the objects in your scene, and the bones in your character, you can press the play button to see how the character responds to the physics as it comes into contact with the other stationary and physics-enabled objects in the scene.



The boned character responding to other objects in the scene

Tool Options



Bone Physics tool options.

- **Select Bone:** Click this menu button to select a bone by name.
- **Bone Physics Region:** With physics, bones are represented internally with a kind of pill-shaped region around them, the physics region. You can enter a number numerically, but generally you would just use this tool to click and drag on individual bones to control the size of the physics region, trying to get it to match the underlying character as closely as possible. When you play back the animation, the bone physics regions are what is used in collisions, not the character artwork. (This is because the bending of the character is not directly physics related. The physics pushes the bones around according to the physics regions, and the bones then move the character just like they would if you were hand-animating.)
- **Motor Speed:** . The motor speed is the number of degrees per second the object will rotate (it can be negative to rotate backwards). Depending if the object bumps into obstacles or there are other influences, it may not actually rotate at that speed, but in a zero gravity setup with no collisions, that will be the speed of rotation.
- **Motor Torque:** Motor torque controls the strength of the motor. With low torque, when a motorized object bumps into other objects it may come to a stop, depending on the size and density of the obstacles. With a high torque, it will tend to push obstacles out of its way. Even with no obstacles, if a motorized object is unbalanced (off center of its origin), a low torque setting may mean that it can even lift itself up.
- **Return to Neutral:** Check this option to return the bone to neutral position.
- **Lock Tip:** When physics are in affect, if a bone has its tip locked it acts as though the endpoint of the bone has been nailed to a stationary point.

Smart Bones (Pro Only)

The Smart Bones feature in Moho Pro allows you to have more control over shapes when you bend them with bones. You can use Smart Bones to control the following types of scene elements.

- **In vector layers that are a child of a bone layer:** Point motion, Curvature, Line Width, Fill Color, and Stroke Color.
- In any layer type that is a child of a bone layer: Layer translation, Layer scale, Layer Rotation (X, Y, and Z), Layer Shear, Layer Opacity, Layer Blur

In the same layer as the Smart Bone itself:

- Bone translation
- Bone scale

- Bone rotation

Smart Bones can be used to control the following additional elements:

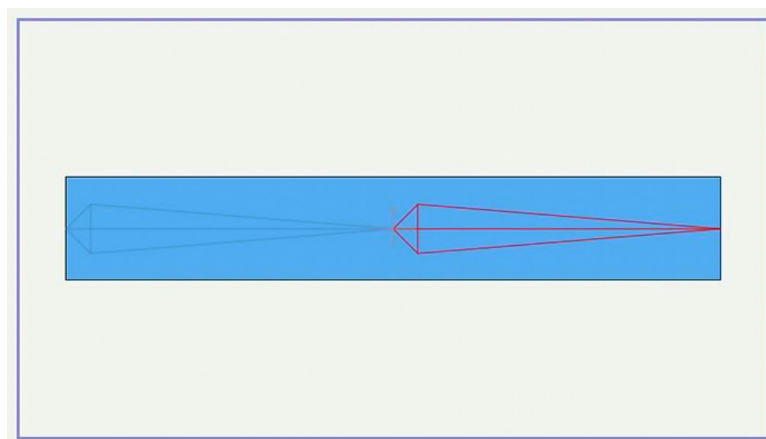
- Stroke exposure: Use Smart Bones to expose more of a stroke along a path as you rotate the bone.
- 3D Thicknesses: Increase or decrease the thickness of vector shapes that have been converted to 3D shapes with Extrude or Inflate.
- Shape and Fill effects: Change the colors and positions in a gradient fill.
- Switch layers
- Layer order
- Layer visibility
- Follow path
- Flip layer horizontally/vertically
- Shape effect positioning

How Smart Bones Work

To illustrate how Smart Bones work, create a vector layer and add a rectangle to it.

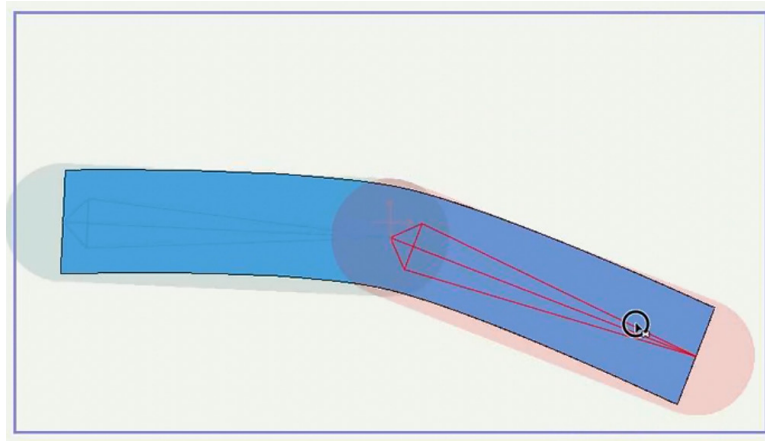
You will eventually add two bones to this rectangle, so you'll also want to make sure that there are some points in the center of the rectangle where the two bones will meet (as a joint).

In the Layers Window, create a bone layer and drag the rectangle vector layer into it. With the Bone layer selected, use the Add Bone tool to create two bones to the bone layer.



Create a rectangle with points at the center; add a bone group, and create two bones.

Use the Bone Strength tool to adjust the bone weights so that the rectangle bends in the center as shown below.




Adjust bone strengths to get a nice bend in the center.

You'll notice that if you bend the bone too far that the area around the bend doesn't look good because the rectangle gets squeezed in the middle.


In previous versions of Anime Studio, the way around this distortion was to add points in the center of the rectangle that would reshape the center appropriately. However, this method resulted in a lot of corrections that had to be made whenever that bone was animated.

Smart Bones use a different approach, by linking a bone rotation to an action, and a resulting correction.

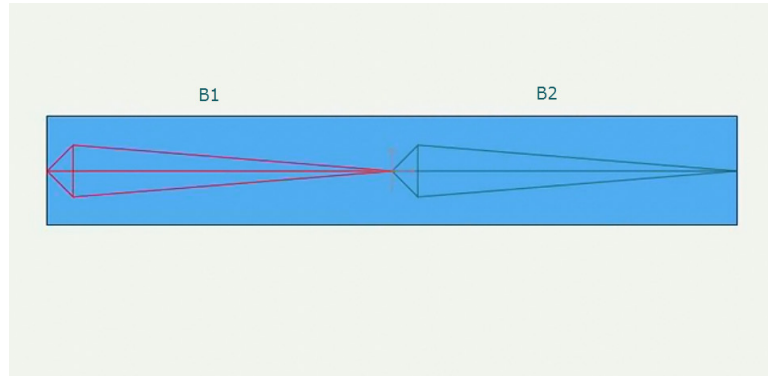
 *The steps that follow describe how to create smart bone actions manually. You can use the **Bone > Make Smart Bone Dial** command to set up the smart bone dials more quickly. See "Make Smart Bone Dial (Pro Only)" on page 464.*

Creating a Smart Bone Action

In order to use this feature, you need to assign a name to each bone that needs correction. In the following figure the bones are named B1 (for the bone on the left) and B2 (for the bone on the right). You can name the bones whatever you want to name them.

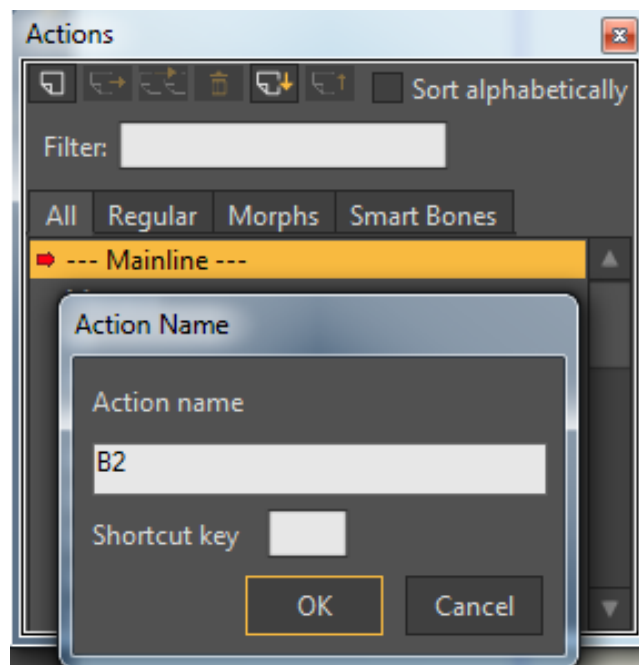
 *Every bone automatically gets named when you create it. By default, the bone is assigned a name such as B1 (for the first bone), B2 (for the second bone) and so on.*

You'll notice when you rotate bone B2 it causes the rectangle to distort when it is bent. You can correct this distortion by creating an action that is associated with that bone.



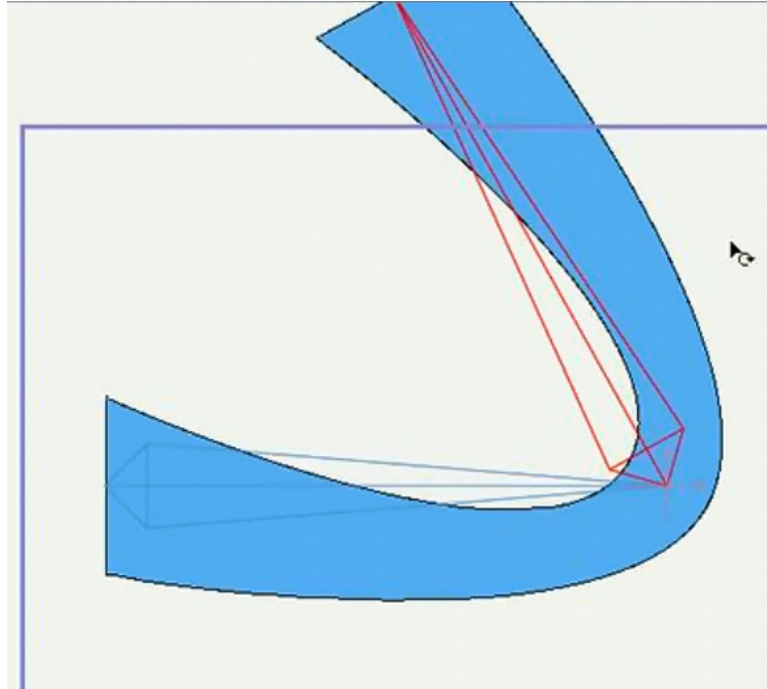
Each bone is assigned a name.

Choose **Window > Actions** to bring up the **Actions** window. If you have a bone selected when you create a new action, Moho will automatically assign the same name as the bone to the new action.



Create a new action, named the same as the bone you want to correct.

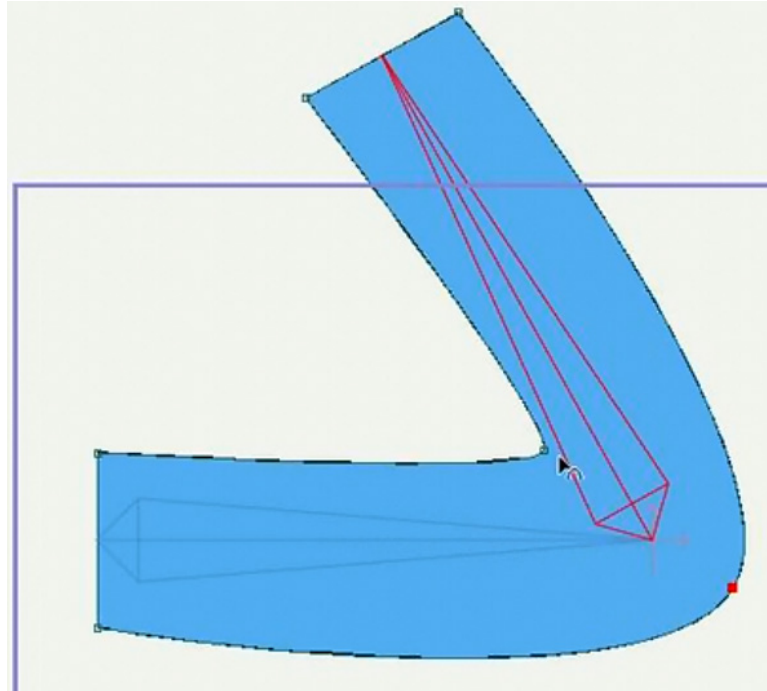
At that point you are editing the action. Choose the Rotate Bone tool in the Tools panel, and rotate the bone as far as you expect it to move (or, to the limit that is set on the bone in that direction).



Rotate the bone to the limit at which you expect it to rotate (upward in this case).

Now switch to the vector layer and use any of the available editing tools to adjust the shape of the rectangle so that it looks good. The joint correction feature can track point movement and curvature changes. This shape will be the target shape for when bone B2 is rotated to that angle.

 When working inside a Smart Bone action, the Manipulate Bones tool can introduce extra unwanted bone motion in the Smart Bone action. For this reason, the Manipulate Bones tool will be disabled.



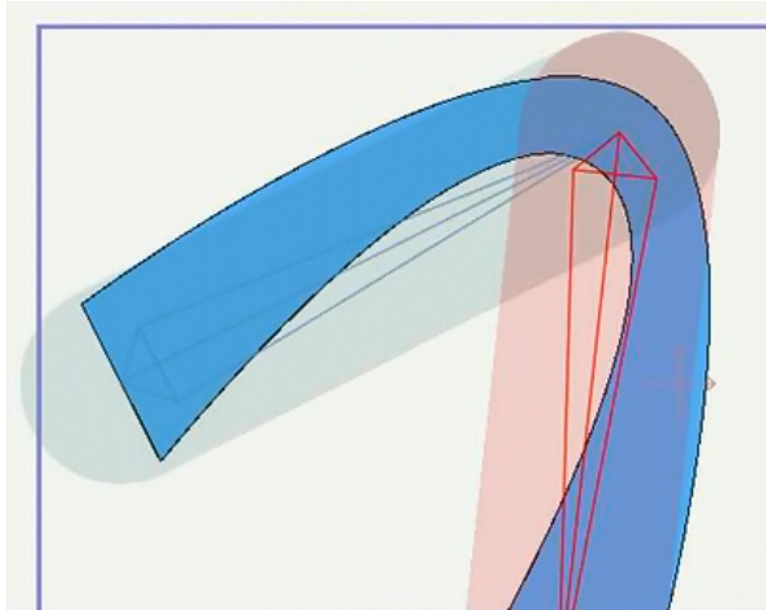
Select the vector layer for the rectangle, and create the target shape for that rotation angle

In the Actions window, switch back to the main timeline by clicking Mainline. Now when you rotate bone B2 toward that angle, it will automatically pick up the action that you just created.

Now the distortion around the joint works much better. You can now go to frames other than zero to add keyframes that animate the bones. The actions will automatically be added when the bone is rotated, and the action will be removed when the bone is straightened.


Creating a Second Smart Bone Action


You've just created an action for the bone when it moves in one direction. However, you also need to create an adjustment for the other direction

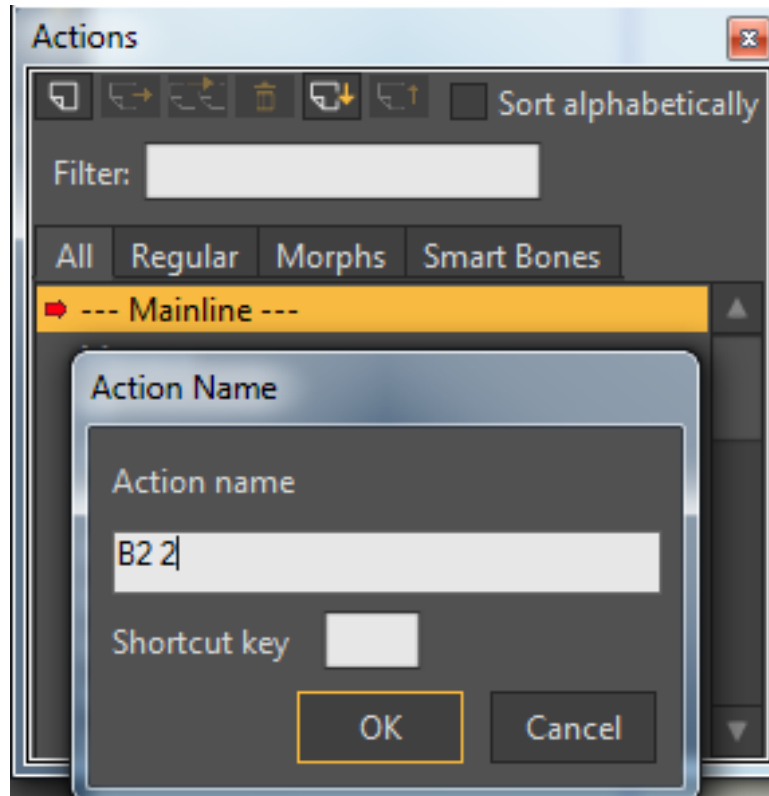


A second action must be created for when B2 is rotated downward.

To create another action that corrects the second direction, go back to the Actions window and create another new action. This bone will be assigned the name of the bone, followed by a space, and the number 2 (B2 2). The B2 prefix associates the action with Bone B2, and the number 2 is a number designation to differentiate it from the first action.

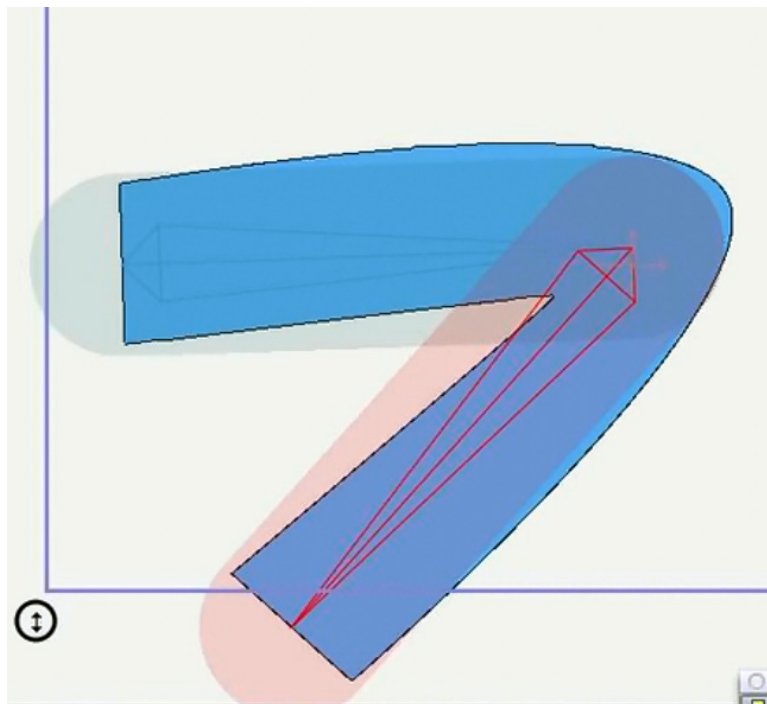
 When you create a second action for the same bone (such as when you want to add a bone that controls in both clockwise and counterclockwise rotation), Moho will automatically append the number 2 after the second action for the same bone.

 A bone can only have two Smart Actions assigned to it (clockwise and counter-clockwise rotation). If you attempt to create a third action for the same bone, the name suggested by the software will be **Action** followed by the first available number greater than 0.



The new action also incorporates the name of the bone you want to correct.

As you did in the first case, select the vector layer for the rectangle, and adjust the shape for when B2 is bent downward. An example is shown in the following figure.

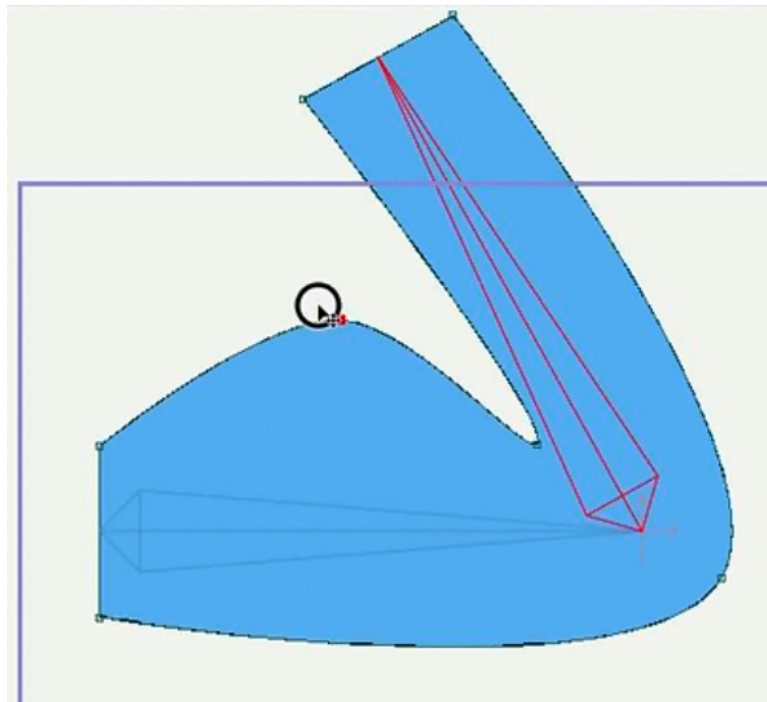


Bend the bone in the other direction to see if adjustments are needed.

Editing a Bone Action

You can also go back to a previous bone action and make corrections to it. For example, when you created the first bone action, it simply improved the shape of the bend. Suppose you want to go back and create something like a muscle bulge for when an arm is bent upward. Bone actions make this process easy to do:

- To begin, go back to frame 0 and add a point to the rectangle, located in the area where you want the muscle bulge to happen.
- Select the first correction action (B2).
- Move the new point like a bulging muscle.




Add a new point and position it to make a bulging muscle.

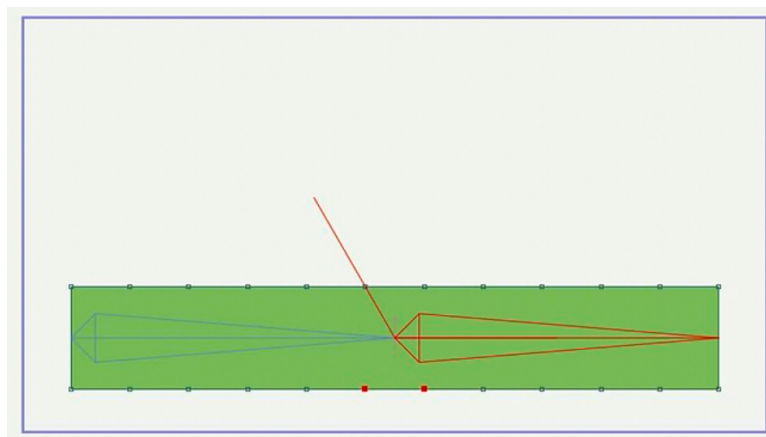
- Go back to the main timeline and play the animation. The keyframes that you originally added will now also include the new muscle bulge when the rectangle is bent in the appropriate dimension. When the arm bends downward, the muscle bulge will not be included because it was not added to the **B2 2** action that bends the arm downward.

Fixing Bad Transitions

You might discover after creating your bone actions that the object doesn't look quite right when it's bent in intermediate positions. For example, objects might bend unpredictably if their point count is too high, or unoptimized. The following solution can help improve the appearance of intermediate frames.

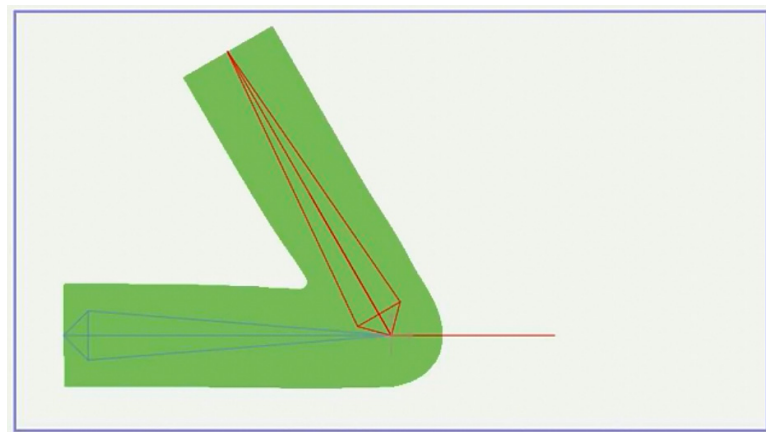
 You can also use Blob Brush to fix a transition between two bones (such as an elbow or knee bend). This type of bone binding can be applied to vector and image layers. For more information about this feature, see "Create Smooth Joint for Bone Pair (Pro Only)" on page 460.

The processes discussed in "Creating a Smart Bone Action" on page 105 and "Creating a Second Smart Bone Action" on page 108 are still used to create your bone action in this case. But in this example you see a rectangle that has many more points along its length (to simulate an object that is not optimized). Most of the points in the rectangle aren't really necessary for it to maintain its shape when it's bent.



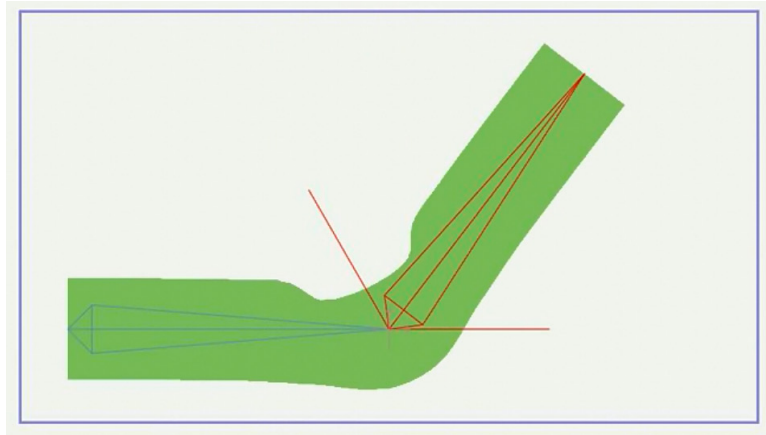
A rectangle with many points along its length

Bones are added to the rectangle, and the second bone (Bone B2) is posed as described earlier in "Creating a Smart Bone Action" on page 105. The end result looks similar to the previous example when Bone B2 is rotated to its extreme position.



Bone B2 bend end result

However, you might notice problems in intermediate positions, such as shown in the following figure. If you only have an action that defines the start and end shapes, you don't have any way to fix interpolation problems that might occur in intermediate frames in your actual animation.



An intermediate frame shows some shaping problems.

If your bone action works fine in the intermediate frames, using just a single frame action, leave it as is.

If the in-between frames are objectionable, you can do the following to correct it:

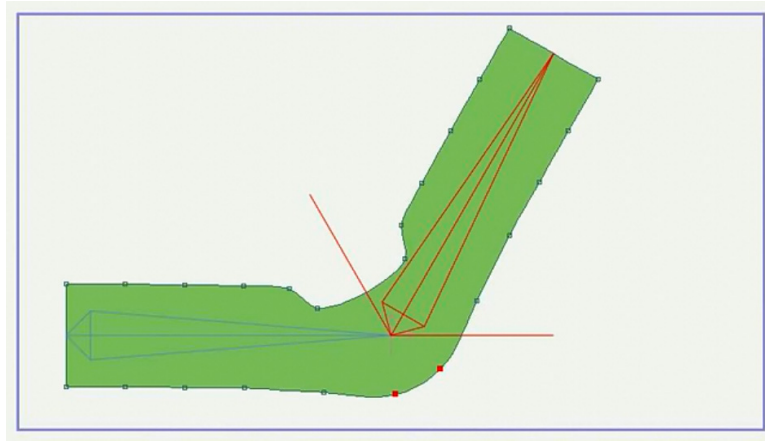
- Go back to the B2 action.
- Instead of creating the angle at frame 1, you can move it somewhere later in time, like frame 120. Move the keyframe for the bone angle out to 120.



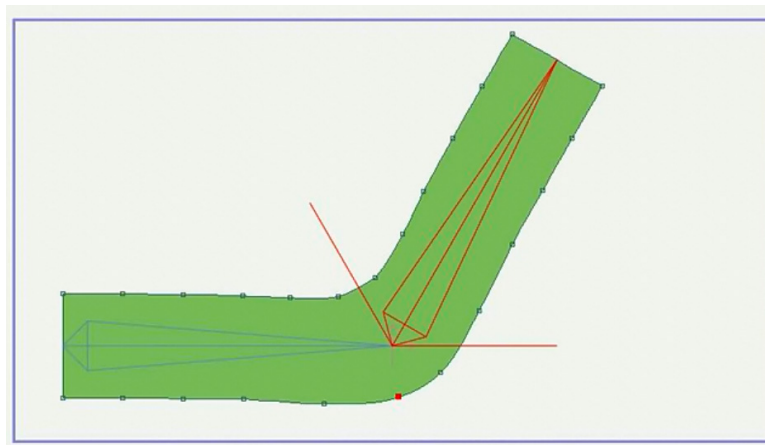
Moho doesn't care how many frames you need to complete the bone action. But because of the nature of the program it interpolates in steps. If an action is too short (3 frames), you only have three steps in between to make the animation smooth. Spreading it out smoother gives you room to correct for a more smooth transition.

Select all of the point positions that you changed for the original bone action and move them out to 120 as well. Now the action takes 120 frames to complete the bend.

- Move to an intermediate frame in that bone action (not in the main timeline) until you locate an area that looks objectionable. Now you can adjust the in between positions of the points. Make sure when you edit the points that they are the only keyframes that are selected.



Frame 60 of the bone action before adjustment.



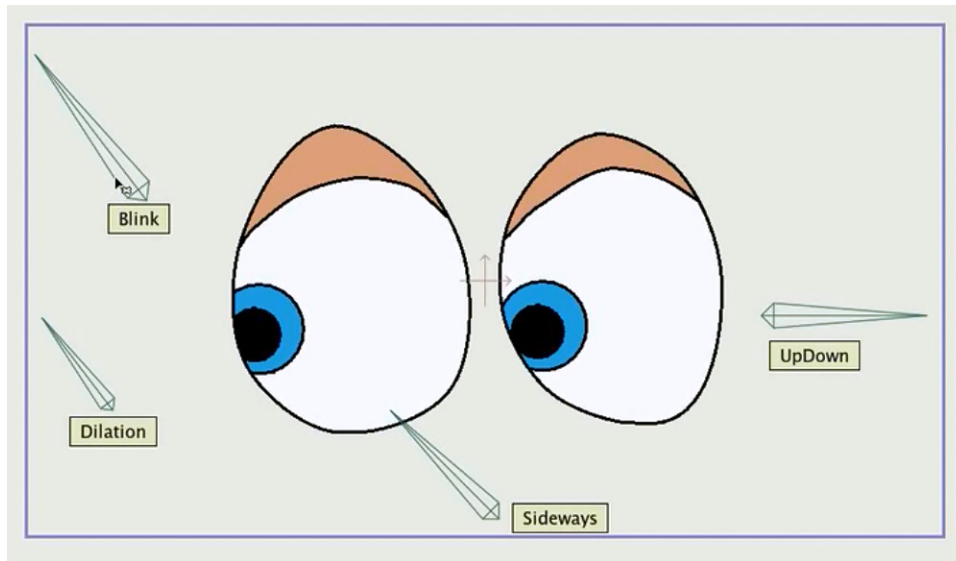
Frame 60 of the bone action after adjustment

After you make your adjustments, scrub through to make sure that there are no other areas that need adjustment. If you find others, just move the points in that frame of the bone action (not in the main timeline) to make additional corrections as needed.

After your edits are complete go back to the main timeline. Test out bending the bone on frame 0.

Other Uses for Bone Actions

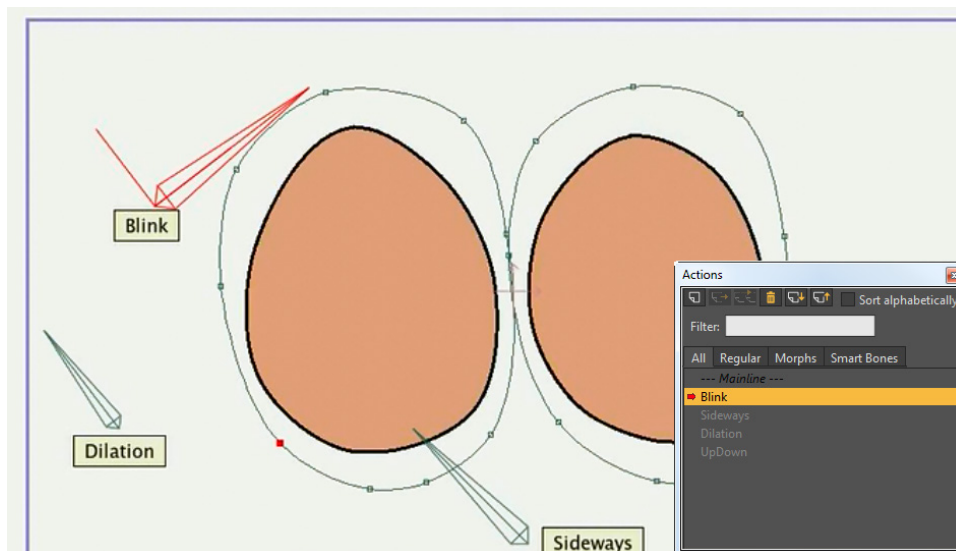
Here are some eyes in which bones have been set up to make the eyes do a variety of movements such as blink, dilation, sideways, and up-down. Tags have been put on the bones to show what the bones are used for, but this is not necessary. The bones aren't really being used as bones, but they are being used as control levers.



Bones used as control levers.

The bones were initially created with the bone strength set to zero. Each of the bones was assigned a name (the name isn't really important but helps you keep track of the actions that the bones are intended to control). When you go to the actions window, you can create actions that match each one of the control levers.

For example, if you are working on the Blink action you rotate the bone to the other extreme, and then adjust the points in the Lids layer to close the eyelids. When you go back to the timeline and move the bone, it closes the eyelid.



A bone used as a control lever to make an eye blink.

Smart Bones and Binding

The original type of binding used in Moho 1.0 was a direct binding method. With direct binding, each point can be bound directly to one particular bone. When that bone moves, the point tracks that bone exactly, without influence from any other bones.

Flexible binding was introduced in later releases of Anime Studio, and is now the default behavior in Moho. The benefit of this type of point binding is that it's relatively easy to make points bend smoothly around joints in a bone structure. With this method, every bone has some kind of influence on every point. Points that are closer to a given bone are more influenced by that bone; but bones that are far away from certain points can also move those points a small amount. Bone strength also plays a part in how much each bone controls each point.

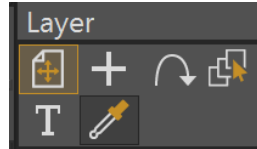
Here's where the type of binding matters: When bones move points, that movement is going to be different depending on the type of binding. When you set up a bone rig with smart bones, the smart bone actions get set up as movement relative to the bone rotation.

If you set up smart bones, but then later change the type of binding on the points, the smart bone actions will no longer be meaningful. Because the basic point motion changes when you change binding, you'll get unexpected results when you apply an action that was designed for a different point motion on top of that.

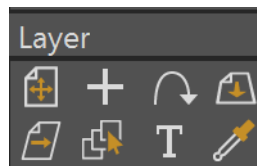
If you need to change the type of point binding for vector layers when working with smart bones, you will generally need to delete and recreate the smart bone actions, or at least review them carefully and tweak them to make sure they still look good with the new point binding. As a general rule of thumb, we recommend that you get the rig to work as well as you can first. Adjust bone position, strength and point binding first, and commit to them before you set up any smart bone actions.

Chapter 6: Layer Tools


The following tools are available to be used with any type of layer. Their purpose is to modify an entire layer, not just an individual object in that layer.



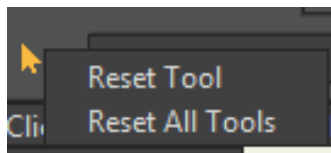
Layer Tools (Debut)



Layer Tools (Pro)

 Moho has a smart tool palette, which shows and hides tools based on their need. The position of the tool shown in the screenshots may differ, depending on the selected layer in the Layers Window, and the current time in the timeline.

 Click the tool icon in the properties bar to display a submenu. Choose **Reset Tool** to reset the current tool to its default settings. Choose **Reset All Tools** to reset all tools to their default settings.



Reset tool options.

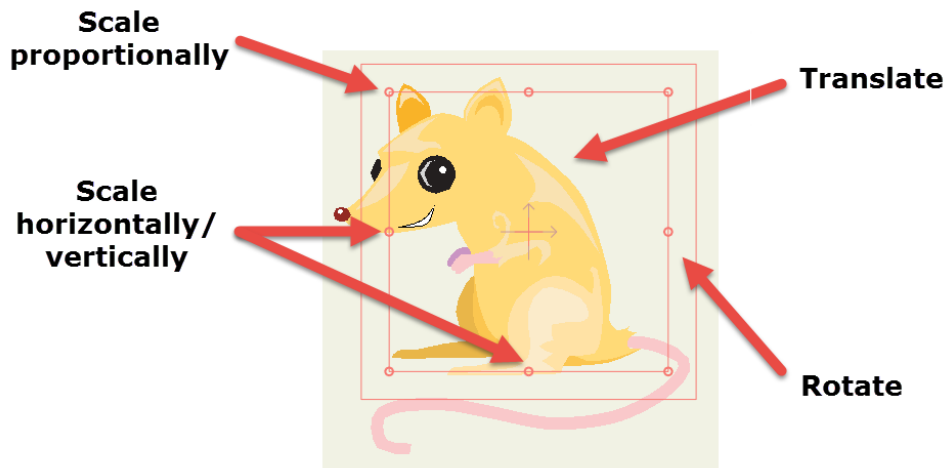
Transform Layer

Animatable: Yes




Use this tool to translate, rotate, or scale the entire layer. It doesn't matter what objects are selected - **everything** in the layer will move when you use this tool.


When the contents of the layer are selected, a pair of rectangles will surround the items in the layer.




Transform Layer rectangle


- **To translate a layer:** Click anywhere inside the inner rectangle to move the layer to a new location.
 - Hold the **Shift** key while translating to constrain the movement to straight horizontal or vertical movement.
 - Hold the **Alt** key while translating to move the layer on the Z (depth) axis.

 When transforming multiple layers with the Transform Layer tool, make sure that you do not transform one or more layers when their parent is also selected. Otherwise, double transforms will result in the child layer(s).

 In Moho Pro, when you move an object forward or backward in Z, it appears to move toward the center of the camera. What you are seeing is a perspective effect. If you want to move an object backward but keep the visual size the same, press the **SHIFT** and **ALT** keys together while you transform the layer. You will see the object move backward or forward, but it will also be transformed along the X and Y axes as well. This will make the layer appear as though it is moving forward or backward from its center.

 In Moho Pro, when you release the mouse after transforming the layer with the **Shift ALT** keys, it will appear as though the layer pops back to its original size. If you rotate the camera you'll see that the object has become larger. This helps you maintain the same composition from the view of the camera, allowing you to compose your scene in 2D but then add depth to it in Moho. As you move the object forward or backward the change in scale reflects the amount that the object is moved. After you release the mouse, the object changes scale to retain the original composition of the scene.

- **To rotate a layer:** Click in the area between the inner and outer rectangles, and drag up, down, left, or right to rotate the layer around its origin point.
 - Hold the **Shift** key while rotating to snap the rotation to 45 degree angles.
- **To scale a layer:** Click one of the corner handles to scale the layer uniformly. Scaling is proportional by default. To perform non-proportional scaling with a corner handle, press the **Shift** key while you scale the object.
- Drag a handle on the top, bottom, right, or left edge of the rectangle to scale the object horizontally or vertically.
 - Press the **Alt** key while scaling to maintain the volume of the object while you scale ... in other words, if you increase the height of an object, the width will decrease; or if you increase the width of an object, the height will decrease.

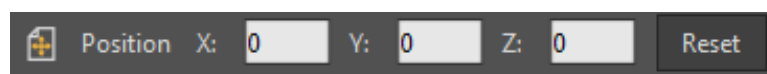
 *When you are working with a 3D camera, the original plane of the object might not be the best place to move the object. You can use the Pan and Tilt camera tools to position the camera along the plane in which you want to move the object, and then use the Transform Layer tool to move the object along the plane of the camera's current view.*

If the **Show Path** box in the tool options area is checked, then the motion path for the current layer will be displayed in the working area when this tool is active. This makes it easier to visualize and plan out the motion of a layer.

Direct Path Editing: To edit the motion path directly, hold down the **Ctrl** key (Windows) or **Cmd** key (Mac) , then click and drag anywhere on the motion path to adjust the curve that the layer will follow through space.

Nudging: When this tool is active, you can nudge a layer by small increments by holding down the **Ctrl** key (Windows) or **Cmd** key (Mac) and pressing the arrow keys. Hold down **Shift** in addition to **Ctrl/Cmd** to nudge the layer by a greater increment.

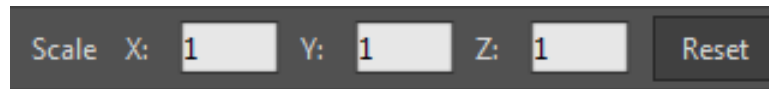
Tool Options (for Translating)



Transform Layer Options for Translating

- **Position X:** Allows you to numerically enter a value for the X coordinate.
- **Position Y:** Allows you to numerically enter a value for the Y coordinate.
- **Position Z:** Allows you to numerically enter a value for the Z coordinate.'
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

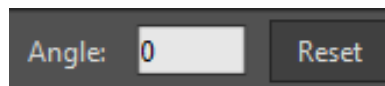
Tool Options (for Scaling)



Transform Layer Options for Scaling

- **Scale X:** Allows you to enter a numeric value for scaling along the X axis.
- **Scale Y:** Allows you to enter a numeric value for scaling along the Y axis.
- **Scale Z:** Allows you to enter a numeric value for scaling along the Z axis.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

Tool Options (for Rotating)



Transform Layer Options for Rotating

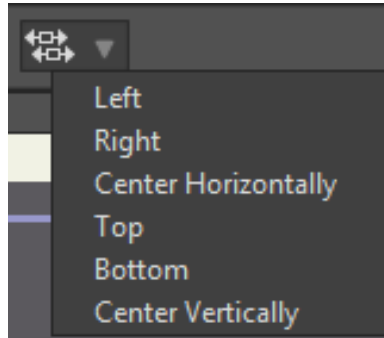
- **Angle:** Allows you to enter a numerical value for rotation along the Z axis.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

Tool Options (Other)



Other Transform Layer Options

- **Show Path:** Check this option to display the motion path on the layer. Uncheck the option to turn the motion path display off.
- **Flip Layer Horizontally:** Click this button to flip horizontally.
- **Flip Layer Vertically:** Click this button to flip vertically.
- **Alignment:** After you select two or more layers, click the Alignment button to choose how you want to align them. Options are **Left**, **Right**, **Center Horizontally**, **Top**, **Bottom**, or **Center Vertically**.




Alignment button and options

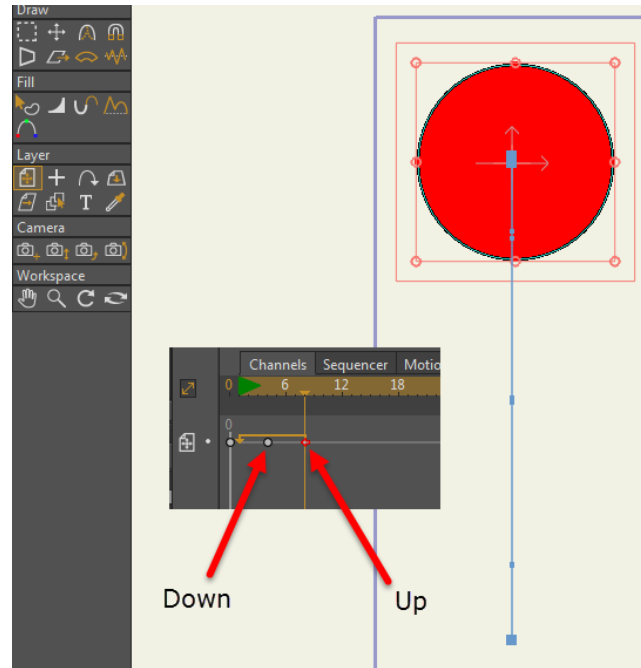
Separating Timeline Channels (Pro only)

Moho allows you to separate timeline channels so that you can work with them independently. For example, the following types of channels can be separated:

- Layer translation
- Layer scale
- Layer shear
- Camera tracking
- Camera pan/tilt
- Selected bone translation
- Selected point position

 *For bone and point channels, you can only work with selected bones or points because it is more than likely that you do not want to split all bones or points in a given layer. Working with selected channels gives you more control over the items in the channels that you want to split.*

When layer transformations appear in the timeline, you can separate them into the X, Y and Z layer transformation channels in the timeline. To illustrate how this works, assume that you want to make a ball bounce up and down and move across the screen. You begin by creating the up/down motion (along the Y axis) with the ball moving down at frame 4, and up again at frame 8. Next, you add a cycle in the timeline at frame 8 to create the bounce.



Simple bounce keyframes with cycle

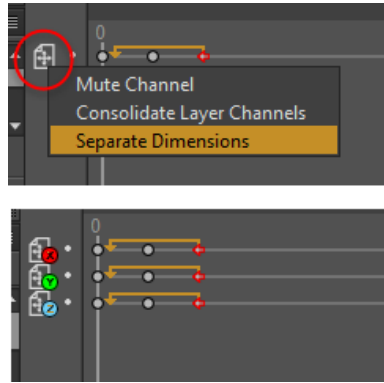
Now you want to make the bounce move across the screen. So you advance to a later frame and move the ball sideways (along the X axis). But in doing this, you break the cycle. The ball moves up and down in its cycle until it reaches the frame where you transformed it to the right side of the screen, and suddenly jumps to that spot.

You can separate the transform channels in the timeline to have more control over how this bounce works. To separate the channels, you first delete the keyframes that moved the ball to the right side of the screen, leaving only the bounce cycle that you created at the beginning.

Now right-click the Transformation channel icon at the left side of the timeline, and choose **Separate Dimensions**. After doing that you will see three individual channels in the timeline, and all of the keyframes that you created appear for each individual channel.

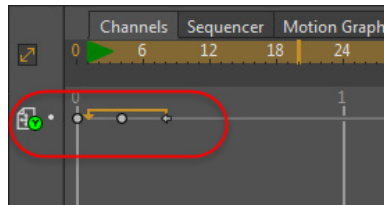
 The Red channel is the X translation (left to right); the Green channel is the Y translation (up and down); and the Blue channel is the Z translation (forward to backward).

 You can right-click on a separated channel icon and choose **Rejoin Dimensions** to merge the separated channels back together again.



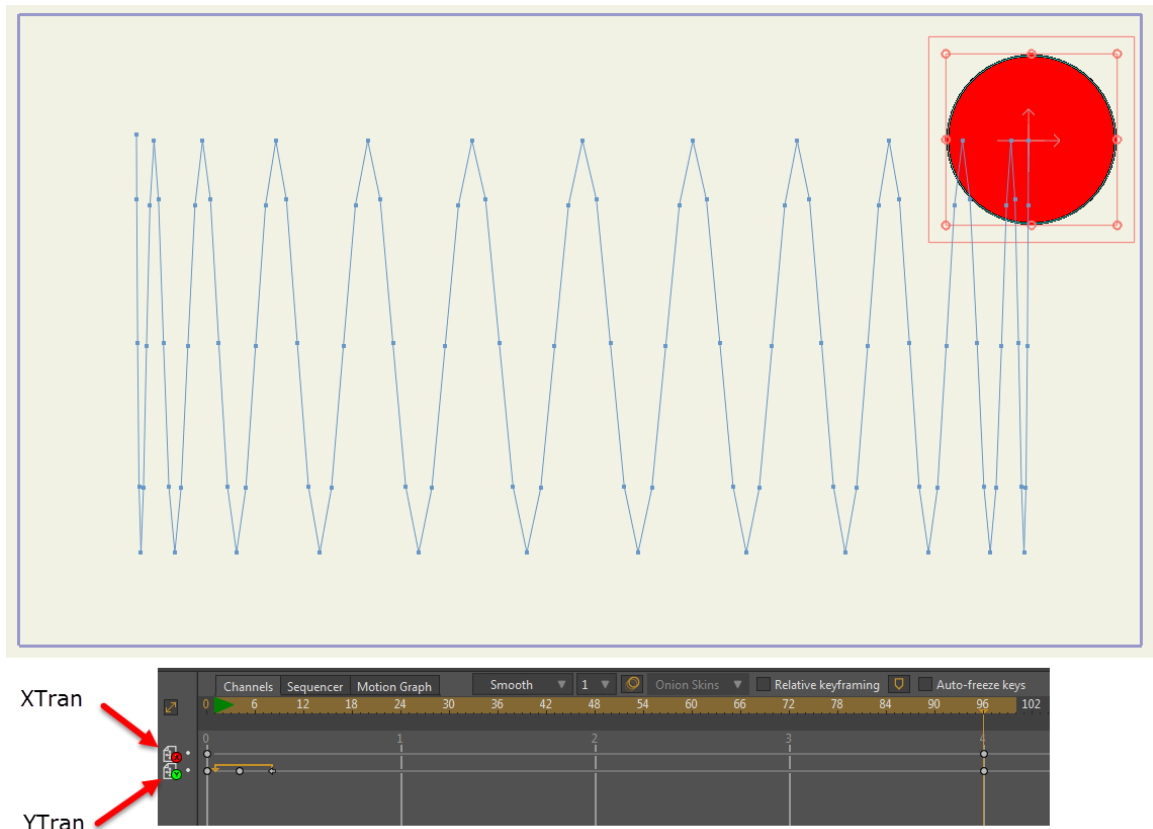
Separated channels for the bounce cycle

Since the bounce happens in the Y (up and down) dimension, you can delete the X and Z channels in the timeline. Select the X (red) and Z (blue) channels, and delete them. When you play back the animation you should still see your ball bounce.



X and Z channels are removed from the bounce cycle

Now you can advance to your later frame, and translate the ball to the right side of the screen. You'll notice now that Moho displays a path that will cause the ball to bounce up and down from left to right.



Move the ball toward the right to create the bouncing ball.

Set Origin

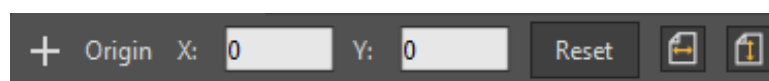
Animatable: Yes



With the Set Origin tool selected, click anywhere in the layer to set the origin to that point. The origin of a layer is indicated by the crosshair displayed when editing that layer. The origin is the point that the layer rotates around when using the Rotate Layer tool, and the point that the layer resizes around when using the Transform Layer tool. The location of the origin can also define how a layer will move when it is attached to a group of bones.

Although you can change the origin at any time, the position of a layer's origin is not animated. We recommend setting the layer's origin just once, and then leaving it alone for the rest of the animation - otherwise unpredictable movement can occur. In most cases, you will never need to change the origin of a layer at all.

Tool Options



Set Origin Options


- **Origin X:** Allows you to view or enter a numerical value for the X origin


- **Origin Y:** Allows you to view or enter a numerical value for the Y origin
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.
- **Flip Layer Horizontally:** Click this button to flip horizontally.
- **Flip Layer Vertically:** Click this button to flip vertically.

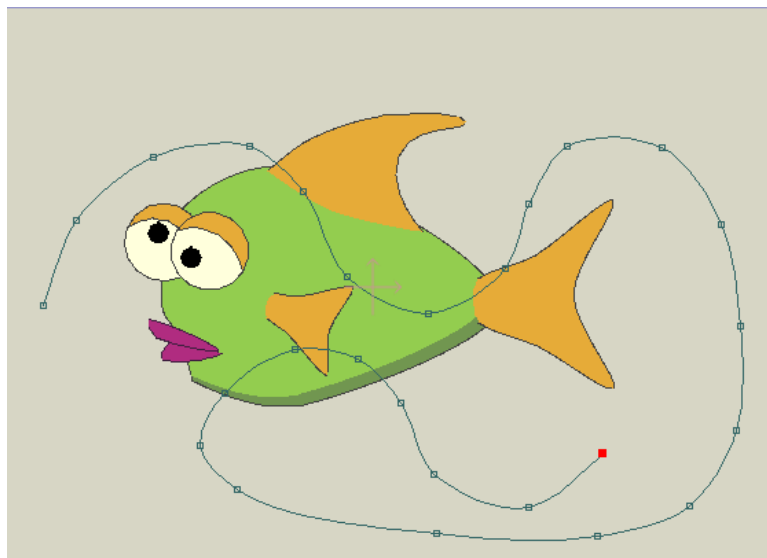
Follow Path



This tool allows you to assign any layer to follow a path in your scene. You will need two layers, one with the path, and the other with the object that will follow the path.

 Previously, there was no indication that a layer was set to follow a path. This could make it very confusing when opening a file you weren't familiar with (or hadn't used in a while). Certain layers might move in unexpected ways. Now, layers that follow a path get a little extra squiggly line (indicating path following) on top of their icon in the Layers Window.

 If a layer follows a path, an extra squiggly line will appear on top of their icon in the Layers Window.

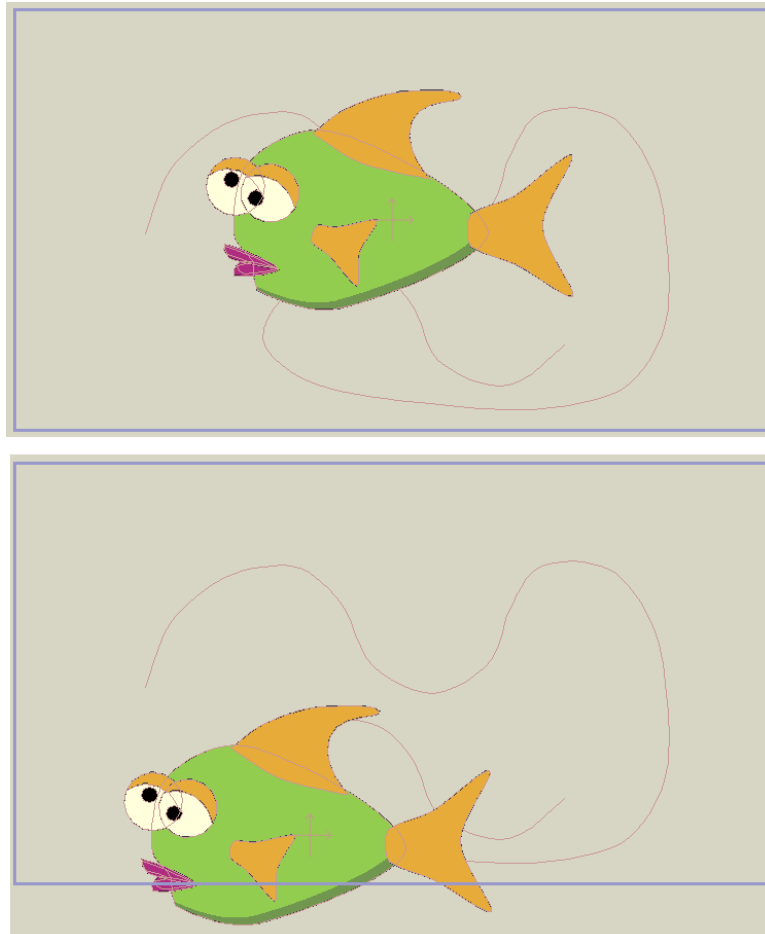


Two layers, one with a path, and another with a character or object

To use the tool, select the layer that contains object that you want to follow the path. Then select the **Follow Path** tool from the Layer section of the toolbox. The path appears in the scene after you select the Follow Path tool. Click the path in the scene to reposition the object to the beginning of the curve.

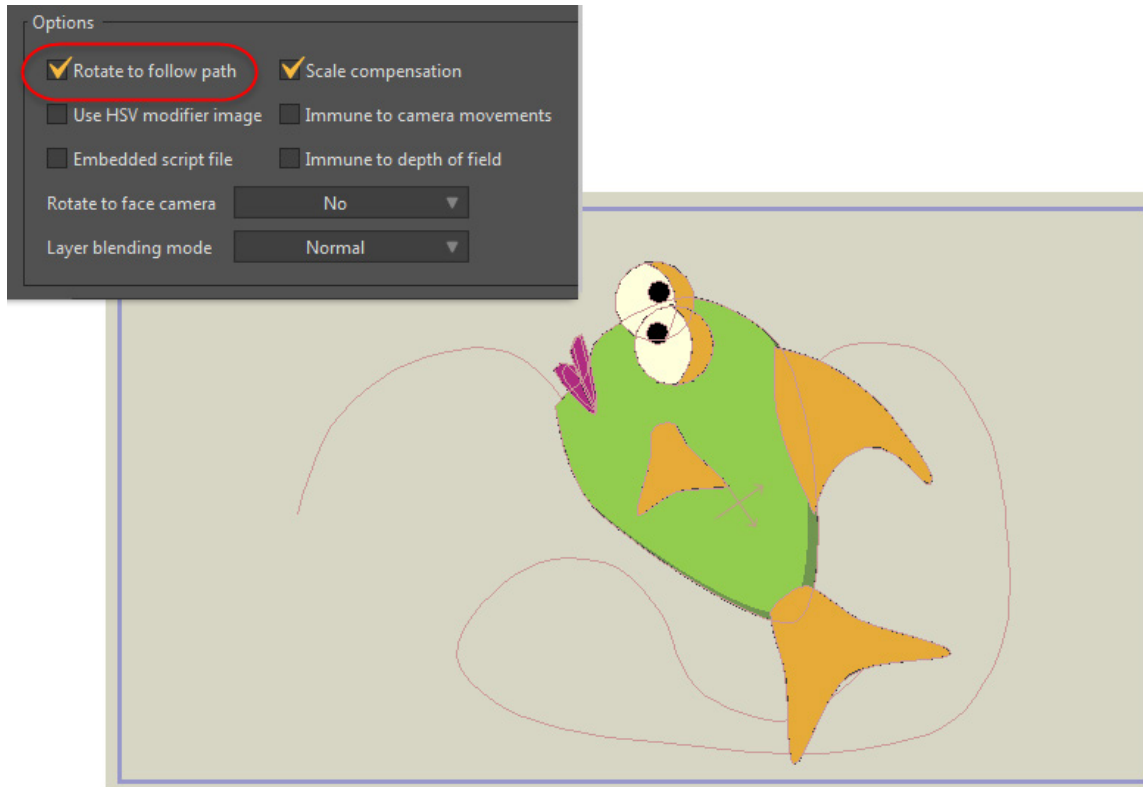
You can click and drag left or right with the Follow Path tool to position the object along the curve at any point. You can then move to a later frame in your animation

and set the object to a new position. This allows you to animate the object travelling along the path.





The fish before and after it is placed on the path with the Follow Path tool

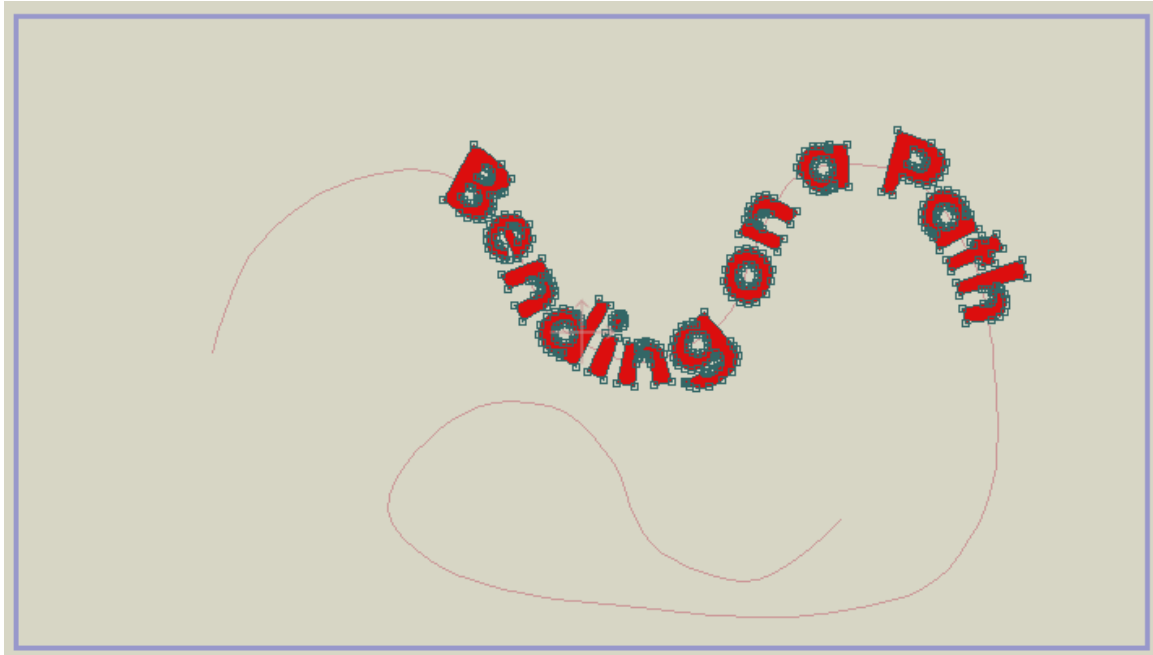
You can set the object to rotate so that it follows the path. Double-click the object's layer in the **Layers** Window, which opens to the **General** tab. Check the **Rotate to follow path** option in the **Options** section of the Layer Settings dialog and click **OK**. This causes the object to automatically orient itself to follow the path to which it is assigned.



Check the Rotate to Follow Path option in the Layer Settings dialog to orient the object to the path

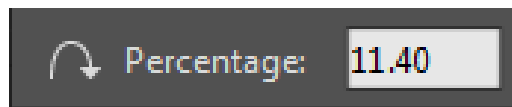
 You can also combine path following with the Stroke Exposure tool, and expose the stroke of the curve while the object moves along the path.

 If you hold down the **Alt** key while clicking on a curve, the object will now bend along the curve. This allows for text bending, characters that warp along a path (like a snake), and so on. You can animate this effect. For example if you go to another point in the timeline, you can Alt-click somewhere else on the curve.



Press the Alt key while using the Follow Path tool to bend the object along the path

Tool Options



Follow Path Options

- **Percentage:** Allows you to enter a numerical value for the position of the object on the path. A value of 0 places the object at the beginning of the path, while a value of 100 places the object at the end.

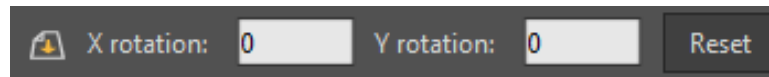
Rotate Layer XY (Pro Only)



Click and drag up and down to rotate the layer around the X (horizontal) axis. This is a true 3D rotation, so that one half of the layer rotates into the screen and the other half out of the screen.

Click and drag side-to-side to rotate the layer around the Y (vertical) axis. This is a true 3D rotation, so that one half of the layer rotates into the screen and the other half out of the screen. You can verify this by using the Orbit Workspace tool to change your view of the scene.

Tool Options



Rotate Layer XY Options

- **X Rotation:** Allows you to enter a numerical value for rotation along the X axis.
- **Y Rotation:** Allows you to enter a numerical value for rotation along the Y axis.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

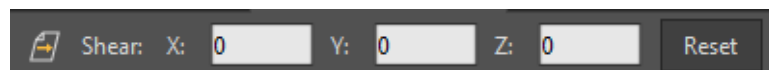
Shear Layer (Pro Only)

Animatable: Yes



Use this tool to shear the current layer horizontally or vertically. Click and drag to shear, or slant the current layer to the left, right, up, or down.

Tool Options



Shear Layer Options

- **Shear X:** Allows you to view or enter a numerical value for shear along the X axis.
- **Shear Y:** Allows you to view or enter a numerical value for shear along the Y axis.
- **Shear Z:** Allows you to view or enter a numerical value for shear along the Z axis.
- **Reset:** If pressed at Frame 0, resets a layer back to its default value. If pressed at any other frame, resets the layer to the value or values set at frame 0.

Layer Selector



The Layer Selector helps you quickly find and edit the vector, image, and 3D content in your layers. It is very helpful, especially when you have dozens or hundreds of layers in your project and can't remember which layer a specific shape appears on.



This tool can be also be used by Alt Right-clicking on the object that you want to select.

You can Alt Right click any layer type that has visible contents. If you click a shape that appears in a Bone group, for example, it will select the vector layer that appears within that Bone group.

There are no options for this tool. Simply click on the object you want to select, and its layer is automatically selected for editing. If there are multiple objects in the layer, the object that you click on is the selected object.

Insert Text



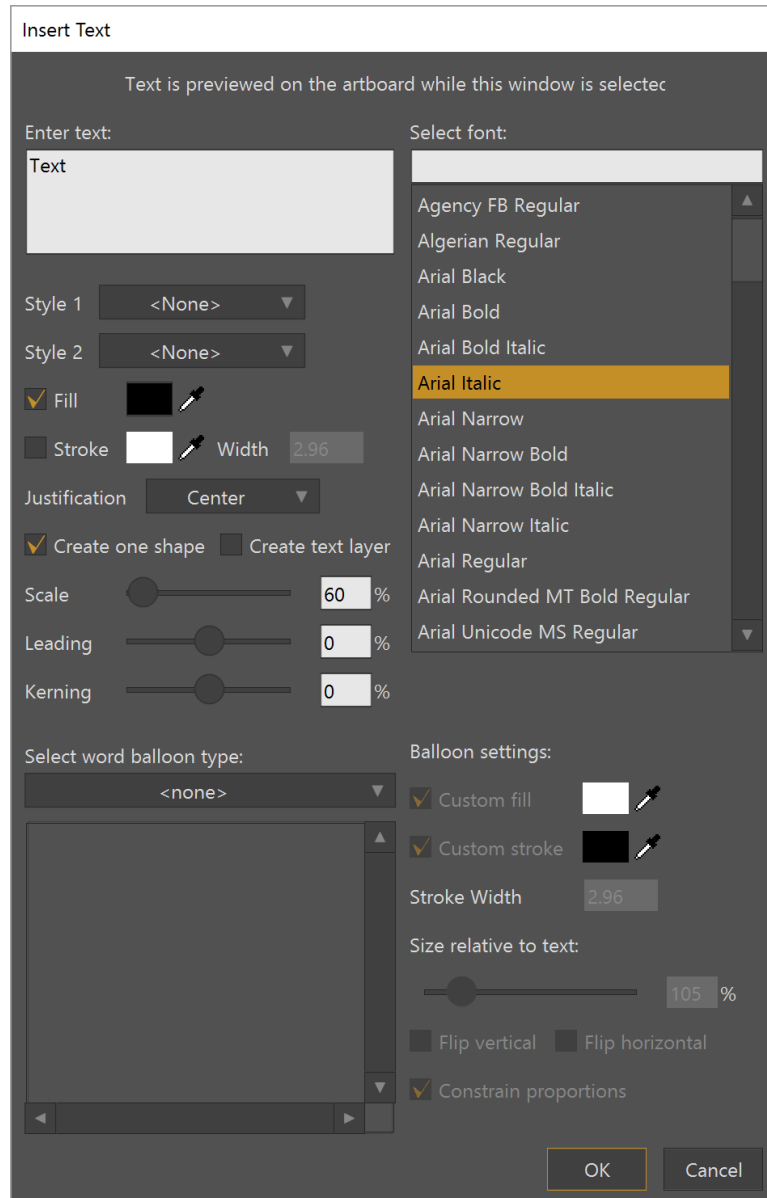
Moho allows you to enter text in your projects. While doing so, you have the option to automatically create a word balloon that encloses the text.



Moho supports both TrueType and OpenType fonts in Windows.

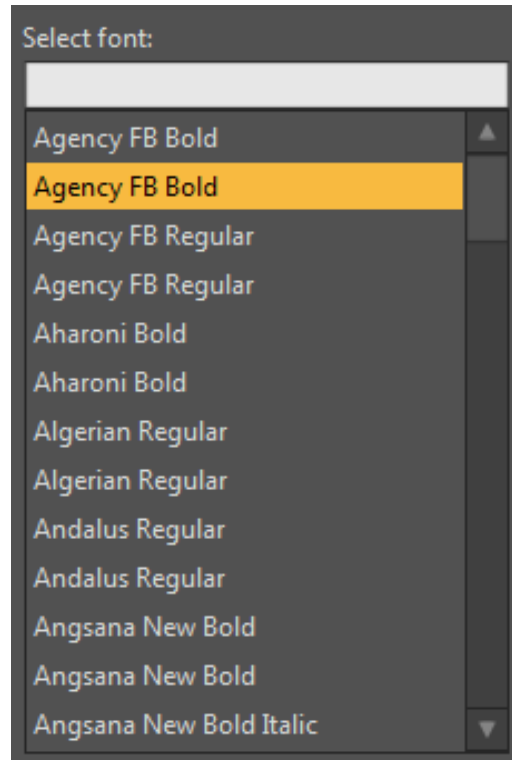
The following example explains how you can add text and a word balloon inside a project:

1. Choose one of the following to open the Insert Text dialog:
 - In the Layers Window, create a new Text layer.
 - Click the **Insert Text** Tool, located in the Layer Tools section.
 - Choose **Draw > Insert Text**
 - Use the keyboard shortcut **COMMAND/Ctrl T**. The Insert Text dialog appears.




Insert Text Options

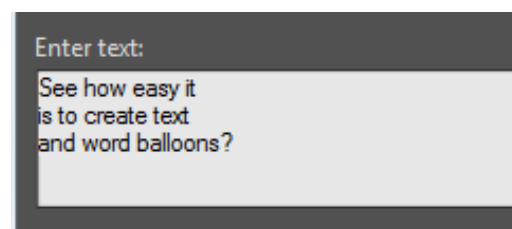
2. The Select Font list displays all of the fonts on your system. Select the font that you want to use from the list.



Select Font list

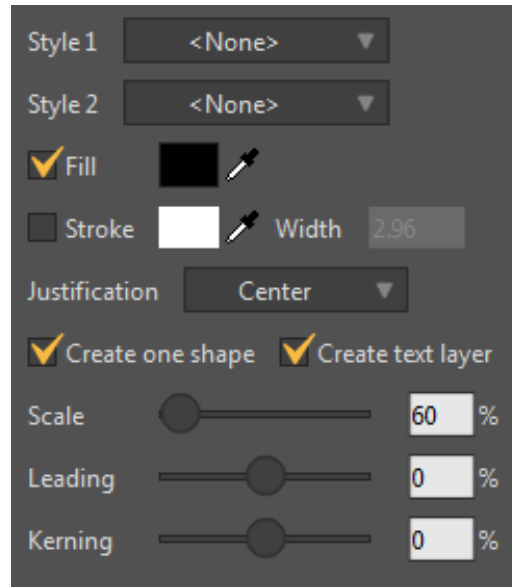
3. Enter the text in the Text field. The project window will update as you type.

 *Word balloons will automatically resize to accommodate the text. If you want to break the text into multiple lines, you will need to press the Enter key where you want a line break to occur.*




Enter your text in the text field.


4. Use the remaining settings to set additional text properties as follows:

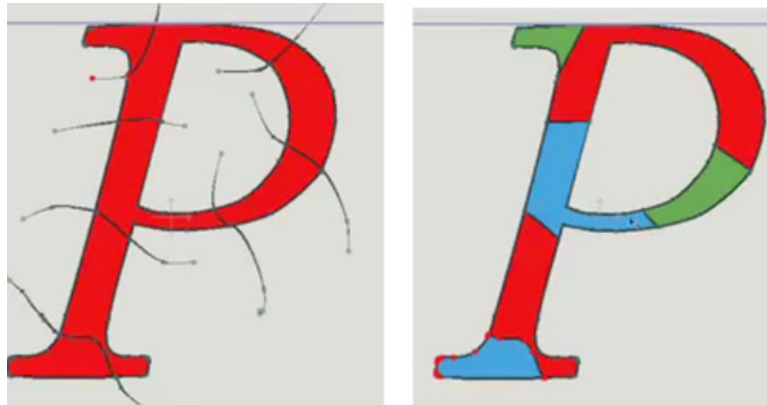


Select fill, stroke, and other font options.

- **Style 1 or Style 2 (Pro Only):** Select a saved style to assign to the text.
- **Fill:** Check this option if you want your text to be filled with a solid color. Uncheck the option if you want your text to only use an outline stroke (described next). For filled text, click the color swatch or use the eyedropper to select the fill color.
- **Stroke:** Check this option if you want your text to have an outline. Click the Color swatch or use the eyedropper to select the outline color.
- **Width:** Enter the desired pixel width for the outline stroke in the **Width** field.
- **Justification:** Click the justification type that you want to apply to the text. Choices are **Left**, **Center** (the default), or **Right**.
- **Create One Shape:** With this option checked, your text object will be added to the currently selected layer. This text will be added as a vector object and will not be editable.

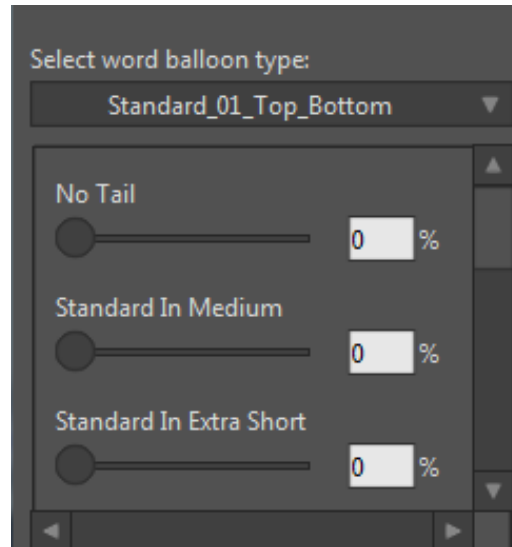
 If you leave the **Create Text Layer** option unchecked, your text object can be manipulated just like anything else. This includes using any of the drawing tools to distort its shape, or to add new points in the middle of a character. This also means that in order to move or rotate a text object, you need to select all the points in the object. This is easy to do using the **Select Points** tool - just click on the filled in area of the text to select all of it.

 If your text is added as a vector object, you can use the Freehand tool and Delete Edge tool to create uniquely colored text. First, create your text as normal, making sure that there is a stroke on the text. Then use the Freehand tool (with its Auto Weld option on) to slice the text or letter up into shapes that you can color differently. Finally, use the Delete Edge tool to remove the lines that hang out from the edges of the text. See “Freehand” on page 49 and “Delete Edge” on page 53 for more information on how to use those tools.



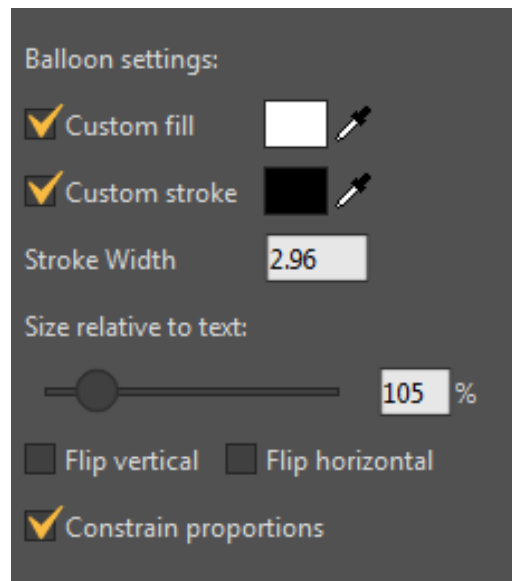
Create colorful text using the Freehand and Delete Edge tools with the Insert Text tool.

- **Create Text Layer:** With this option checked, a new text layer will be created, and you can easily edit the text afterward. To do so, open the Layer Settings dialog and click the Text tab to make your changes.
 - **Scale:** Use the Scale slider to increase or decrease the text size, or enter a scale value in the Scale field.
 - **Leading:** Use the Leading slider to adjust the spacing that appears between multiple lines of text. Move toward the left to decrease space, and toward the right to increase space. Negative values are also valid.
 - **Kerning:** Use the Kerning slider to adjust the amount of space between letters. Move toward the left to decrease space, and toward the right to increase space. Negative values are also valid.
5. If you want to use a word balloon to enclose your text, select one of the word balloons from the **Select word balloon type** list. Otherwise, choose **<none>** if you do not want to use a word balloon.
 6. Additional word balloon options (custom for each word balloon type) appear beneath the selection. These options allow you to change the appearance of the word balloon. For example, you might find options that affect the appearance and placement of the balloon tail, or whether the outer edges of the balloon are smooth or cloud-like. Each of these balloon morphs are set to zero, initially. You can move the dials in any combination to change the appearance of the balloon. The preview window updates as you make your changes. The text will appear in your document, pre-filled with the current fill color and style, and it can be resized and positioned just like any other object.



Choose a word balloon type, if desired, and use the balloon morphs to customize its appearance.

7. Use the following settings to determine the color and size of the word balloon:

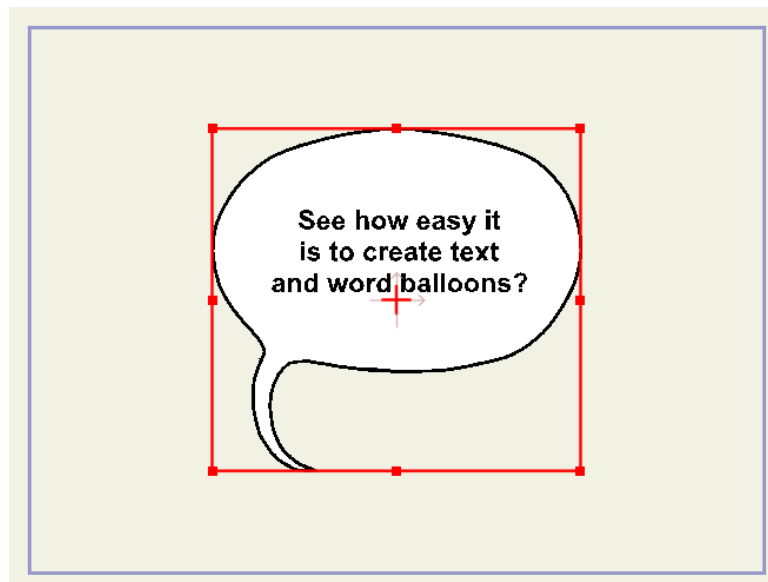


Choose a word balloon type, if desired, and use the balloon morphs to customize its appearance.

- **Custom Fill:** Check this option if you want to select a fill color for the word balloon. Click the color swatch or use the eyedropper to choose the desired fill color.
- **Custom Stroke:** Check this option if you want to select a stroke (outline) color for the balloon. Click the color swatch or use the eyedropper to choose the desired stroke color.
- **Stroke Width:** Enter the width of the stroke used for the word balloon in pixels.

- **Size Relative to Text:** Use this slider to increase or decrease the amount of white space that appears between the text and the outer edges of the balloon. Move the slider toward the left to decrease the amount of space, and toward the right to increase the amount of space.
- **Flip Vertical:** Check this option to flip the object vertically. For example, if the tail is on the bottom of the balloon by default, it will place the tail on the top.
- **Flip Horizontal:** Check this option to flip the object horizontally. For example, if the tail is on the left side of the balloon by default, it will flip the balloon so that the tail is on the right side.
- **Constrain Proportions:** Check this option if you want to keep an equal amount of white space around the width and height of the balloon. When unchecked, the height of the balloon will be closer to the text, and the width of the balloon will have more white space.

8. Press OK to add the text to your project.



Text added as a text layer.

Creating Word Balloons (Pro Only)

You can use Moho Pro to create word balloons for your own use. Briefly, the following conditions should be met when creating word balloons:

- The Moho files must contain a rectangular point group named **Text Region**. If this point group is missing, the balloon will be considered invalid.
- If you want to add morph targets to your word balloon, you will need to use the **Window > Actions** command to open the Actions window. Use the **New Action** button in the Actions toolbar to design single-frame animations that you can use for your morph targets. For further information on this process, see *“Creating Morphs (Pro Only)” on page 370*.

- Default word balloons for Moho appear in the [Resources > Support > Word Balloons](#) installation folder. It is not recommended to put your custom word balloons in this same folder. Instead, create a content folder as recommended in ["Creating a Content Folder"](#) on page 16, and place your custom word balloons in its Word Balloons subfolder.

Eyedropper



To use the Eyedropper, click on a shape to copy its parameters.

Hold the ALT key to push the current color.

- Press the COMMAND/CTRL key down while you click to pick up the properties of the underlying object. This is not limited to vector layers. For example, if you have a Bone Layer active in the Layers Window but click over a gradient shape on the stage, the properties of the gradient shape will be copied to the clipboard in a Web color format. You will then be able to paste that property into the Color Picker to assign that color to a fill, stroke, or project background color.

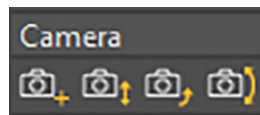
Chapter 7: Camera and Workspace Tools

Camera Tools

The following tools let you move a virtual camera around in a scene. Although layers in Moho are primarily 2D, Moho's camera can be moved around in true 3D space. The camera tools affect all layers in the document, not just the currently active layer.

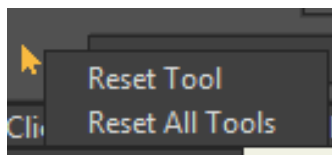


Camera Tools (Debut)



Camera Tools (Pro)

 Click the tool icon in the properties bar to display a submenu. Choose **Reset Tool** to reset the current tool to its default settings. Choose **Reset All Tools** to reset all tools to their default settings.



Reset tool options.

Track Camera

Animatable: Yes



This tool moves the camera up and down, and side-to-side. By giving the project's layers different depth values, you can create parallax (depth) effects. Holding the **Shift** key while using the Track Camera tool will constrain the camera to only move vertically or horizontally. Holding the **Alt** key will move the camera forward and back.

If the **Show Path** box in the tool options area is checked, then the motion path for the camera will be displayed in the working area when this tool is active. This makes it easier to visualize and plan out the motion of the camera. (The camera's motion

path is only visible when the Orbit Workspace tool has been used to view the scene from outside the camera.)

Zoom Camera

Animatable: Yes



This tool zooms the camera in and out on the scene, just like the zoom control on a real camera. Technically, the Zoom Camera tool is changing the field of view angle (or focal length) of the virtual camera. The default camera Z position and field of view is equivalent to a 35 mm camera to reduce the wide angle distortion.

Roll Camera

Animatable: Yes



This tool rolls the camera side to side. Try tilting your head side to side, and you'll understand this tool immediately.

Pan/Tilt Camera (Pro Only)

Animatable: Yes



This tool changes the viewing angle of the camera. Drag the tool up and down to change the tilt angle of the camera, and drag side to side to change the pan angle. Hold the **Shift** key while using this tool to constrain the camera to only one direction of rotation. Press the Alt key while dragging with the Pan/Tilt camera tool to orbit around a central point, such as when you want to fly around a 3D object.

This tool is most useful when you've set up a scene in 3D (different layers at different depths), and have placed the camera so that it is sitting somewhere among the layers, not viewing them from a distance.

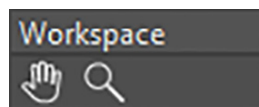


In order to be consistent with multi-touch features, the Pan/Tilt Camera tool has had its mouse direction reversed.

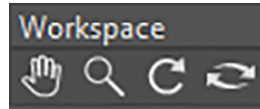
Workspace Tools

Change your view of the workspace

The last group of tools in the toolbar is always available, regardless of the current layer type or the current selected object. These are the Workspace tools, and are used to control your view of the project, but don't actually modify the project itself.



Workspace Tools (Debut)



Workspace Tools (Pro)

Pan Workspace



When the Pan Workspace tool is selected, you can click and drag in the working area to move the project side to side and up and down. Note that this isn't the same as moving the objects in your project - only your view of them is changing, not where they appear in the final image.

A shortcut for the Pan Workspace tool is to click and drag in the working area using the right mouse button - it's a quick way to pan, regardless of what tool is selected in the toolbar.

Several tools allow you to pan the workspace by pressing the spacebar and dragging the workspace. The cursor turns into a hand when panning is active.

Zoom Workspace



The Zoom Workspace tool is similar to the Pan Workspace tool: it moves your view of the project, without modifying the objects themselves. With this tool, dragging the mouse **left** or **right** zooms your view of the project in and out.

A shortcut for the zoom tool is to click and drag left or right in the working area using the right mouse button while holding down the shift key - it's a quick way to zoom, regardless of what tool is selected in the toolbar.

Rotate Workspace (Pro Only)



The Rotate Workspace tool is used to temporarily rotate the workspace. Think of drawing on paper - sometimes you might rotate the physical paper to draw from a different angle. The Rotate Workspace tool works in a similar way - sometimes (especially with the Freehand drawing tool) it may be helpful to orient the workspace in a different direction. A shortcut for the Rotate Workspace tool is to click and drag in the working area using the right mouse button or the touchwheel on a Wacom tablet, while holding down the control key - it's a quick way to rotate, regardless of what tool is selected in the toolbar.

To get back to the normal view of the scene, you can select Reset from the View menu, click the Reset View button in the tool options area of the Moho window, or press the **Home** key to reset the view.

Orbit Workspace (Pro Only)




The Orbit Workspace tool allows you to view your scene from outside the camera. It's like holding the scene in your hand and turning it around to look at it from different angles. This tool is mainly useful when you're working on a scene with 3D elements (layers with different depths, complex camera moves, etc.). Hold the **Alt** key while using this tool to move your view forward and back.

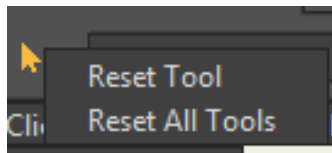
After using this tool to change your view of the scene, a blue wedge will be visible in the scene, representing the location of the camera. To get back to the normal view of the scene, you can select Reset from the View menu, click the Reset View button in the tool options area of the Moho window, or press the **Home** key to reset the view.

Chapter 8: Special Tools

Moho includes a number of special tools that are available in specific circumstances. These tools appear in the Special section of the tool palette when the conditions are met. The sections that follow describe how these special tools are uses.

 *Moho has a smart tool palette, which shows and hides tools based on their need. The position of the tool shown in the screenshots may differ, depending on the selected layer in the Layers Window, and the current time in the timeline.*

 *Click the tool icon in the properties bar to display a submenu. Choose **Reset Tool** to reset the current tool to its default settings. Choose **Reset All Tools** to reset all tools to their default settings.*



Reset tool options.


Poser (Pro Only)

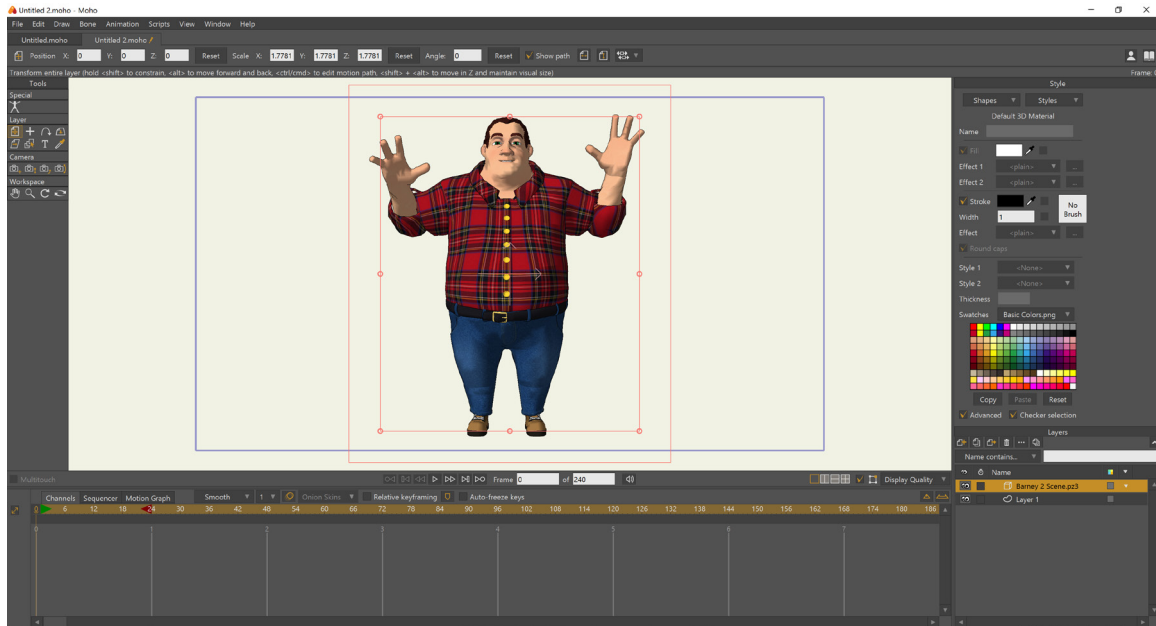
Animatable: Yes



Poser 7 or later must be installed on your system in order for this feature to work. In addition, the scene that you import into Moho must contain objects that are installed in libraries that are recognized by your Poser application. Refer to your Poser documentation on how to use, add, and maintain content in your Poser library folders.

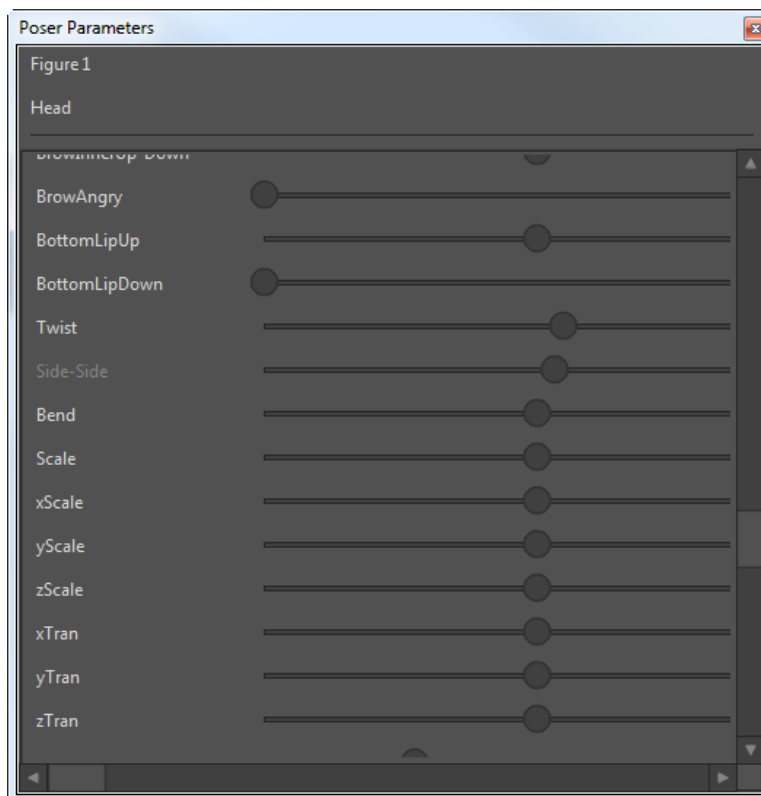
After you create your scene in Poser, save it to a folder on your hard disk. The file will be saved with a .PZ3 or .PZZ extension, depending on whether you use compressed files or not. In Moho, choose the **File > Import > Poser Scene** command, and select the scene that you saved from Poser.

 *Poser scenes that use dynamic hair are very resource intensive. If your Poser scene uses dynamic hair or other resource-intensive features, be careful not to use extreme settings.*





A Poser figure, imported into a Moho scene

After the Poser scene has been imported, the Poser tool is enabled in the Special section of the tool box. You can click one of the body parts to rotate it with the Poser tool, or you can use the Poser Parameters dialog (**Window > Poser Parameters**) to rotate or scale the selected body part through the use of sliders. When you rotate the integrated Poser content, the display of the character switches to Box mode to reduce demand of your computer resources.




Rotate or scale Poser actors with dials in the Poser Parameters dialog


 Poser animations are baked into the Poser project that you import. If you make animation changes in Moho, the changes that you make will be transferred to the Poser project file. When you quit and relaunch Moho, the keyframes in your Poser object layer will be gone because they have been written into the Poser project file.

 To select the character's root actor (usually the BODY), hold down the **ALT** key while clicking the figure with the Poser tool.

The parameters for each body part can be animated. For example, you can pose the figure on one frame in your timeline, and then move to a frame that appears later in the timeline and reposition the body part. Moho will then animate the in-between frames by interpolating the motion between the keyframes that you set. The Poser integration features also import any animation associated with the Poser scene.

The Poser tool allows you to select a Poser figure or actor (such as a body part) within the scene, and then modify the parameters of the selected item. You will be able to edit many of the same parameters as you can in Poser. For example, you can select a body part and then adjust the Bend, Twist, Front-Back, or Side-Side parameter to rotate the body part to a different position. You can also use the **Window > Poser Parameters** command to open the Parameters window for the selected body part. When you move a body part, keyframes appear in the timeline.

 If the Poser project used a BVH motion capture file to generate the animation on the character, you will see keyframes on every frame. You can select and delete some or all these keyframes and edit the animation within Moho if desired. A new keyframe will be added at any point in the timeline when you make a change in the Poser Parameters palette.

 After importing the Poser scene, you may notice a difference in the time length of your animation after you import into Moho. Poser's default frame rate is 30 frames per second, whereas Moho's default frame rate is 24 frames per second. To make the time match up to that created in the Poser program, choose **File > Project Settings**, and set the frame rate of your Moho project to 30 frames per second.

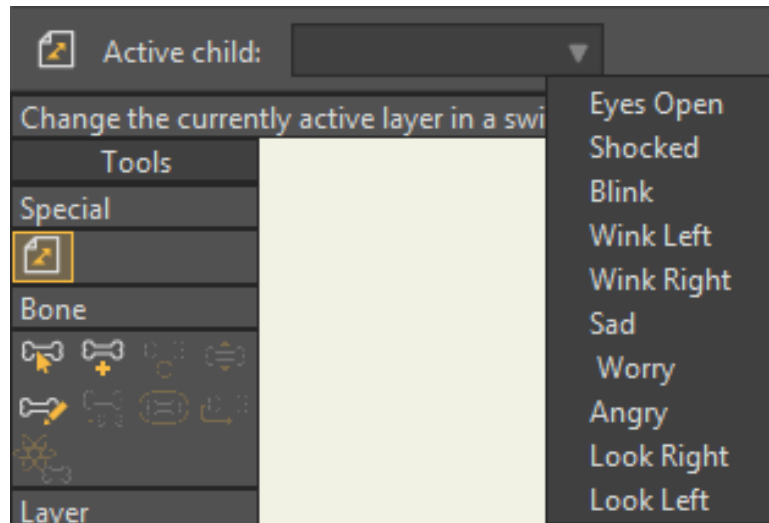
Switch Layer

Animatable: Yes



This is a specialized tool for use with Switch layers only. This tool has no effect if you click and drag in the workspace. What it does is supply a popup menu in the tool options area that lists all the sub-layers of a switch group. You can change the active layer by selecting it from the menu.

Tool Options



Switch Layer Options

- **Active Child:** Use this menu to select the active layer for the switch function

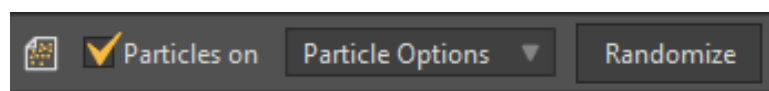
Particle Layer (Pro Only)

Animatable: Yes

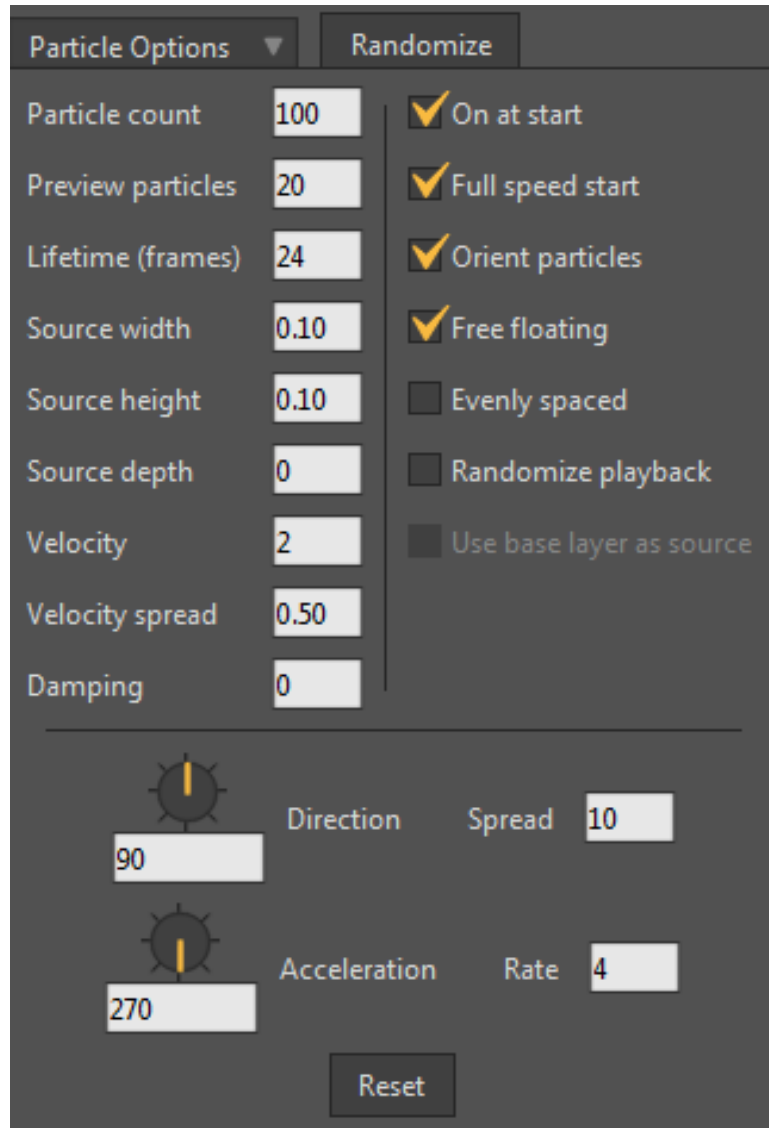


This is a specialized tool for use with Particle layers only. This tool has no effect if you click and drag in the workspace. What it does is supply a checkbox in the tool options area that lets you control whether the particle layer is turned on or not (emitting particles or not).

Options that appear in the Particle Options dialog are discussed in detail in [“Particle Layers \(Pro Only\)”](#) on page 195.



Particle Layer Options



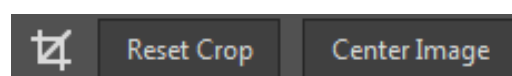
Particle Options

Crop



The Crop tool allows you to crop an image layer to a specified area. After you add the image, select the Crop tool and draw a rectangle around the area that you want to keep. As you draw the rectangle, Moho highlights the area that you want to keep. When you release the mouse, the image layer will be cropped to the rectangle that you drew.

Tool Options



Crop tool

- **Reset Crop:** Click the Reset Crop button to restore the image to its original appearance.
- **Center Image:** Click the Center Image button to center the cropped image around the point that the entire image was originally centered.



Using the Crop tool

Image Masking



Many Moho users do not use Photoshop or other similar programs, making it difficult to create images with transparent backgrounds. The Image Masking tool assists with this task. This tool helps you clear out and remove background areas from images that you import into Moho.

Tool Options

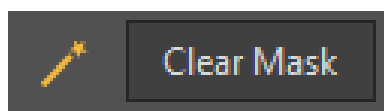


Image Masking tool

- **Clear Mask:** Click the Clear Mask button to remove all areas from the mask and restore the image to its unmasked state.



Import an image into your Moho scene

After you import an image, select the Image Masking tool from the Layers section of the tool box. Click on an area that you want to remove from the background. Click and drag left or right to control the sensitivity of the tool. Drag toward the left to decrease the sensitivity, and toward the right to increase it. Release the mouse button when you have masked out the desired area.



Click with the Image Masking tool to mask out areas of the image that you want to hide

Video Tracking



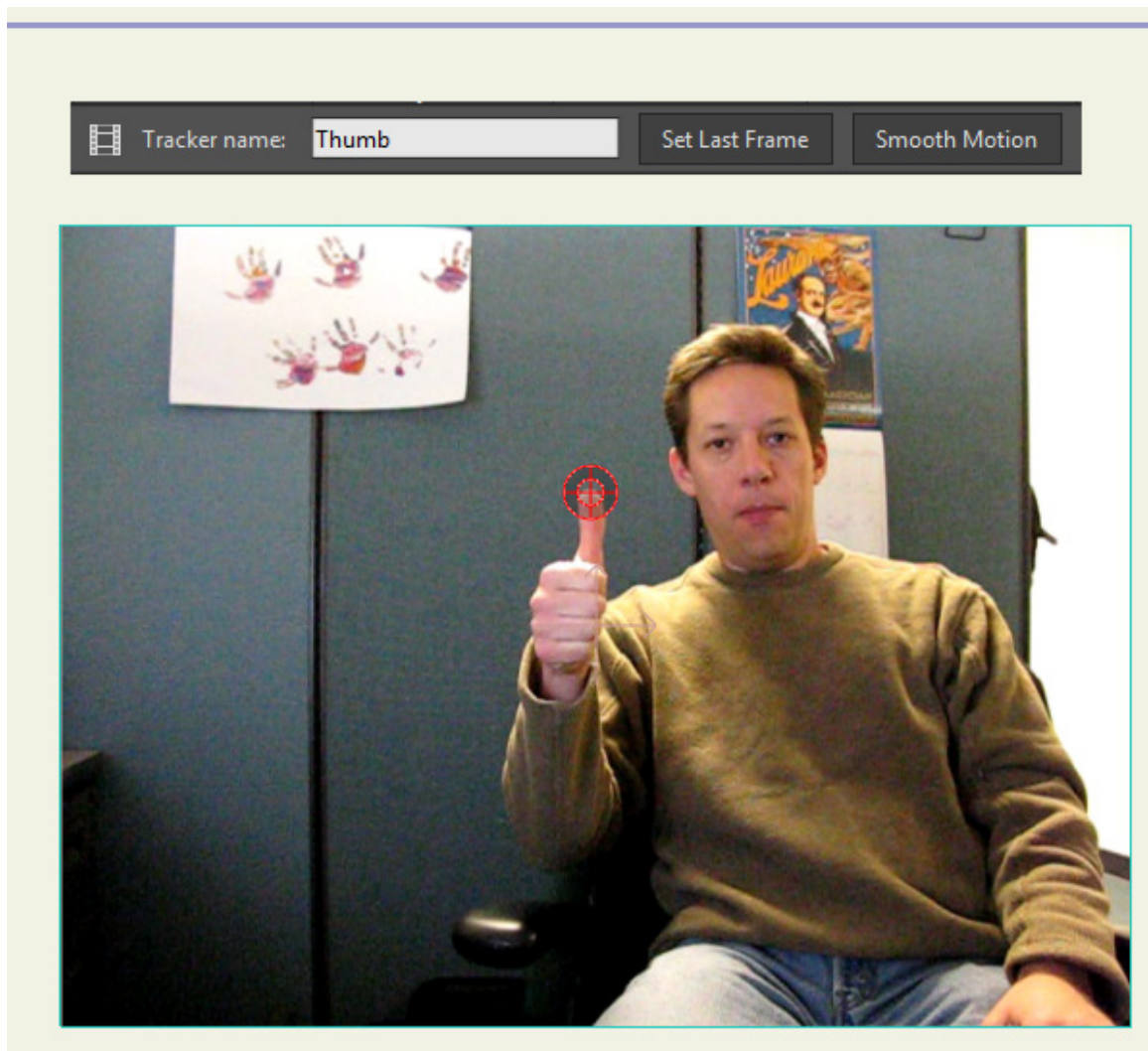
To use the video tracking feature, you need to have a movie file in your project. Either import a movie into an existing project or open a movie file

from scratch. The following sections describe the process of how the video tracking feature works.

Adding Tracking Points

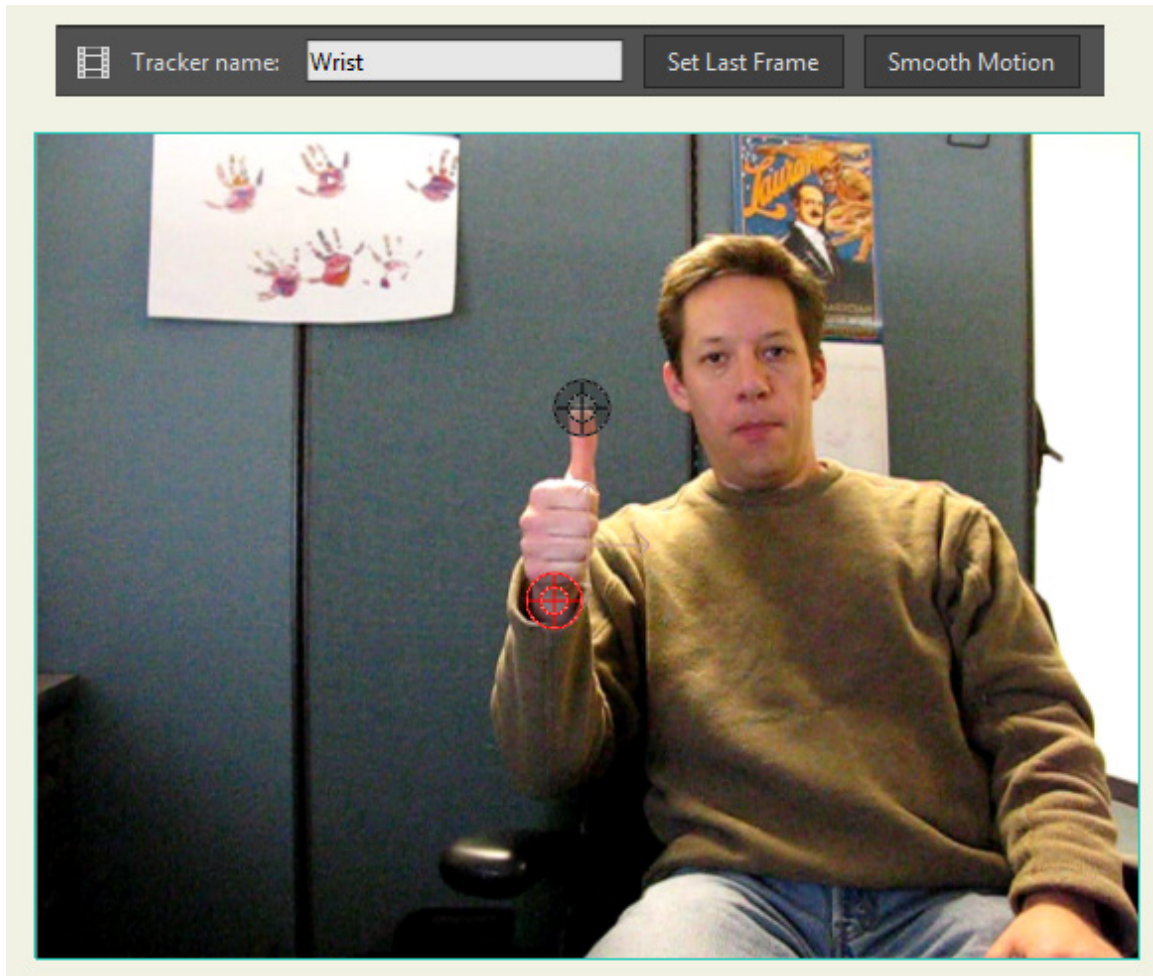
Assume that you have imported a video, and you want to eventually add an object that will follow the position and rotation of a person's thumb and wrist. The first step of the process is to add tracking points that identify the two points you want to follow. The Primary tracking point controls the position of the object's origin. The Secondary tracking point controls the angle or scale of the object. To add the tracking points, select the Video Tracking tool from the Layer panel.

Click on the first point you want to track. You can click, and then drag to position the point exactly where you want to place it. It is optional, but recommended, that you name the tracked point in the Tracker Name field of the status bar. For example, since we are tracking a thumb here, we name the tracking point **Thumb**.



The first tracking point is added to the thumb

Now we add the second tracking point for the wrist, and name it (appropriately) **Wrist**.

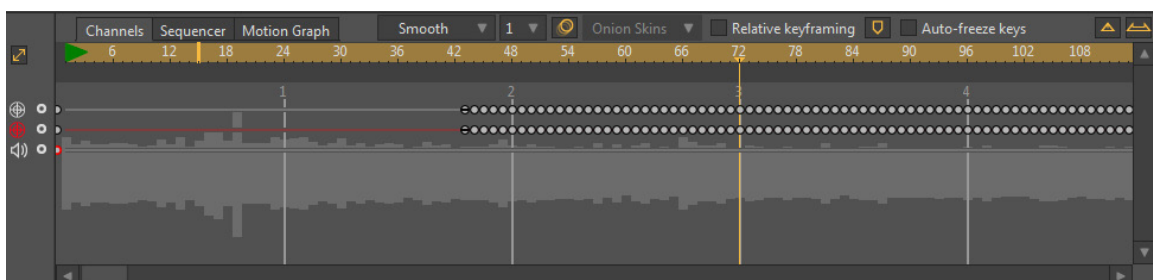


The second tracking point is added to the wrist

After you place your tracking points, make sure the Video Tracking Tool is still selected. Also make sure that there are enough frames in your project to play the movie segment.

Play the video back and watch the tracking points follow the points you selected. Playback runs a little slower during video tracking.

As you play the video back, you'll notice keyframes being added to the timeline. While the video is playing, watch for any problem spots in the way that the tracking points follow the items you want to track. When you see a problem, don't worry ... there are ways to fix them!



After the tracking points are added, keyframes are generated in the timeline

Fine-tuning Marker Positions

You might notice some places where the tracking points seem to drift away from the marker, or stop following it entirely. If this happens, stop the video playback. Go back to the beginning of the movie. Zoom in more closely to the video and use the Video Tracking tool to reposition the markers that need to be adjusted.

Choose **View > Reset** to reset the zoom level of the video back to the default. Play the video again and watch for any other problems. Keep making adjustments until you are happy with the results. The following movie shows our markers after they have been adjusted.



Click [this link](#) to view a brief video in your browser that shows what the markers look like after they are adjusted.

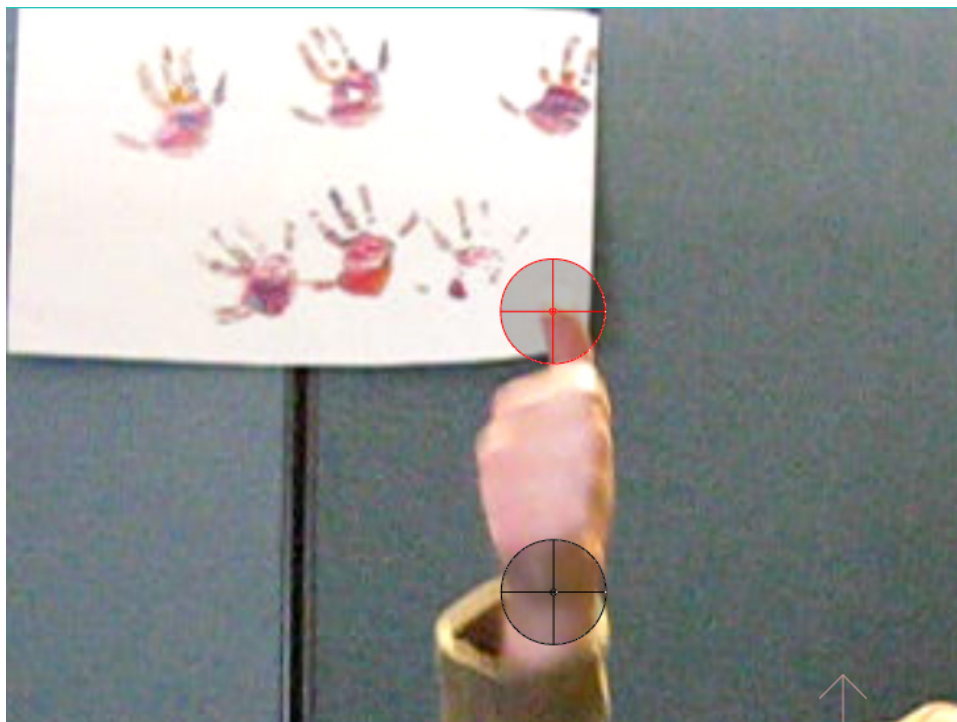
Re-syncing Tracking Points

You may also find instances where the tracking points go out of sync with the tracked object. The most likely cause for this is when the tracked area touches or passes over another area in the video that is very close in color. For example, when the tip of the thumb goes in front of the paper on the wall, there are similar colors in the paper that cause the tracking point to go out of sync with the thumb. Fortunately, there is a way to fix that. The next movie shows one of those problem areas.



Click [this link](#) to view a brief video in your browser that shows how the tracking point loses focus after reaching the paper on the wall.

To fix this type of problem, you scrub through the timeline until you find the point where it loses track. In the next figure you see the spot where the thumb appears to blend in with the paper. This is the area that causes the tracking point to lose sync with the thumb.



Find the point where the point loses focus


After you find the problem frame, advance ahead a couple of frames until you reach a point where there is more contrast. Then drag the tracking point to position it where it should be. When you press Play, the tracking point will continue tracking from there.



Advance the video to a clear spot and adjust the tracking point

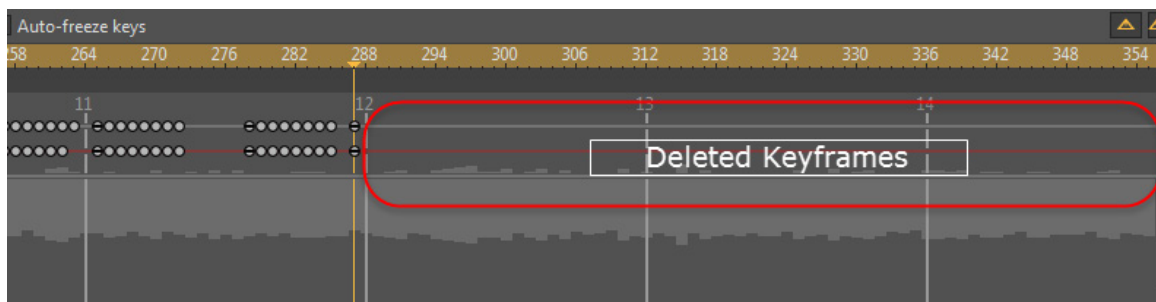
Sometimes color similarities occur for a period that is longer than a couple of frames. For example, in our video there is a segment where the thumb passes across the face. This is a much larger area where there is very little color contrast between the tracked object and the area it passes over.

The solution here is slightly different. You can use interpolation to calculate the path between two good points. First, move back to find the last good point before the thumb crosses the face. Delete the keyframes from that point until the thumb passes across the face and reaches the other side.

 You can use the **Animation > Clear Animation > From Layer After Current Frame** or **Animation > Clear Animation > From Document After Current Frame** commands to delete keyframes from the current frame to the end of the project.



Here we move to the point just before the thumb passes over the face ..



... and we delete the keyframes that occur until the thumb reaches the other side of the face

Jump ahead in the video to a point after the thumb passes over the face and reposition the tracking point. When you play the video back, Moho will interpolate the motion between the keyframes that are missing.

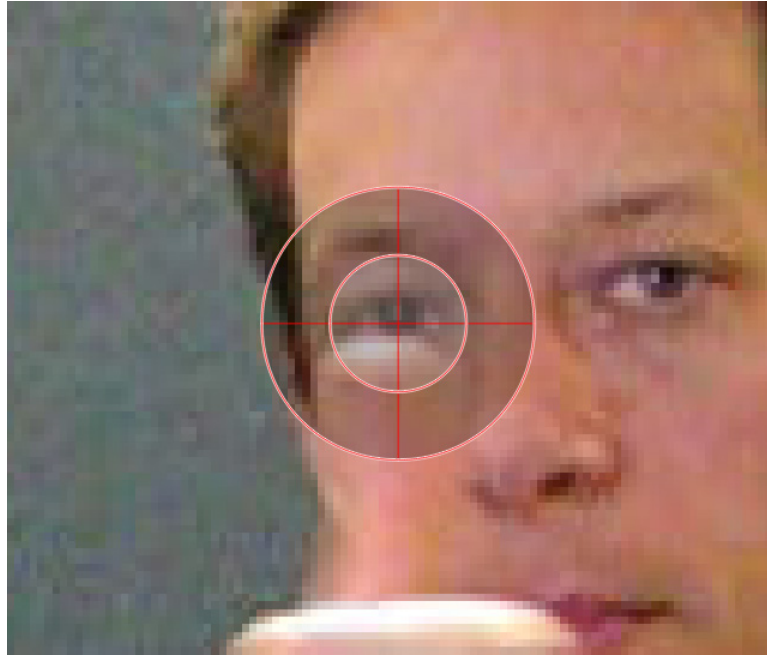


On the other side of the face, we reposition the tracking point to a good spot

Adjusting Tracking Point Sensitivity

When you add tracking points, you can change the sizes of the inner and outer rings to adjust the falloff. Click and drag on the edge of the rings to change the size. The inner ring defines the region that you are trying to track. For example, if you are trying to track an eye, adjust the inner ring so that it surrounds the eye.

The outer ring represents how fast the object can move. From one frame to the next, the outer ring represents the maximum distance that you want the object to move. If you have a fast-moving object you may need to increase the size of the outer circle for tracking. Expanding the search area too much can lead to further errors, so you want to keep it as narrow as possible. The default settings are generally sufficient for most cases.

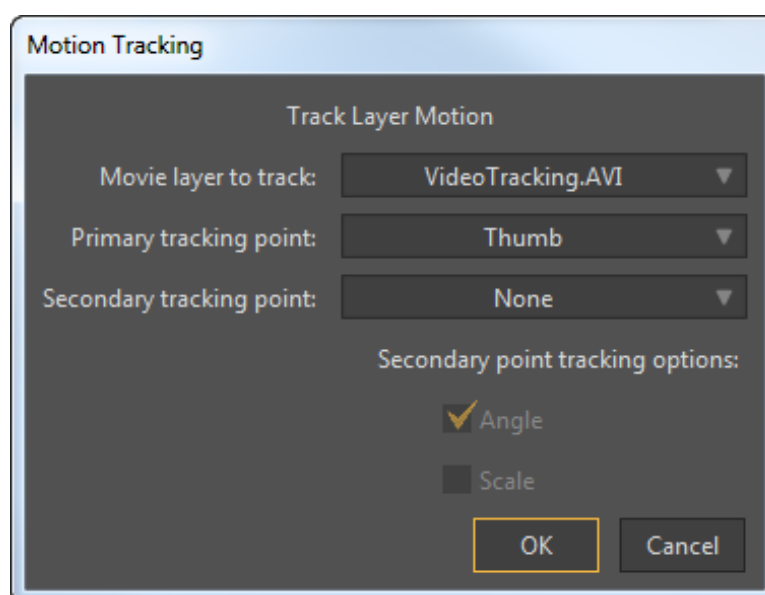


Two rings control the sensitivity of the tracking point

Assigning the Tracked Layer

After you set the two points on the object you want to track, you can then assign the layer that will track those points. In our example, we returned to Frame 0 and added an exclamation point to a new layer. Now we want the exclamation point to follow the hand in the video.

To assign the layer that will track the points, choose **Animation > Track Layer to Video**. The Motion Tracking dialog lists the videos in your scene (in this case, there is only one).



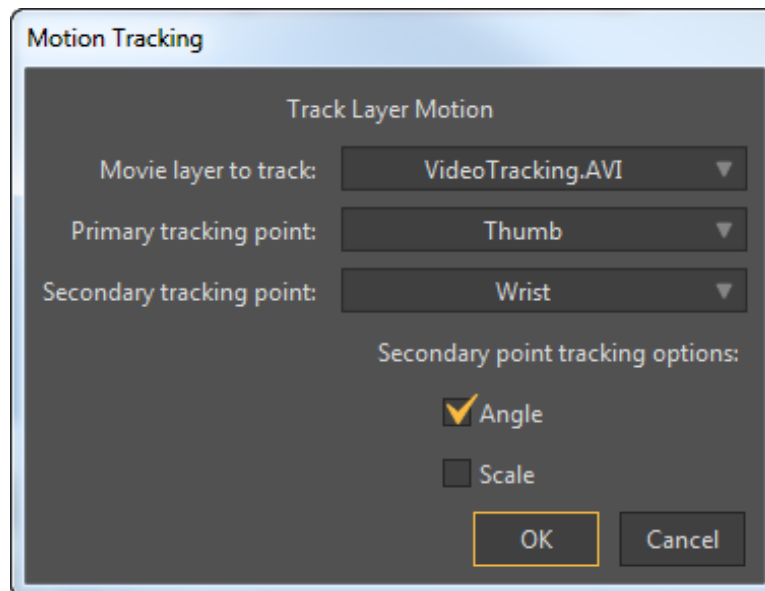
Select the movie to track, then choose the primary and secondary tracking points

First we'll assign the Primary Tracking Point, which is associated with the origin point of the tracked layer. We want the origin of the exclamation point to track the Wrist point. So, we select **Wrist** here and choose OK. When we play the result, the origin of the exclamation point (represented by the crosshairs) tracks the wrist.



The crosshairs of the exclamation point, representing the origin, now follow the primary tracking point

The secondary tracking point is optional. You can use it to control either the angle or scale of the tracked layer. In our case, we want the thumb to control the direction of the exclamation point, so we select the thumb as the primary tracking point and the wrist as the secondary point. Then we check the option to control Angle.



The secondary tracking point can control the angle or scale of the tracked layer. We want the thumb to control the angle of the exclamation point

The following movie shows the results of our selections. Now when you play the movie, the origin of the exclamation point follows the wrist, and the angle of the

exclamation point is follows the angle line from the wrist (primary tracking point) to the thumb (secondary tracking point).



Click [this link](#) to view a brief video in your browser that shows how the exclamation point follows the wrist and points in the same direction as the thumb.

Offsetting the Origin

You can use the Transform Points tool in the Draw panel to move the tracked object away from the origin. The origin still tracks to the two tracking points, but the object that you are tracking can be offset.



You can offset the object from its origin with the Transform Points tool

Once you have applied video tracking points to another layer, the two layers are totally independent. The tracking feature creates standard keyframes. You can edit, add or remove keyframes to the tracked object. You can also hide or delete the video layer that was used to initially create the tracking points and keyframes. The layer that was tracked to the video will still continue to follow the motion. This allows you to use a video file as a reference whether or not you want to see the video in your final project.

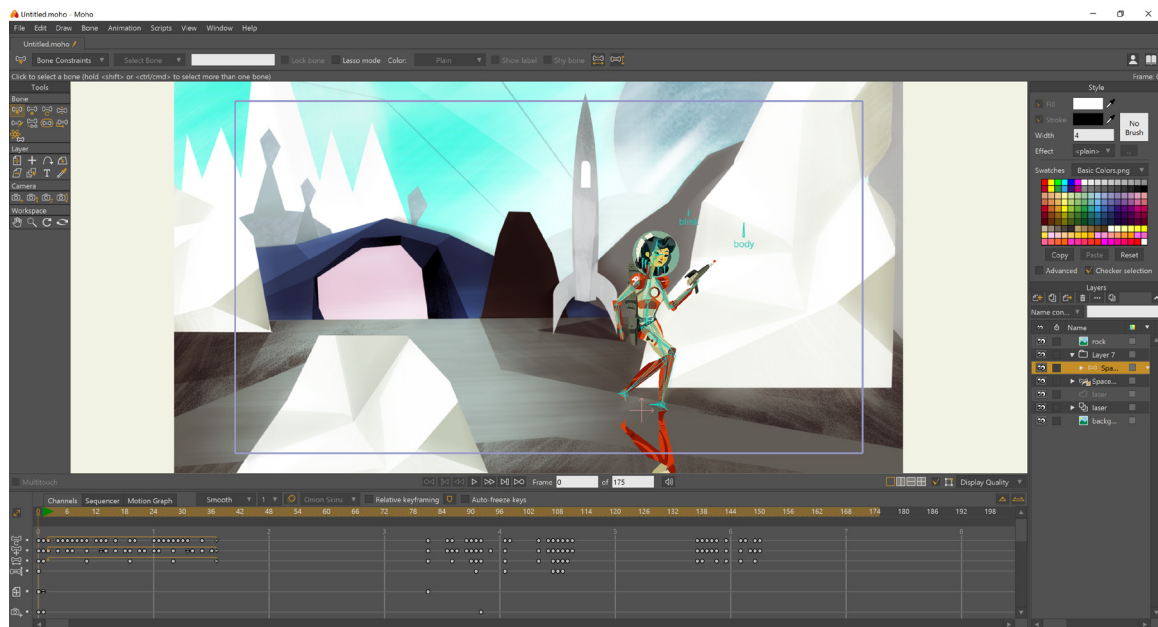
Moho Windows

Chapter 9: Moho's Main Window

Overview

The Moho interface has various windows that are used for controlling different aspects of a Moho project. In this chapter we'll briefly describe some general components of the Moho project window.

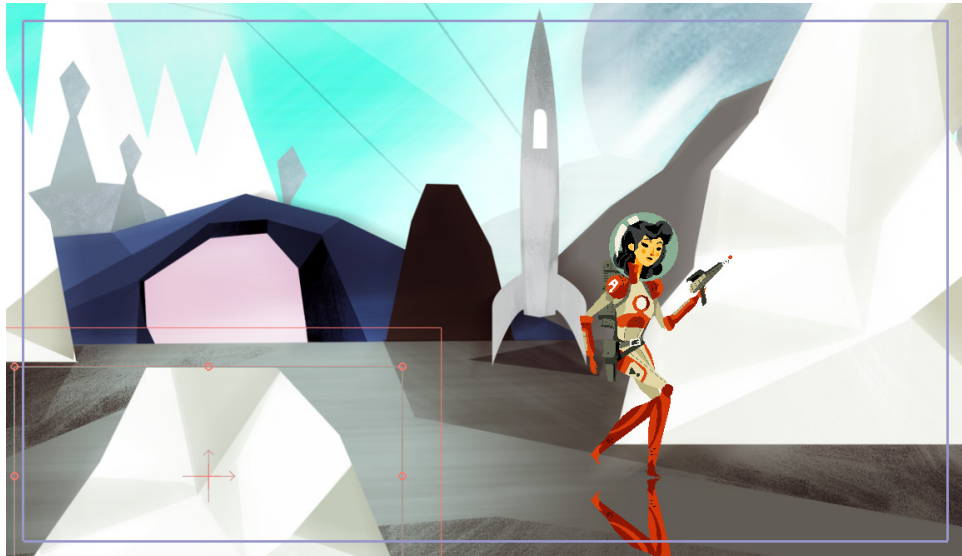
The more complex parts of the Moho interface, such as the Layers Window, have their own chapters that follow this one. Although this chapter will describe how the main window works, it won't go into detail about creating a drawing or animation.



Moho Pro interface

Working Area

Most of the Moho project window is taken up by the working area. This is the region where you will create and view your drawings and animations. In every project, even an empty one, two items will be displayed in this area. The first is a cross marking the center of the currently active layer. The second is a blue rectangle that indicates the visible region of the project. Only objects that are within this rectangle will appear in your final animation.



Working Area

Although every project has a fixed image size (for example 640x480 pixels), the working area is basically an endless flat space on which you can draw and animate. The blue visibility rectangle mentioned above indicates the actual image area for the project. While working, you may want to zoom in or out to see more or less detail in your project. A quick way to do this is by using your right mouse button. By dragging the right mouse button in the working area, you can move around from side to side. If you hold down the shift key while right-clicking and then drag left or right, you can zoom in and out. If you want to restore a reasonable overall view in the working area, press the Escape or Home keys, or choose Reset from the View menu (see [“Chapter 24: View Menu”](#) on page 487).

The background of the working area is usually just a blank color, but if you drag an image file into the working area, it will appear in the visibility rectangle. This is a helpful feature meant to allow you to trace the image with the drawing tools.

The **real** work that happens in the working area is not covered here, but is described in the sections [“Moho Tools”](#) on page 31, and [“Moho Windows”](#) on page 158.

Toolbar

The toolbar to the left of the main Moho window is where you select which tool you want to work with. The available tools will change depending on whether you're currently animating, which objects are selected, and what type of layer is currently active. The purpose and use of each tool is described in the following chapters:

- **Draw Tools:** See [“Chapter 3: The Draw Tools”](#) on page 32
- **Fill Tools:** See [“Chapter 4: Fill Tools”](#) on page 62
- **Bone Tools:** See [“Chapter 5: Bone Tools”](#) on page 82
- **Layer Tools:** See [“Chapter 6: Layer Tools”](#) on page 117
- **Camera Tools:** See [“Chapter 7: Camera and Workspace Tools”](#) on page 138

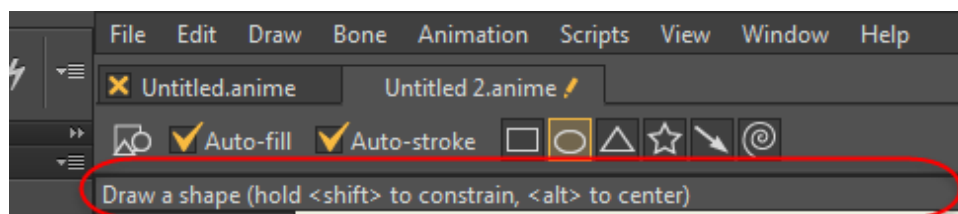
- **Workspace Tools:** See “Chapter 7: Camera and Workspace Tools” on page 138



Moho Tools (Pro tools shown)

Status Bar

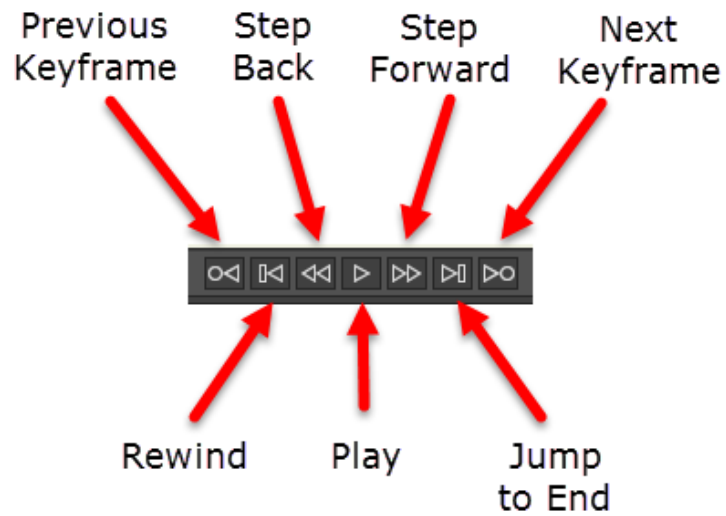
The status bar along the top of the Moho window displays a short description of the currently active tool in the toolbar. If you don't know what a tool does, the best thing is to read this manual. However, if you just need a quick reminder, the status bar can be helpful.



Status Bar (Pro version shown)

Playback Buttons

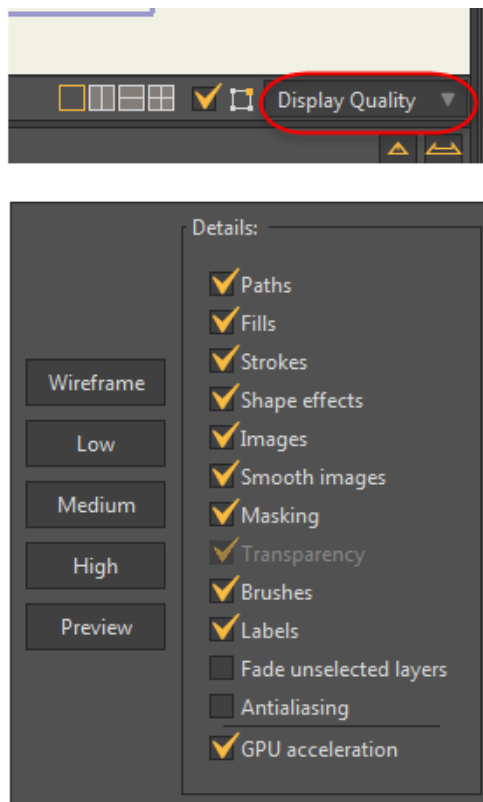
Near the bottom-left of the main Moho window are a set of playback buttons that allow you to play/stop/rewind/etc. your animation.



Playback controls

Display Quality (Pro Only)

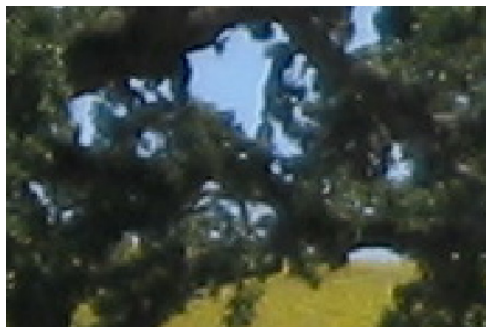
Near the bottom-right of the main Moho window is a popup box that lets you customize the level of display quality in the editing area. The Display Quality popup lets you control the following options.



Display Quality options

Note that this only applies to the editing view - when rendering your final project, everything will be drawn in full quality, regardless of the following settings.

- **Paths:** Display points and curves for vector layers.
- **Fills:** Display the fill colors of vector shapes.
- **Strokes:** Display the outlines of vector shapes.
- **Shape Effects:** Displays shape effects
- **Images:** Display images in image layers.
- **Smooth images:** Display images with higher quality alpha blending.
- **Masking:** Display masking effects.
- **Transparency:** Display shape transparency.
- **Brushes:** Display brush effects applied to shape outlines.
- **Labels:** Displays bone labels on the workspace so you can easily identify what the bones control.
- **Fade unselected layers:** Fades the content of unselected layers so that you can more easily see and work on the content in layers that are currently selected.
- **Antialiasing:** Draw shapes with smooth edges.
- **GPU Acceleration:** Check this option to enable **GPU acceleration**; uncheck to disable it. GPU Acceleration improves the display of image and vector layers. An OpenGL-compatible graphics card is required.

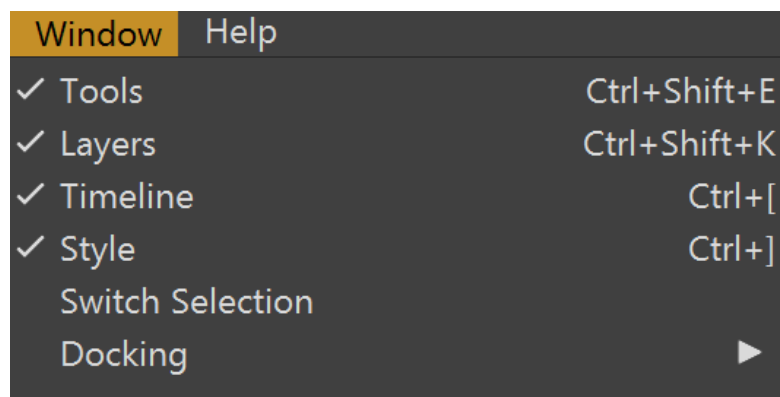


GPU Acceleration off (top) and on (bottom)

A little way to the left of the Display Quality popup is another popup box labeled **Current Layer**. This popup contains similar options to those found in Display Quality. The options in **Current Layer** apply only to the current layer, while **Display Quality**'s options apply to the entire project. So, for example, if you wanted to display fill shapes for all layers except one, you would leave **Fills** turned on in the Display Quality popup, but turn it off in the Current Layer popup for the layer in question.

Docking and Undocking Windows

You can dock and undock the windows that appear at the sides and bottom of the Moho interface to maximize the area that the document window uses. The windows that you can dock and undock appear in the upper portion of the Windows menu as shown in the following figure:



Window commands

Windows that are normally docked (the **Tools**, **Layers**, **Timeline** and **Style** windows) will become undocked if you choose the Window menu command associated with that window. Choose the command again to redock the windows in their default space.

Windows that are normally hidden (Switch Selection, Actions, Library, Audio Recording, and Poser Parameters (the last in Pro Only)) will open undocked when choosing the command. Choose the respective command again to close the window.

Chapter 10: Layers Window


A Moho document is composed of **layers**, each of which can be independently edited and animated. Layers can be thought of as transparent sheets of plastic. You can draw separately on each of these sheets, and the final picture is the composition of all the sheets stacked on top of one another.

Layers can be added, removed, copied, and re-ordered. The Layers Window is where all these operations take place in Moho, and is the topic of this section.

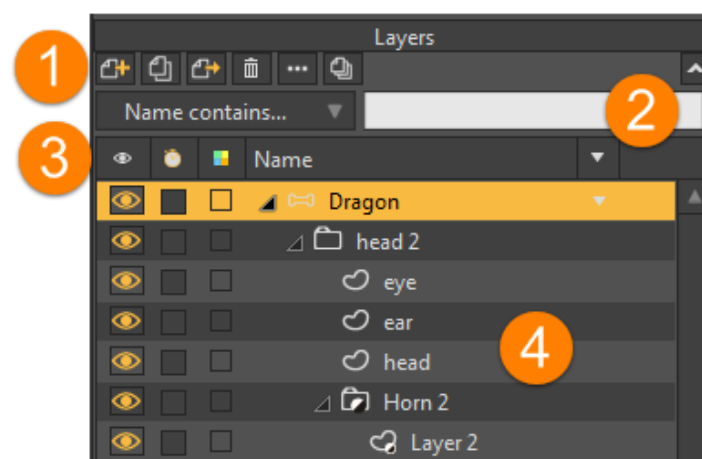
Overview

The Layers Window has four main sections of interest shown in the following figure:

1. **Layer toolbar**: Displays buttons that allow you to create and manage the types of layers in your project. These are described in [“Layer Toolbar” on page 166](#).
2. **Layer Search**: (Pro only) Allows you to search for specific types of content in your layers. See [“Searching the Layer List \(Pro Only\)” on page 167](#) for more information.
3. **Layer headers**: Identifies the type of information contained in that column in the Layers list. The Layers list has a Quick Settings context menu that allows you to display or hide the Quick Settings dialog for that layer.

 *Layer preferences in the Layers/Objects tab are described in [“Layers/Objects Tab” on page 438](#).*

4. **Layer List**: Displays information about the type of content in each layer, along with other information according to your preferences. For more information on using the layer list, see [“The Layer List” on page 173](#).

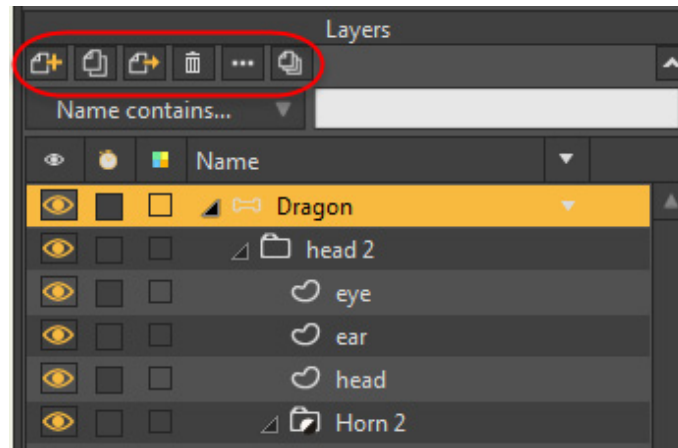


The Layers Window



Layer Toolbar

At the top of the Layer panel is a toolbar that provides several layer operations. From left to right, the buttons are **New Layer**, **Duplicate Layer**, **Reference Layer** (Pro only), **Delete Layer**, **Layer Settings**, and **Layer Comps** (Pro only).


The buttons in the toolbar are described below:








Layer Toolbar

-  **New Layer:** Adds a new, empty layer to the project. A popup menu allows you to choose the type of layer you want to add. The new layer is placed directly above the current active layer.
-  **Duplicate Layer:** Makes a copy of the current active layer and adds it to the project. This new copy is placed directly above the current active layer. If you duplicate a group layer, all of the sub-layers inside it will be duplicated also.

 You can copy a layer and paste it into another opened document. Select the layer that you want to copy, and choose the **Edit > Copy Layer** command. Switch to the destination document, and choose **Edit > Paste Layer** to paste it directly above the currently selected layer. You can also copy multiple layers as outlined in “Editing Multiple Layers” on page 205.


 If you have multiple layers selected when the Duplicate Layer button is pressed, all of the selected layers will be duplicated.

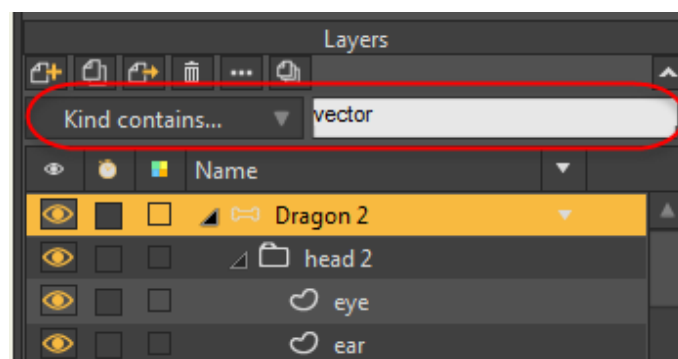
 If the Inline layer naming option is enabled in the Layers/ Objects tab of the Preferences dialog, you can immediately edit the name when a single layer is duplicated. If multiple layers are selected before duplicating, none of the duplicated layers will enter edit mode.

-  **Reference Layer (Pro only):** Creates a reference layer immediately above the current layer, which takes on the properties of the selected layer. See [“Using Layer Referencing \(Pro Only\)”](#) on page 178 for more information.
-  **Delete Layer:** Deletes the current active layer. This operation cannot be undone, so you will be asked to verify if this is really what you want to do.
-  **Layer Settings:** This command brings up a dialog with various controls to modify the layer's appearance and behavior. The next section, Layer Settings, goes into detail about these options. The Layer Settings dialog can also be invoked by double-clicking the current active layer in the layer list.
-  **Layer Comps (Pro Only):** Click to display a menu of Layer Comp commands. These commands are discussed in [“Using Layer Comps \(Pro Only\)”](#) on page 176.

Searching the Layer List (Pro Only)

Many projects contain many different layers, and it can sometimes become difficult to locate specific types of content in your scene. Moho's layer search makes it easier to locate content by according to search terms and other settings that you specify.

 When a search filter is being applied to the list, you can right-click a layer and choose *Reveal Layer in Unfiltered List*. The layers list will remove the search filter, and display all entries in the Layers panel, and the layer that you right-clicked will be selected.



Layer Search

The layer search is located immediately beneath the Layers toolbar. It supports OR or NOT syntax as follows:

- Use the | symbol for the OR operator. For example, you can type **cat | dog** and get results that contain either **cat** or **dog**.
- Preface a search term with the - or ~ symbol for the NOT operator. For example, if you type **cat - dog**, or **cat ~ dog**, you will get results that contain **cat** but do not contain **dog**.

In Moho Pro, the Search consists of the following areas:

- **Search context menu:** The search context menu appears at the left side of the search area. It allows you to perform searches based on the following criteria:



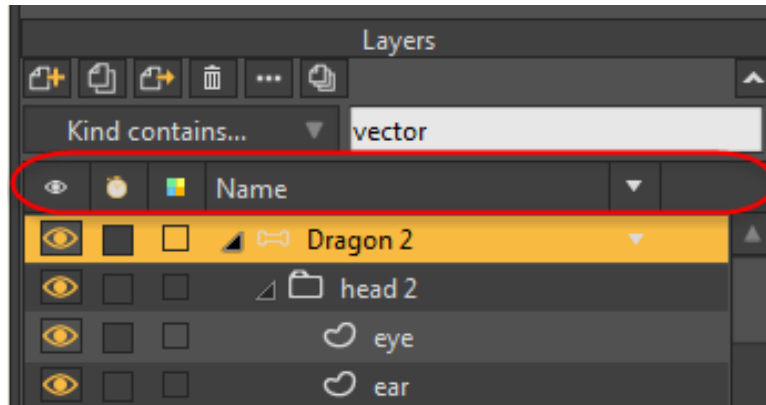
If you select a criteria without entering search text or select a menu option that displays all layers, normal display mode is displayed.

- **No filter:** Choose this option to hide the search field. All content in the layers list will appear.
 - **Name contains:** This is the default option. Searches by layer name, according to the search term that you enter in the text field.
 - **Group name contains:** Returns any group whose name contains the entered text. It will be shown along with all of its children.
 - **Comp name contains:** Searches for layer comps named according to your entry in the search field.
 - **Kind contains:** Searches through the layer list by kind. For example, entering Image in the search field will display all image layers in the layer list.
 - **Label color is:** Searches the layer list by layer color. Available colors are Plain, Blue, Cadet Blue, Coral, Green, Orange, Pink, Purple, Red, Tan, Turquoise, and Yellow. Choose **Any Color** (default) to remove color specifications.
 - **Visibility is:** Allows you to search for all visible or invisible layers. Choose **Is or is not visible** to remove visibility option from the search.
 - **Tags contain:** (Pro Only) Allows you to search for information included in tags, based on the text you enter in the search field.
 - **Comments contain:** (Pro Only) Allows you to search through layer comments, based on the text you enter in the search field.
- **Search text field:** Where the search type selected above is based on a text string, simply enter the search term in the field. Results will be filtered in the layer list as you enter the string.

When you enter text in the search field, it will display any layers that contain that text, along with its parent hierarchy. When you delete the text no filter will be applied.

Layer List Columns


The top of the layer list contains identifiers that describe the type of information within that column, depending on the type of information that you want to show or hide.

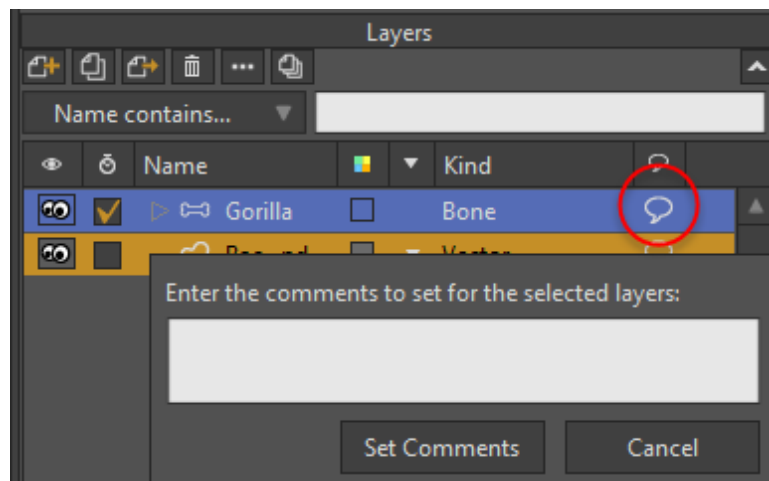


Layer list headers

Comments (Pro Only)

Choose **Comments** to display a column that contains a small word balloon indicator. Click the indicator in the desired layer to display or edit the comments for that layer. Then click the **Set Comments** button to apply the changes.

 The Set Comments dialog will initially pre-fill in with the comments from the last selected layer. This is similar to how they would be in the Layer Settings dialog under the General tab when multiple layers are selected. You may need to use modifier keys to preserve the selection when clicking the indicators if you want to edit multiple layers. Changes are undoable.



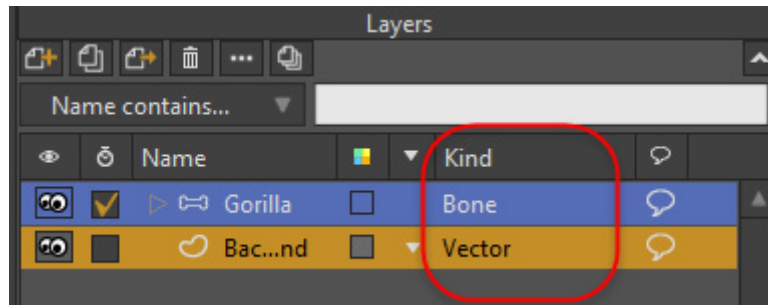
Comments column

Kind

The Kind column is resizable. Displays information about the type of layer; for example, Image, Bone, Vector, Frame by Frame, and so on. Additionally, Kind information can also include additional information, such as whether a layer is a Reference layer, or if it is Masked.

 *Reference Layers will be designated with a little badge.*

Certain types of layers act as groups, and can contain other layers within them. (You can think of them like folders on your hard drive.) These layers have a triangle on their left side. Clicking this triangle opens and closes these group layers, allowing you to access or hide the sub-layers they contain.



Kind column


Label

The Label column allows you to choose a color for the selected layer. Click the square icon to assign a label color. Available choices are Plain, Blue, Cadet Blue, Coral, Green, Orange, Pink, Purple, Red, Tan, Turquoise, or Yellow. If the Label column is not visible, you can also double-click a layer to assign a color, as described in ["Using Layer Colors"](#) on page 177.

 *If multiple layers are selected when you choose the label color control, all selected layers will be assigned that label color.*

Name

The Name field is required, so the option to hide this identifier is greyed out. This column is resizeable. You can assign a name for the layer when you initially create it; or by single-clicking the Name field in the Layers Window, or by a fast double-click to open the Layer Settings dialog.

 *If you change the name of an item when the layers list is sorted by name, the renamed item will be resorted to the appropriate location for the new name.*

 *You can double-click the Name or Kind column resizer to automatically expand the column to the maximum width required to fully display the columns.*

Quick Settings (Pro only)

The Quick Settings column displays an arrow that opens the Quick Settings dialog for the selected layer. For more information on the Quick Settings dialog, see [“Using Layer Quick Settings”](#) on page 179.



*If you do not have the Quick Settings column displayed in the layers list, you can also right-click a layer and choose **Quick Settings for Layer** from the context menu to open the Quick Settings dialog.*

Tags (Pro only)

The Tag column displays a small tag icon. Click the icon to assign tags to the selected layer. After entering the tags, click Set to apply the changes.

Timeline Visibility (Pro only)

The Timeline Visibility column displays a checkbox for each layer, which allows you to show or hide that layer on the timeline. Check the box to display the selected layer in the timeline. If you have assigned a color label, the timeline will display that layer in the selected color.

Visibility




The Visibility control determines whether a layer is visible or invisible in the workspace. This control appears in the Layers Window by default, but you can hide it if desired.

Right-click the Visibility column to choose a label color from a context menu. This provides a combined visibility and label column, should you choose not to display the Label column separately. When you sort the columns in your layer list by visibility, items will be subsorted by their label color.

If visibility is set to On, any objects drawn in the layer will appear in the main Moho window, as well as in any rendering of the project. If you turn visibility off, the layer will turn invisible and will not appear in the main Moho window. This can be a convenient way to remove clutter in the main window when you don't need to see all the layers at once. Also, only visible layers will appear when you render a view of the project or export an animation - you can generate test movies much quicker if you turn some layers invisible that don't involve what you're currently working on.

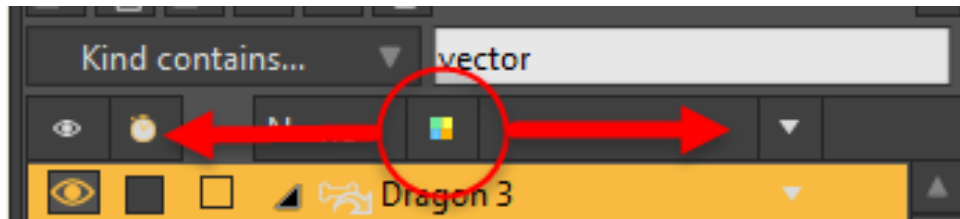


*The visibility box of the currently active layer behaves differently. The currently active layer is always visible (how could you edit it if it wasn't?), and clicking its visibility box (while holding the **Alt/Option** key) will turn all the other layers at the same level visible or invisible.*

 If you click in the Layers Window to toggle the visibility of a layer, you can set underlying layers to the same visibility. To do so, keep the mouse button pressed down while you drag over the underlying layers. Release the mouse button after you drag over all layers you want to set.

Reordering Column Headers

After you display the columns you want to include in the Layers Window, you can rearrange the order in which they appear in the Layers list. Drag the column header left or right to reposition it to the column in which you want it to appear.

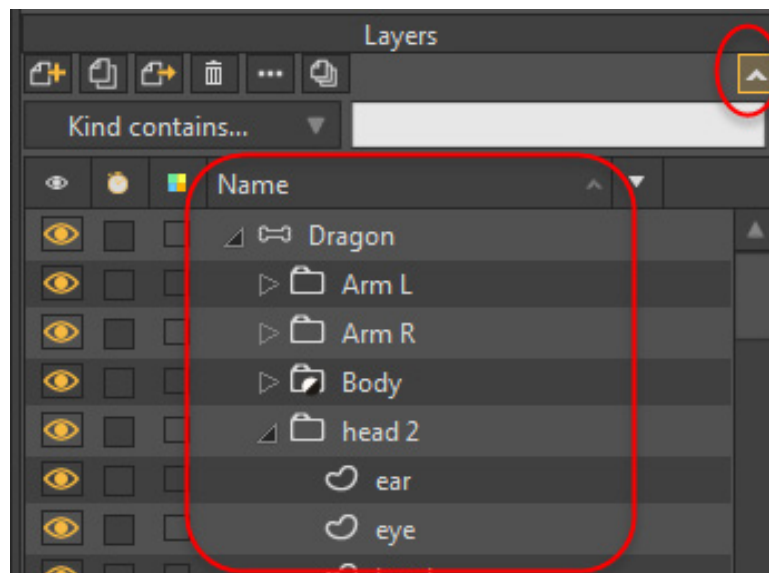


Drag a column header left or right to change the order of displayed columns.


Sorting Columns

A sort button appears in the upper right corner of the Layers Window. Click this icon to enable or disable sorting in the Layers Window.

When sorting is enabled, you can click the column header that you want to sort. Click again to reverse the sort order.

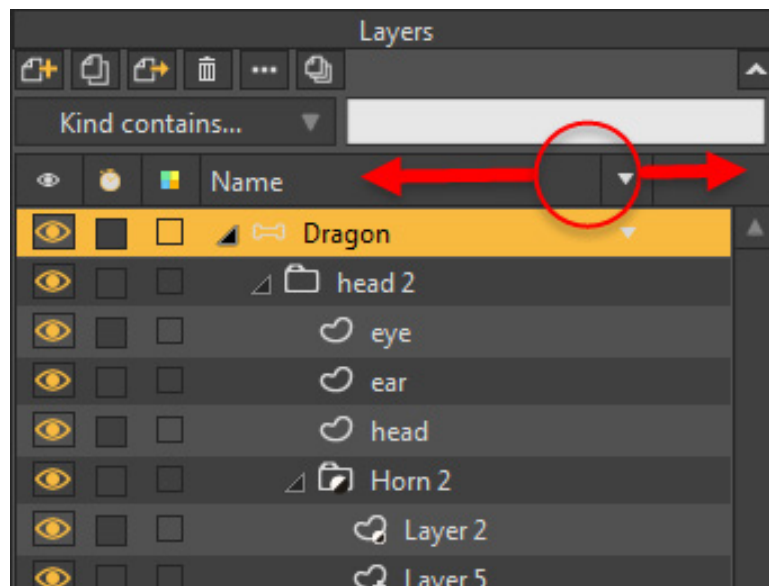


Enable sorting with the Sort button in the upper right corner, then click a column header to sort items in the layer list.

 You will not be able to rearrange layer order when sorting is enabled. If you need to change the layer order, click the Sort button to turn off sorting, and rearrange your layers as desired. You can re-enable the Sort feature after you have reordered your layers.

Resizing Columns

The Name and Kind fields in the Layers Window are resizable. If you find that your layer names are getting cut off due to lack of space, simply drag the right side of the column header to resize the column.

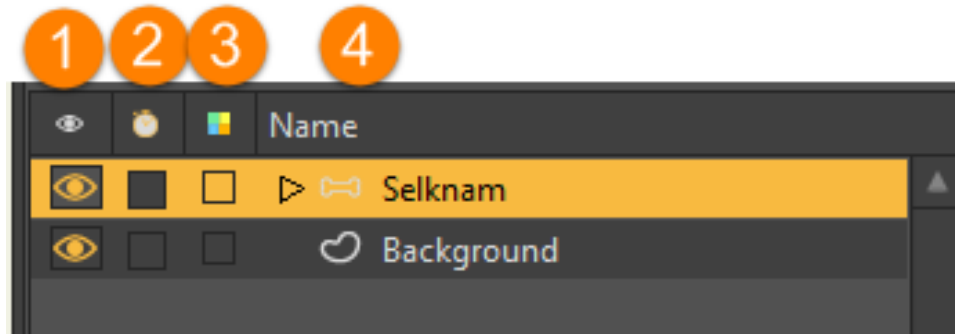


Drag the right side of the Name or Kind column header left or right to resize the columns.

The Layer List

Most of the Layers Window is taken up with the layer list. This is a vertical scrolling list of all the layers in the document. The layers are stacked in order from bottom to top. That is, when the project is displayed, the lowest layer in the list is drawn first, followed by the second from the bottom, and so on up to the top. When two layers contain objects that overlap, this ordering determines which object is in front and which is behind.

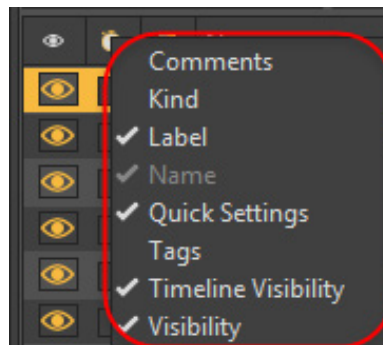
A layer's entry provides you with several pieces of information: In the following figure, it shows layer visibility (1), timeline visibility (2), layer color/label (3) and layer name (4).:



A single layer in Moho

 You can edit more than one layer at a time in Moho, as described in “Editing Multiple Layers” on page 205.


Right-click in a column header to open the Layer List display options. Check or uncheck the categories that you want to show or hide in the layer list:



Layer list display options

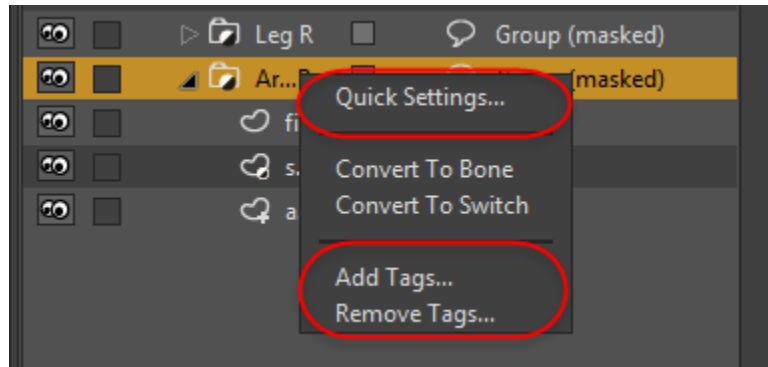
Reordering Layers

Layers can be re-ordered simply by dragging one layer above or below another layer. Just click and drag the layer you want to move - you will see a red insertion bar indicate where the layer will be placed when you drop it. When the insertion bar appears at the location you choose, just drop the layer and you're done. You can also use this method to drag sub-layers into or out of group layers.

 When you drag multiple layers in Mac, a number appears at the right side of the Layer name to indicate the number of layers that are selected for dragging. Windows displays a drag cursor only.

Layer Context Menu

When you right-click a layer, a context menu provides commands that are applicable to that layer type. The following commands are typical of all layer types:



Right-click a layer to display a context menu of commands that are specific to that layer type.

- **Quick Settings:** Choose this option to display the Quick Settings dialog for that layer. See “Using Layer Quick Settings” on page 179.
- **Add Tags:** (Pro only) Opens a text field that allows you to add tags to the selected layers. Tags should be separated by commas.
- **Remove Tags:** (Pro only) You can use the Layer Settings dialog to enter tags for multiple selected layers, which results in several layers having the same tags. Choose the Remove Tags option to display a popup menu that allows you to enter the tags that you want to remove from the selected layer.

Other context menu commands are displayed, depending on the type of content in that layer:

- The context menu for vector layers provides quick access to masking options, including whether or not to mask the layer and how to apply the mask if selected.
- Audio Files, image layers, and Poser layers (Pro only) provide options to reveal the source media in the Finder or Explorer and open the source media file. The source file will open in the default application assigned to that media type.
- The context menu for a group layer provides the option to convert to a Bone group or a Switch group.
- The context menu for Bone Groups provides an option that converts the bone group to a switch group.
- If the layer is included in a layer comp, the name or names of the layer comps will appear in the context menu.
 - If multiple layers are selected and they are all included in a layer comp, the comp name will have a plus sign that precedes the layer comp name.
 - If the selection of layers includes some that are included in a layer comp and some that are not, a minus sign will precede the layer comp name.
 - A checkmark appears in front of a layer comp name if the currently selected layer is included in that layer comp. If you select a comp name that has a checkmark beside it, any of the currently selected layer(s) that are included in that layer comp will be removed from it.

- If you select a layer comp in the list that does not have a checkmark beside it, any of the currently selected layer(s) that are not assigned to that layer comp will be added to it.

Changing Layer Settings

The last thing you can control in the layer list is the property set of any layer. By double-clicking a layer in the list, a dialog will appear with various options controlling the appearance and behavior of the layer. This dialog is described in [“Chapter 12: Layer Settings” on page 205](#).

Copying and Pasting Layers Between Documents

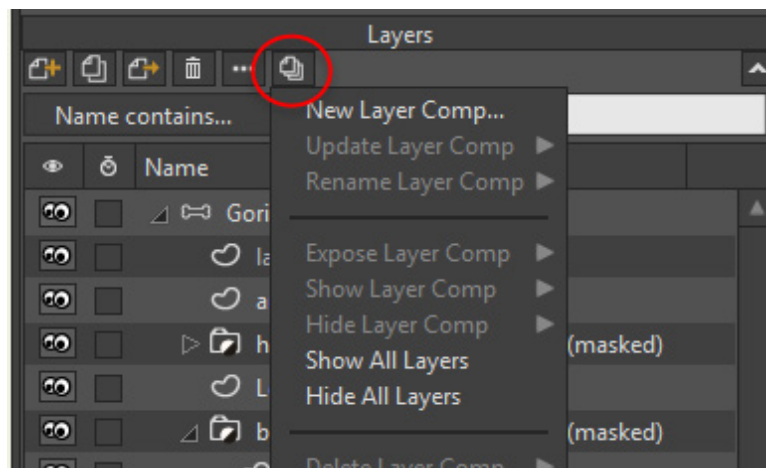
The **Edit > Copy Layer** and **Edit > Paste Layer** commands allow you to copy and paste a selected layer between documents. For more information on these commands, see [“Copy Layer \(Pro Only\)” on page 428](#) and [“Paste Layer \(Pro Only\)” on page 428](#).

Using Layer Comps (Pro Only)

Layer comps are useful if you want to export only selected items in your scene so that you can composite them externally in third party software. For example, you can create a layer comp that relates to background elements, another that relates to characters, and another that relates to foreground elements or titles.

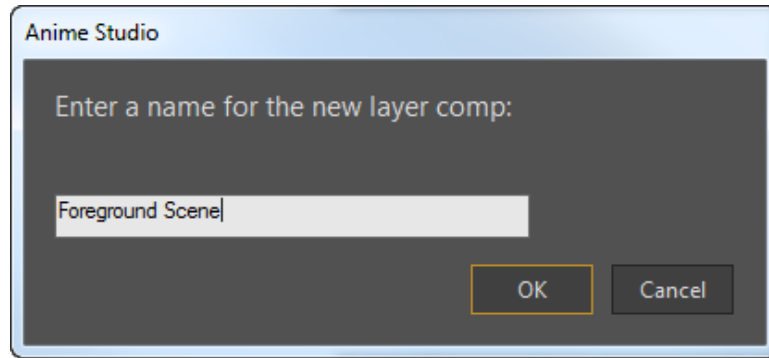
Turn groups on and off until you get elements that logically belong together. Then create a new layer comp from that group. At render time, you can then choose to render specific layer comps as a movie file.

The Layer Comp tool appears in the toolbar in the Layers Window. Click the Layer Comps tool to display a menu that includes the following commands:



Layer Toolbar

- **New Layer Comp:** In the Layers Window, hide the layers and objects that you do not want included in the layer comp, and make sure that all items that you do want to include are visible. Then choose New Layer Comp. Enter a name for the layer comp in the dialog that appears.



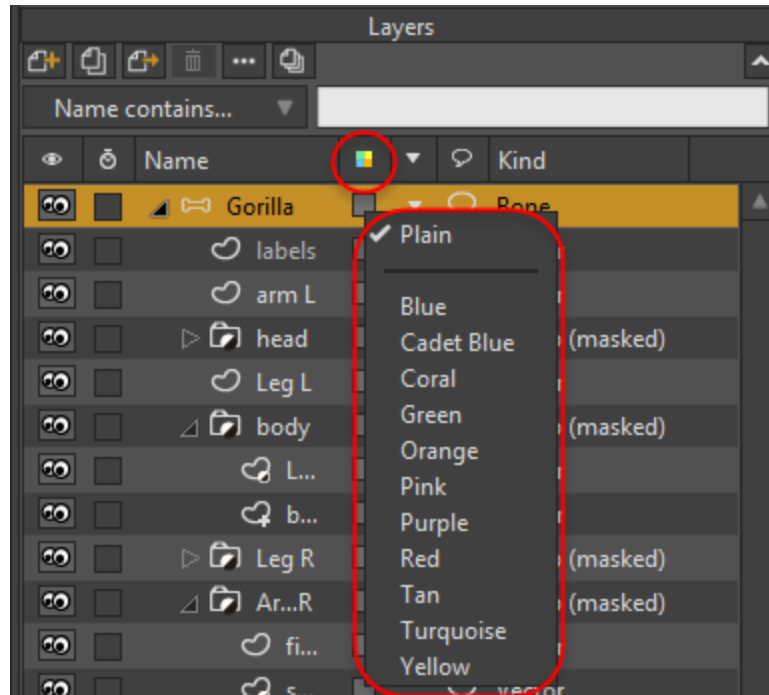
Creating a new layer comp

- **Update Layer Comp:** Choose this option if you need to make changes to an existing layer comp. Make sure that all items that you want to include are visible on the stage. Choose Update Layer Comp and select the layer comp that you want to change.
- **Rename Layer Comp:** Choose this option and then select the Layer Comp that you want to rename. A dialog will prompt you to enter a new name for the selected Layer Comp.
- **Expose Layer Comp:** Allows you to “solo” the items in a selected layer comp. All other items will be set to invisible. Select the layer that you want to expose from the list of layer comps.
- **Show Layer Comp:** Allows you to show a single layer comp by name. Select the layer comp that you want to show from the list of layer comps.
- **Hide Layer Comp:** Allows you to hide a single layer comp by name. Select the layer comp that you want to hide from the list of layer comps.
- **Show All Layers:** Shows all previously hidden layer comps.
- **Hide All Layers:** Hides all layer comps.
- **Delete Layer Comp:** Allows you to delete a layer comp from the list. Deleting a layer comp does not delete the content contained within it, it only removes the references to the deleted layer comp.

Using Layer Colors

If you have many different layers in your Layers Window, you can assign colors to them to help find specific content more easily. To do so, double-click the layer in the Layers Window to open the Layer Settings dialog. In the General tab, choose a color for the layer from the Layer Color drop-down selector. The layer will then be displayed in the Layers Window in the color that you choose.

Alternatively, if the Label column is displayed in the Layers Window you can click the button to assign a color.



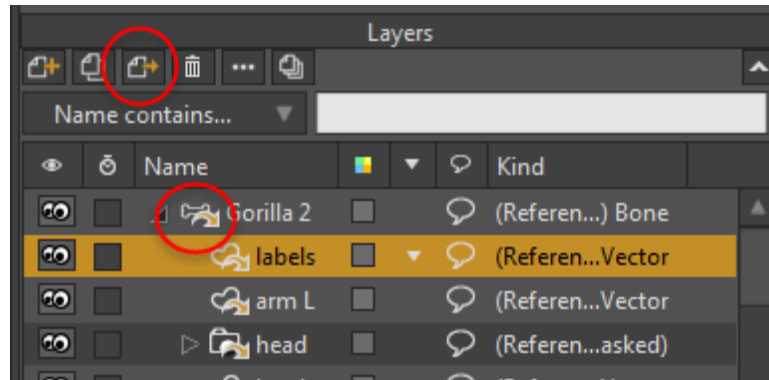
Choosing a layer color

Using Layer Referencing (Pro Only)

Layer referencing allows you to create one or more references or instances of a layer. Referenced layers take on the properties of the original layer. This even extends past the initial creation of the layer. As an example, let's say you have a rigged character. When you create a reference of the character and then move the original character's arm, the reference layer character will also move his arm! If changes are made to the reference layer, it will act independently from the original, allowing for the creation of unique assets. You can even reference layers across multiple documents, opening up new workflow possibilities for team based productions.

When you make changes to the original layer, the changes are applied to all instances as described in the following sections.

You can easily create reference layers from the Layers Window. Simply click the **Reference Layer** icon to add a reference layer above the currently selected layer. Referenced layers have a special icon that displays a curved arrow over the layer type symbol, and the Kind column will label the layer as referenced.

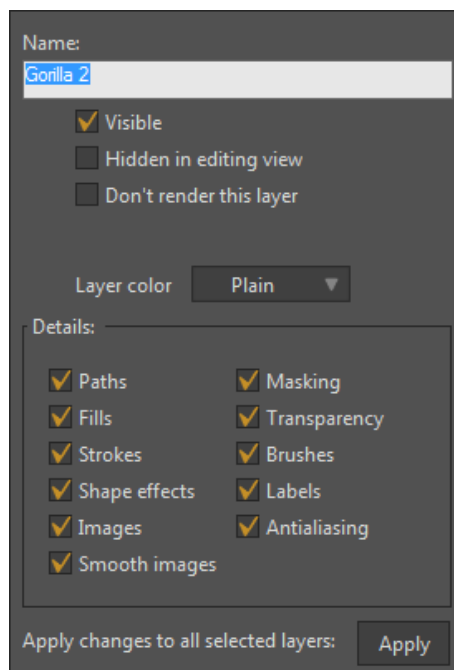


Reference Layer icon

 For more information and hands-on examples that describe how to create and use reference layers, see “**Layer Referencing (Pro Only)**” on page 274 in your Moho Tutorial Manual.

Using Layer Quick Settings

The Quick Settings dialog displays frequently used layer settings in a convenient format. You can open the Quick Settings dialog. If you have the Quick Settings column displayed in the Layers Window, you can click the icon in the Quick Settings column to open the Quick Settings dialog for the selected layer(s).



Quick Settings dialog

From the Quick Settings dialog you can apply a number of different settings to the selected layer, including:

- **Name:** The name for the selected layer.

- **Visible:** Shows or hides the selected layer.
- **Hidden in editing view:** Turn on this checkbox to hide the layer while editing. The layer will still appear in rendered output, but will be invisible in Moho's edit view. This can be useful to reduce clutter and improve performance. Things you might consider hiding in the editing view are background details, texture and detail layers, or special effects like particle layers. Note that if a hidden layer is the currently active layer, it will temporarily un-hide itself so that you can edit whatever it contains.
- **Don't render this layer:** If this box is turned on, then the layer will not appear in any rendered/exported movies. This option is usually used for some kind of helper layer. For example, you might draw a layer with some guide lines to help you draw and animate a scene, but you don't want those guides to appear in the final output. Note layers have this option turned on by default.
- **Layer Color:** Layer colors are used to help you categorize the content in your project using colors of your choosing. Use the Layer Color selector to choose a color for the current layer. Plain will display the layer in the normal Moho interface color. Several other color choices are available for categorizing your layers.
- **Details:** Enables or disables display of several different types of properties in your scene. Many of the settings below are also available in the Display Quality options dialog, discussed in ["Display Quality \(Pro Only\)" on page 162](#).
 - **Paths:** Display points and curves for vector layers.
 - **Fills:** Display the fill colors of vector shapes.
 - **Strokes:** Display the outlines of vector shapes.
 - **Shape Effects:** Displays shape effects.
 - **Images:** Display images in image layers.
 - **Smooth Images:** Display images with higher quality alpha blending.
 - **Masking:** Display masking effects.
 - **Transparency:** Display shape transparency.
 - **Brushes:** Display brush effects applied to shape outlines.
 - **Labels:** Displays bone labels on the workspace so you can easily identify what the bones control.
 - **Antialiasing:** Draw shapes with smooth edges.
 - **Apply changes to all selected layers:** After you check the settings you want to apply to the selected layers, click the **Apply** button.

Chapter 11: Layer Types

Drawings in Moho are vector-based. Vector drawings are different from pixel-based images (like a photograph) in that they use lines and curves to represent a picture, rather than a grid of colored pixels. This difference makes a lot of things easy in Moho that would be difficult or impossible to do with a pixel-based image.

First of all, since a Moho drawing is represented as a bunch of curves, you can reshape the curves at any time, without ever losing precision. Also, Moho projects are relatively small, even for complex animations - this means Moho doesn't require much memory even when working on a long movie. Vectors also have benefits when it comes to animation. By moving just a few points, you can totally change the shape of an object over time.

You're not restricted to vector artwork, though - Moho also has Image Layers. Using this type of layer, you can work with regular images within a Moho project. So, Moho is not strictly vector-based, but you will probably still use mostly vector layers, as image layers are not as flexible when it comes to animation.

Of course, most standard image and movie formats are not vector-based, so when you're done working on a Moho project, it must be rendered to create a traditional pixel-based image. During the rendering process, Moho can apply various effects to the objects, such as shading and blurring.

Moho is designed in such a way that projects are split into layers. You can have many, many layers in a Moho project, each representing a different element in a scene or animation, such as background scenery, a character, or a title. Some layers can even contain other layers, so a more complex object, such as a character, might contain separate layers for each arm and leg.

Layer Types

Moho currently supports the following types of layers:

- **Vector Layers** are used to hold vector-based artwork. These are the main type of layer you will use to create drawings. See "Vector Layers" on page 183 for more information.



*In Moho Pro, you can use the **Scripts > Draw > Simplify Curve** menu command to reduce the number of points in a complex Vector layer.*

- **Image Layers** can be used to bring in images from other applications. Image files created in 3D programs or photo editing applications can be used in Moho with Image Layers. See "Image Layers" on page 184 for more information.
- **Group Layers (Pro only)** are used to group together multiple layers. If you created 20 layers with trees for example, you could put them all in a Group Layer and call it a forest. Group layers are a useful tool for organizing a complex project. See "Group Layers (Pro Only)" on page 186 for more information.



Right-click a Group Layer in the Layers Window to quickly convert the Group layer into a Bone or Switch layer.

- **Group with Selection Layers (Pro only):** After selecting two or more groups, choose the Group with Selection layer type to create a group that contains the selected layer(s). See [“Group with Selection Layers \(Pro Only\)” on page 187](#) for further information.
- **Bone Layers** contain skeletons that are used to control the artwork in your vector and image layers. You manipulate skeletons as if they were “puppets” by bending arms and legs to make a character move. See [“Bone Layers” on page 188](#) for more information.



Right-click a Bone layer in the Layers Window to quickly convert it into a Switch layer.

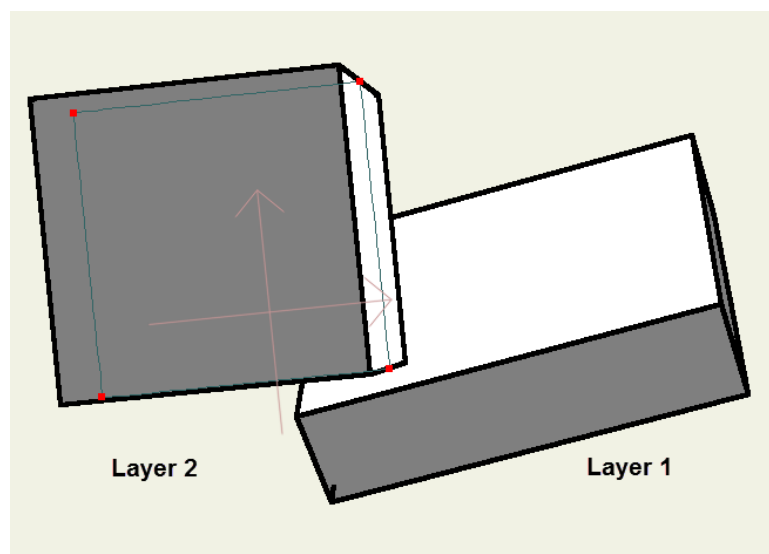
- **Switch Layers** are just like Bone layers, except they will only display one of their sub-layers at a time. Switch layers are an excellent way to perform lip-sync animation. Which sub-layer gets displayed is controlled by a switch data file. You can create this data file by hand, or better yet, use a lip-syncing program like Papagayo. See [“Switch Layers” on page 190](#) for more information.
- **Frame by Frame Layers (Pro only):** Provide a quicker and easier way to create frame by frame animation. For further explanation of the settings, see [“Frame by Frame Layers \(Pro Only\)” on page 194](#). For a hands-on tutorial, see [“Tutorial 5.10: Using Frame by Frame Layers for Animation \(Pro Only\)” on page 221 in your Moho Tutorial Manual](#).
- **Particle Layers (Pro only)** are used as a way to simulate water, sparks, smoke, crowds, or any number of effects that can be made up of many small objects. A Particle layer behaves somewhat like a Group layer, but instead of displaying each of its sub-layers, it can display many, many copies of each sub-layer arranged in sort of a “spray” formation. The sub-layers appear to be moving outward from the origin of the Particle layer. For more information, see [“Particle Layers \(Pro Only\)” on page 195](#).
- **Note Layers (Pro only)** are like sticky notes in Moho. You might use a note layer when you want to leave a note for yourself or another animator. For example, you might create a note layer at a particular frame that needs some work, or to describe why a character is set up in a particular way. See [“Note Layers \(Pro Only\)” on page 198](#) for more information.
- **Audio Layers (Pro only)** allow you to add a sound file to your project. When adding an audio layer you will be prompted to select an audio file.
- **Patch Layers (Pro only)** allow you to arrange layers so that part of a layer can appear behind a layer, and another part of the same layer can appear in front of a layer. They are used in conjunction with the Character Wizard, but can also be used in other ways.
- **3D Layers (Pro only)** can be used to import 3D objects that were created in a 3D modeling program. Use the File > Import > 3D command to create a 3D Layer. 3D models can be a good source of background scenery. Or, use a 3D model for a character's head, and decorate it with eyes, mouth, etc. created with Moho's vector layers. See [“3D Layers \(Pro Only\)” on page 200](#) for more information.

Enhanced Layer Alignment Features (Pro Only)

The Layer Alignment features in Moho assist in alignment when using 2D to 3D conversions. New layers align to face with the current camera view. This allows you to create more complex 3D objects in your Moho scenes.

To demonstrate, try this:

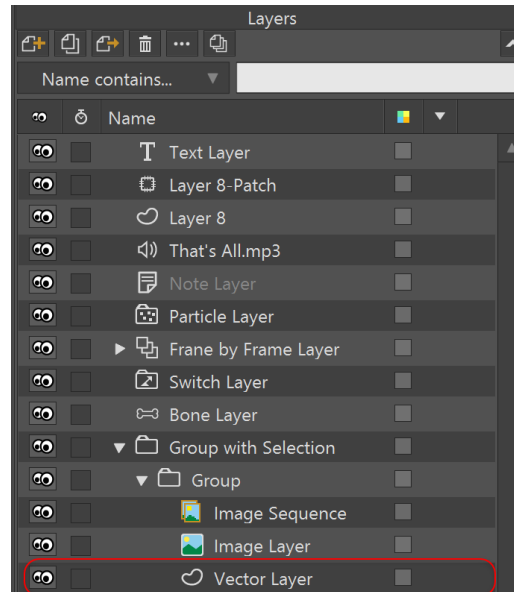
1. Create a new Moho scene.
2. Use the Draw Shape tool to draw a box in the scene.
3. Use the 2D to 3D conversion features to extrude the 2D box into a 3D box. To convert a 2D vector layer to 3D, double click on the layer in the Layers Window and click on the 3D Options tab. Then select 'Extrude' from the 3D Conversion drop down menu.
4. Use the Orbit Workspace tool to rotate the camera so that you are looking at the 2D box from a different angle.
5. Create a new layer, and add another extruded box on that layer. The new box faces the current angle of the camera.
6. Rotate the camera so that you can see how the two boxes relate to each other.



New layer alignment features

Vector Layers

Vector layers are the most common layer in Moho projects. Artwork that you create in Moho is always contained in a vector layer. Tools are available for drawing and editing curves, setting up fills and outlines, and connecting your drawings to bones.



Vector Layers

The tools available for working with vector layers essentially make up a 2D drawing program. You can draw lines and curves, re-shape existing curves, and manipulate objects in various ways. There are a couple ways that Moho differs from other drawing programs. First, everything you draw in Moho is a set of points and curves. In many programs, when you draw a circle, you get a circle object, or you may type some text to create a text object. In Moho, once you've created the circle or the text, there's no difference between them whatsoever - they're both collections of curves. One happens to be in the shape of a circle, and the other in the shape of some text. There are advantages in treating all objects the same: first, you never have to worry about what type of object you're working with - the answer is always the same: a set of points and curves. The other advantage is that any operation you can perform on hand-drawn curves can be performed on text, or a circle, or whatever.

The other feature of Moho's drawing mode that is different from many other drawing programs is the concept of welding. In Moho, two points can be welded together into a single point. In fact, any number of points can be welded together. When points are welded together, moving one of them moves them all, along with any curves that pass through that point. This is particularly useful when you start to animate objects. For example, if you want to move a character's nose, then welding it to the face might not be a bad idea. That way, however you distort the nose or the face, they'll always stay connected.

Image Layers

Image layers are a way of importing artwork into Moho that was created in other programs. Any program that can produce image files can be used together with Moho this way. For example, a painting program, photo editor, or 3D modeling program can produce images that can be used in a Moho image layer. You can't edit the pixels of one of these images in Moho, but you can move, resize and rotate image layers, and attach them to skeletons for more complex animation.



When an image layer is first selected, the default tool is set to the Transform Layer tool.

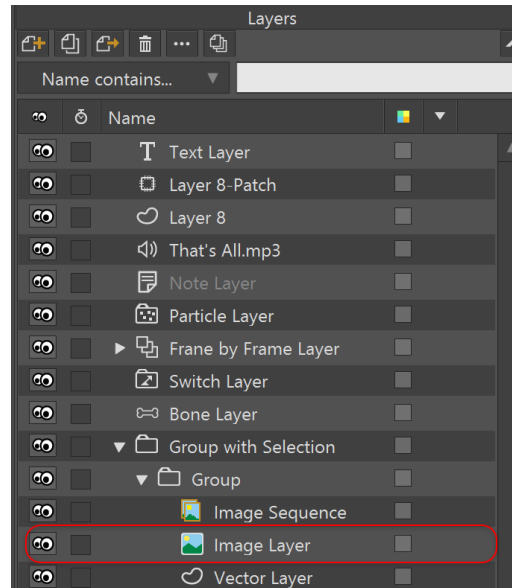


Image Layers

The best image format to use with Moho is PNG. PNG files have high quality, good compression, and support full alpha channels for transparency effects. Although PNG is the preferred format for use with Moho, you can also use JPEG, BMP, Targa, or GIF images.

Image layers can also be used to bring external movies into Moho. Instead of selecting a still image, select a movie file when creating a new image layer. Moho can import QuickTime (Windows and Mac OS) or AVI (Windows only) movies as image layers. When importing a movie file, Moho will use the movie's alpha channel (if present) to composite the movie with other elements in the scene.



Due to differences in media support between Macintosh and 64-bit Windows OS, you will need to use the 32-bit version of Moho Pro to import and export MOV files that have alpha channels.

Image Sequence Layers

Create an image sequence layer, or choose **File > Import > Image Sequence** to Import a numbered sequence of images. Each image is imported as its own layer, and the entire group is enclosed in a switch group. The image files should be named using a numerical sequence. For example, "file0001.jpg", "file0002.jpg", "file0003.jpg", etc.

Image Sequence layers allow you to import sequentially-numbered images into Moho Pro. After choosing an Image Sequence layer, you will be prompted to locate your sequentially numbered images on your hard drive. Click the first image, then shift-click to select the last image in the sequence. Then click Open to create the Image Sequence layer.

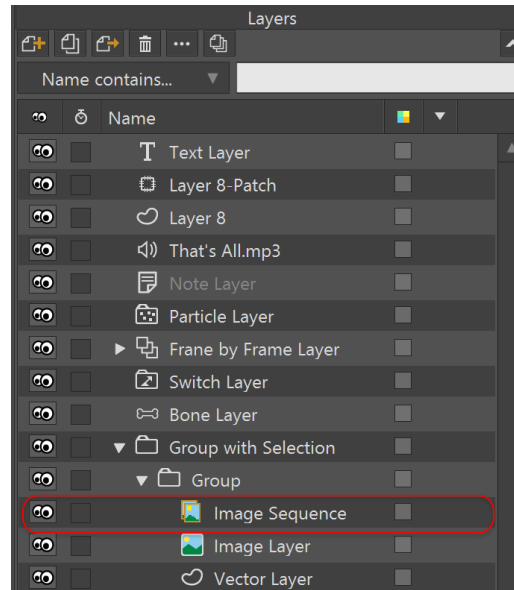


Image Sequence Layers

In the timeline, the first image in the sequence will be designated by a green triangle pointing forward in the timeline, and the last image in the sequence will be designated by a red triangle pointing backward in the timeline. You can scrub through the timeline to see the individual frames in the sequence, just as you can with a movie.

**First image
in sequence**

**Last image
in sequence**

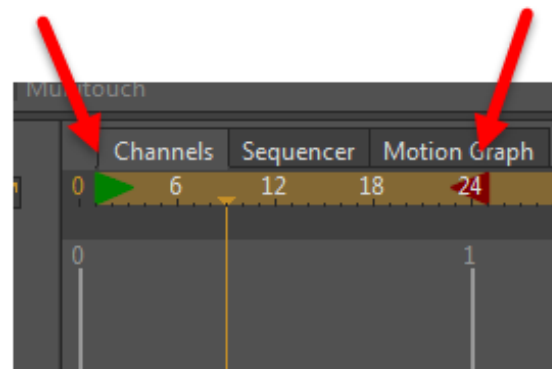
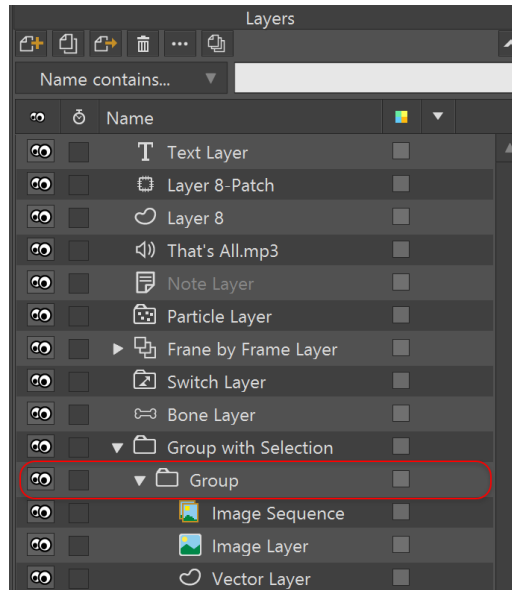


Image Sequence Layers

Group Layers (Pro Only)

Group layers are used to group together multiple sub-layers so that they can be manipulated as one. They're also very useful for organizing complex projects. You can think of a group layer as a folder that can contain files (layers) and other folders (more group layers). When you move a group layer, turn it invisible, or apply an effect (such as a layer shadow), these are all applied to every layer contained within the group.

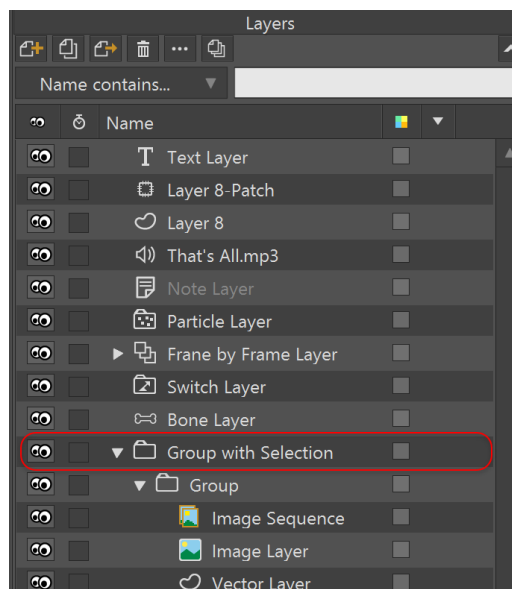


Group Layers

Group with Selection Layers (Pro Only)

You can use the Group with Selection layer type to combine two or more selected layers into a group.

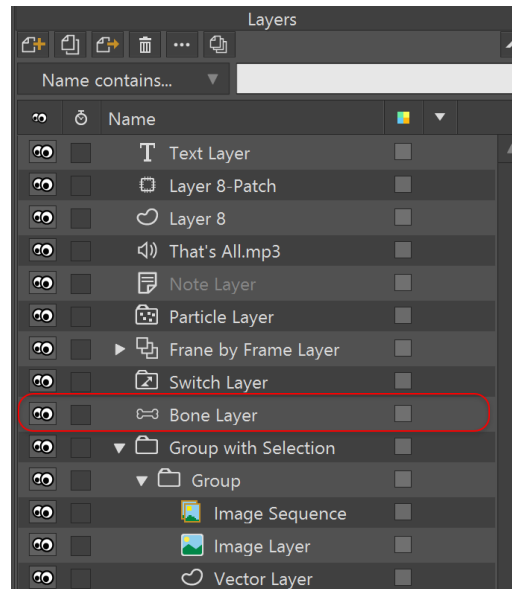
The group layer will be created as the parent of the last layer that you selected, unless its parent is also selected. In that case, the new group will become the grandparent of the last selected layer.



Group with Selection Layers

Bone Layers

Bone layers are similar to Group layers - they can both group together multiple sub-layers that can then be manipulated as a single object. However, bone layers have an additional feature: In a bone layer, you can set up a skeleton that can be used to manipulate your artwork. A skeleton is exactly what it sounds like - an internal structure that can move the outer, visible portion of your artwork.



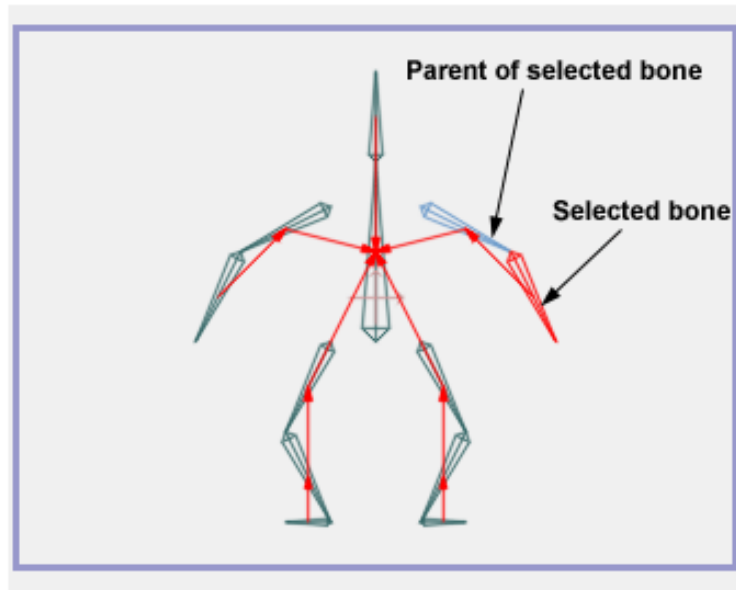
Bone Layers

Setting up bones is sort of a pre-animation phase. You don't draw shapes in Bone layers, you set up controls that will help you animate later on. The purpose of setting up bones is exactly what you might think: creating a rigid skeleton inside your drawing. Later on, during animation, when you want to move an object, bones make the job easy. By moving a single bone in the arm of a character, for example, the whole arm will move with it. Around the elbow, the drawing of the arm will bend and stay smooth (as long as the bones were set up well with the Bone editing tools).

Bones by themselves don't really do much of anything: you can move them around, but they're invisible in the final Moho output. To really make use of bones, they need to be attached to objects in other layers. This process is covered in **"Bones" on page 104 in your Moho Tutorial Manual**, and also **"Chapter 5: Bone Tools" on page 82**.

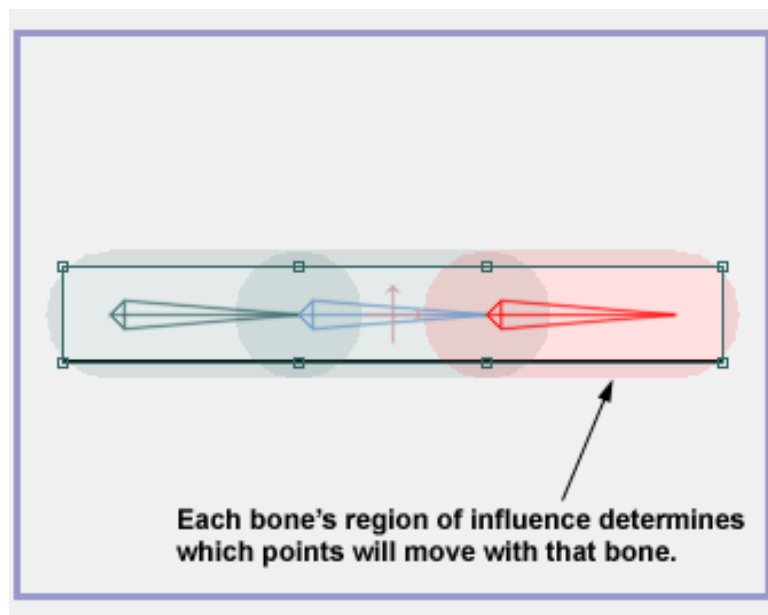
When you create a skeleton out of a group of bones, the bones have a hierarchical relationship. Each bone has a single parent (or maybe no parent at all, in which case it's called a root bone), and each bone may have multiple children. The relationship between parent and children is that when a parent bone is moved, all of its children move with it. When a child bone is moved however, it's parent remains unchanged.

Below is a picture of a skeleton created in Moho. Red arrows have been added that point from each bone to its parent (the spine has no parent and is referred to as the root of the skeleton). Note that the currently selected bone is highlighted in red, and its parent (if it has one) is highlighted in blue, as shown below.

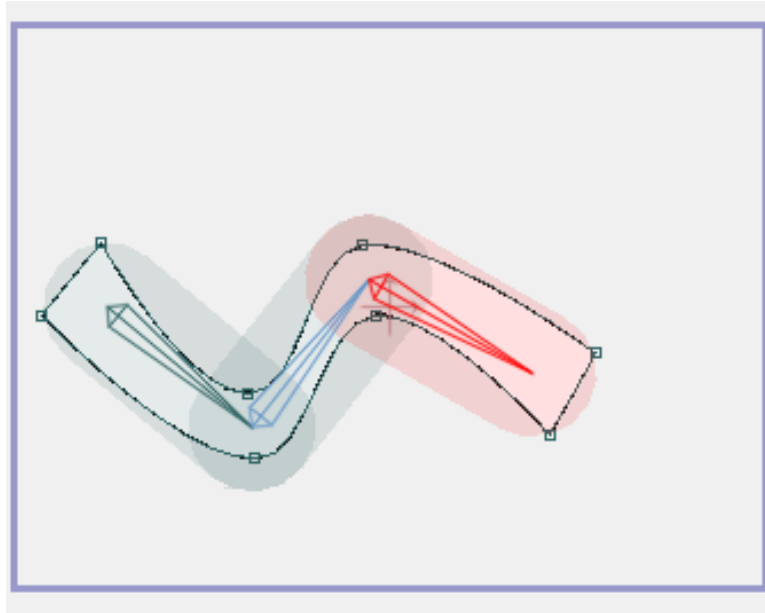


A skeleton hierarchy

When you use bones with a vector layer, you need to consider how the bones and curve control points will interact. When a bone moves, it moves the points around it as well. Each bone has a region of influence (which you can adjust). Points move mostly with the bone whose region of influence they fall within, although other bones can still have an effect on them. Below is a picture of some points and bones. Notice the region of influence around each bone. The second picture shows the same object after the bones have been moved. Notice how the points follow the bones according to regions of influence (and how the curves pass smoothly through the points, wherever they move to).



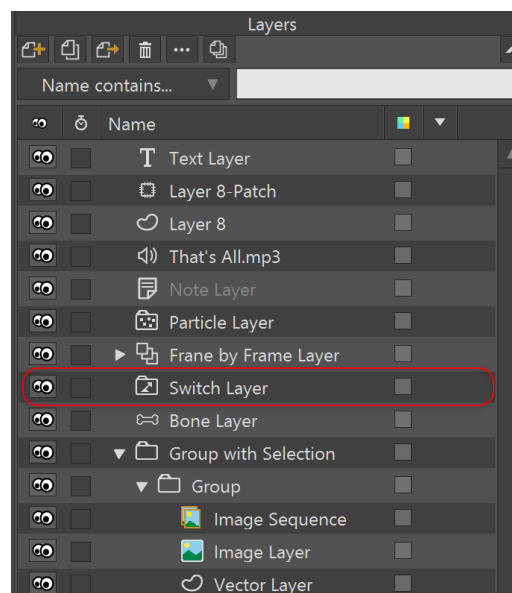
A bone and vector setup



Moving bones moves the curve control points

Switch Layers

Switch layers are used to group together multiple layers, much like Group layers. However, switch layers have an interesting twist: only one of their sub-layers can be displayed at a time.



Switch Layers

One reason you might want to do this is for lip-sync animation. In this case, each of the sub-layers would correspond to a mouth shape for a particular sound.

Many of the characters in the Library provide switch layers for the visemes that Moho supports. For example, if you load Jace from the Version 6 character library and

expand the Mouth layer, you'll see support for the following visemes and mouth positions: **Rest**, **Etc**, **FV**, **L**, **MBP**, **O**, **E**, **AI**, **U**, and **WQ**.

Moho includes powerful automatic lip-syncing which is a big time saver .

- Moho Debut uses the volume of the audio track to determine which mouth shape to use. When the audio is quiet, the mouth is more closed. When the audio is louder, the mouth is more open.
- Moho Pro uses a production sync library that analyzes the audio track to determine the phonemes (the basic components of speech) that are being used. Results are improved when you enter the spoken words into Moho. After the production sync analysis is done, Moho Pro applies the matching mouth shape.

The mouth shapes supported by the Moho lip syncing features follow standards developed by Preston Blair, an animator from the early days of Disney.



To set up a mouth that can lip sync, you will need to create a switch layer that contains at least ten sub-layers with different mouth shapes. Shapes should be created for the appearance of the mouth when at rest, and when speaking each of the 9 before-mentioned phonemes. The Preston Blair mouth shapes are discussed in more detail at http://minyos.its.rmit.edu.au/aim/a_notes/mouth_shapes_01.html.



For examples of how lip syncing is used, see “Tutorial 5.1: Automatic Lip-Sync” on page 180 in your Moho Tutorial Manual and “Tutorial 5.2: Phoneme Lip-Sync” on page 182 in your Moho Tutorial Manual.

If you prefer more control over lip-syncing than what the automatic built-in lip-syncing offers, you can take full manual control over the process using a separate, and free, tool called Papagayo (see <http://www.lostmarble.com/papagayo/>). In Papagayo, you type in the words that are being spoken. Papagayo then uses a phoneme dictionary to break down the words into spoken phoneme components. These are lined up on a timeline, along with the audio waveform.

Initially, the lineup on the timeline in Papagayo is rough and the phonemes are spaced evenly. You then shift words and phonemes along the timeline so that they line up better with the actual sounds you hear. The final result is saved out as a “switch data file” that can be imported into Moho.

You can also create a switch data file by hand. To do this, the data file should look like this:

```
MohoSwitch1
1 A
2 A
10 B
22 A
37 C
40 C
```

- The first line is a header that just tells Moho that the file is a switch data file.
- The following lines contain two items each:

- The first item is a keyframe.
 - The second item is the name of one of the switch group's sub-layers. (In this example, the switch layer should have three sub-layers, named "A", "B", and "C".)

If you make changes to the switch data file outside of Moho, and you want to incorporate those changes, you will need to re-load the data file. To do this, double-click the Switch layer in the Layers Window, and in the dialog that opens up, go to the Switch tab, press **Source Data** and re-select the data file.

You don't have to use a data file to work with Switch layers - you can also control them manually from within Moho. To control which sub-layer is displayed at any frame in your animation, just right-click on the Switch layer in the Layers Window. A pop-up menu will appear that lets you choose which sub-layer to display.

Moho includes several sample mouth sets for doing lip-sync with Papagayo - take a look at those files to see how a switch layer should be set up. Also, check out the lip-sync tutorials included in this manual.

Switch layers have a feature that allows for smooth switching. To use this feature, all the sub-layers need to be Vector layers, and they need to have the same number of control points. Then, when switching, Moho can smoothly transition between sub-layers. To enable this feature, turn on **Interpolate sub-layers** in the Switch layer's properties dialog. An example of using this feature is included in one of the mouth sets mentioned above.

Switch layers can be set up with skeletons, just like bone layers. More accurately, a switch layer **is** a bone layer, just a specialized one. If you add bones to a switch layer, you can use them (for example) to change the shape of a mouth as it speaks, bending it into a smile or a frown.

Don't feel restricted to lip-sync animation with switch layers. They have a lot of potential uses (controlling eyes, syncing to music & sound effects, switching between different hand gestures, etc.).

Using Switch Layers

Improvements to switch layers now include behaviors that will make them work better for frame-by-frame animation. These improvements include the following changes and enhancements:

- You no longer need to select a switch layer's active child in the Layers Window. You can now simply **Alt COMMAND/Ctrl Right-click** on it in the workspace.
- You can Alt-click the child of a switch layer in the Layers Window to activate it.
- You can activate the previous switch layer child using the Alt+D shortcut.
- To activate the next switch layer child, use the Alt+C shortcut.
- When moving switch layer keys in the timeline:
 - Drag the left side of the switch layer key to move it forward or backward in time.
 - Drag the right side of the switch layer key to move it forward or backward in time.

- For shorter keys, you can use shortcut keys as follows: hold the Cmd/Ctrl key down to move the right side, or the Shift key to move the left side.
 - Hold the Alt key down to revert to the old behavior of simply moving keyframes around.
 - Drag the center of the switch layer key to move the entire switch layer as a whole. You can also drag it before or after a neighboring switch layer to swap positions.
- When a layer is added to an empty switch group, it becomes the active child at frame 0.
 - When a new layer is created inside a switch group, Moho will assign a unique name (which is necessary for proper switch group functionality).
 - When a layer inside a switch group is renamed, the switch animation channel is updated to use the new name to preserve existing switch animation.
 - When a new layer is created inside a switch group at a frame other than zero, that new layer is not marked invisible prior to that time. (The switch layer takes care of its visibility, so setting it separately is redundant and makes it difficult to re-time the frame-by-frame effect.)
 - When a new shape is drawn in a vector layer inside a switch group at a frame other than zero, that shape will not be set invisible prior to that time. (Same reasoning as for new layers.)



If the children of a switch layer have layer colors assigned to them (as described in "Using Layer Colors" on page 177), the corresponding keys in the timeline will have the same color when those children are active. This makes it easier to see at a quick glance what switch layer is active at what time.



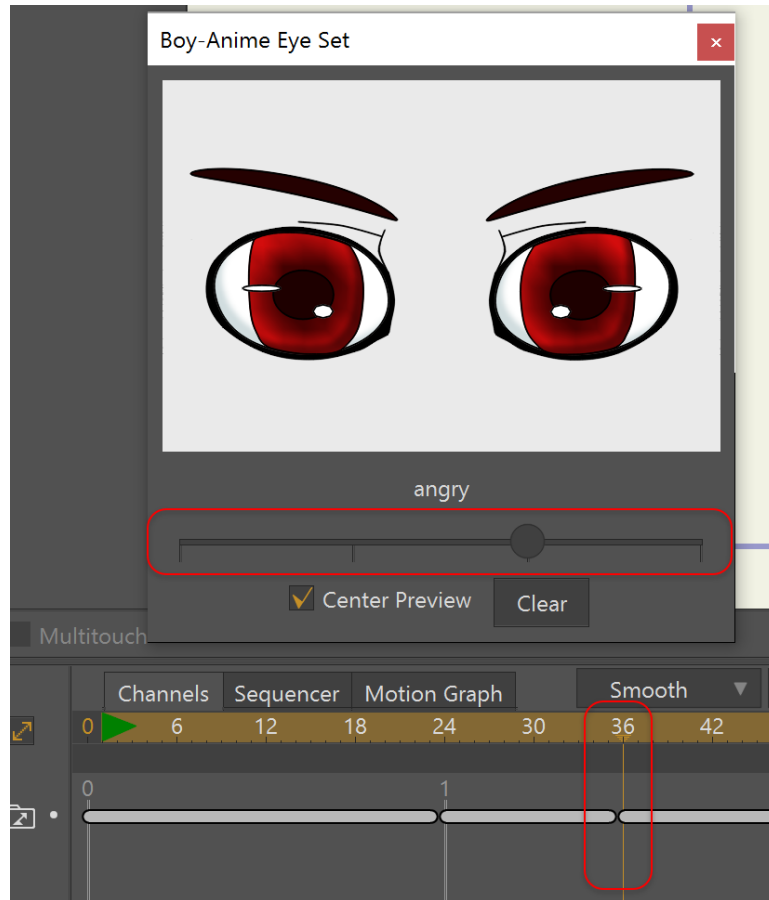
Switch layer keyframes are displayed in the timeline. You can mouse over one of the keyframes to see which layer is active at that point.

Using the Switch Selection Window

Choose **Window > Switch Selection** to open the Switch Selection window. When you have a switch layer selected in the Layers Window, the Switch Selection window will allow you to choose a switch layer by moving the slider left and right. Use the Center Preview checkbox to toggle between centered preview or a group-relative display. This choice will be stored with the document.

- **To add a switch layer to the timeline:** Advance to the frame where you want the switch layer to change, and then move the slider to the switch layer you want to add to that frame. As you move the slider, a preview of the associated switch layer will appear in the preview window. A keyframe will automatically be added to the timeline after you choose the switch layer with the slider.

- **To remove a switch layer from the timeline:** Advance to the frame that contains the switch layer you want to remove. Then click the **Clear** button in the Switch Selection dialog.



Switch Selection Window

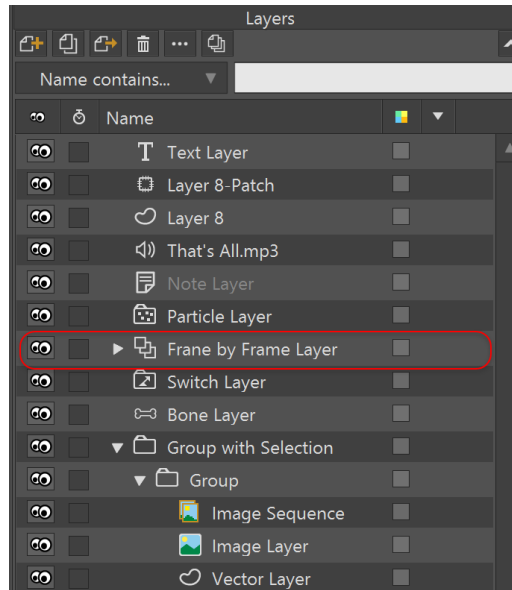
Frame by Frame Layers (Pro Only)

The Frame by Frame layer type automatically creates a layer that has the Frame by Frame option turned on in the Layers Window. A new vector layer will be placed inside the Frame by Frame animation layer so that you can begin drawing in it.

All of the drawing tools are available when a frame by frame layer is selected. Unlike doing frame by frame animation with switch layers, you will not need to go into the individual layers inside the frame by frame layer. If a frame by frame layer is selected when you insert text, the text will be created on the active vector layer. You also will not need to expand a Frame by Frame animation layer to select the individual layers while you draw.



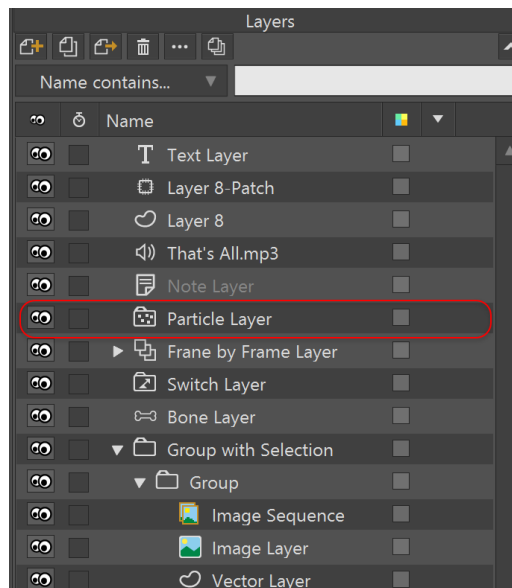
See **“Tutorial 5.10: Using Frame by Frame Layers for Animation (Pro Only)”** on page 221 in your Moho Tutorial Manual for more information on how to use Frame-by-Frame layers.



Frame by Frame Layers

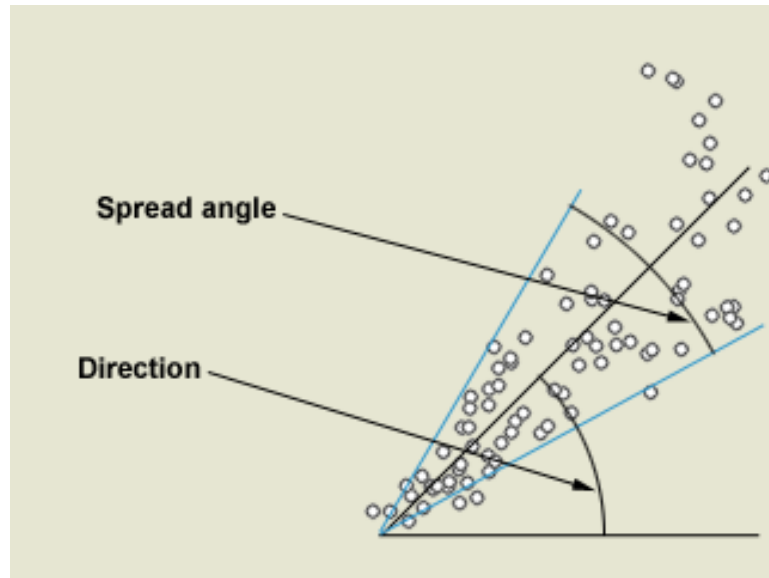
Particle Layers (Pro Only)

Particle layers are a way to simulate such effects as flowing water, fire, bubbles, or other effects that you can imagine are made up of many small objects. A particle layer is like a group layer in that it can contain sub-layers. However, instead of just displaying its sub-layers as they are, a particle layer will automatically animate its sub-layers so that they appear to be flowing outward from the particle layer's origin.



Particle Layers

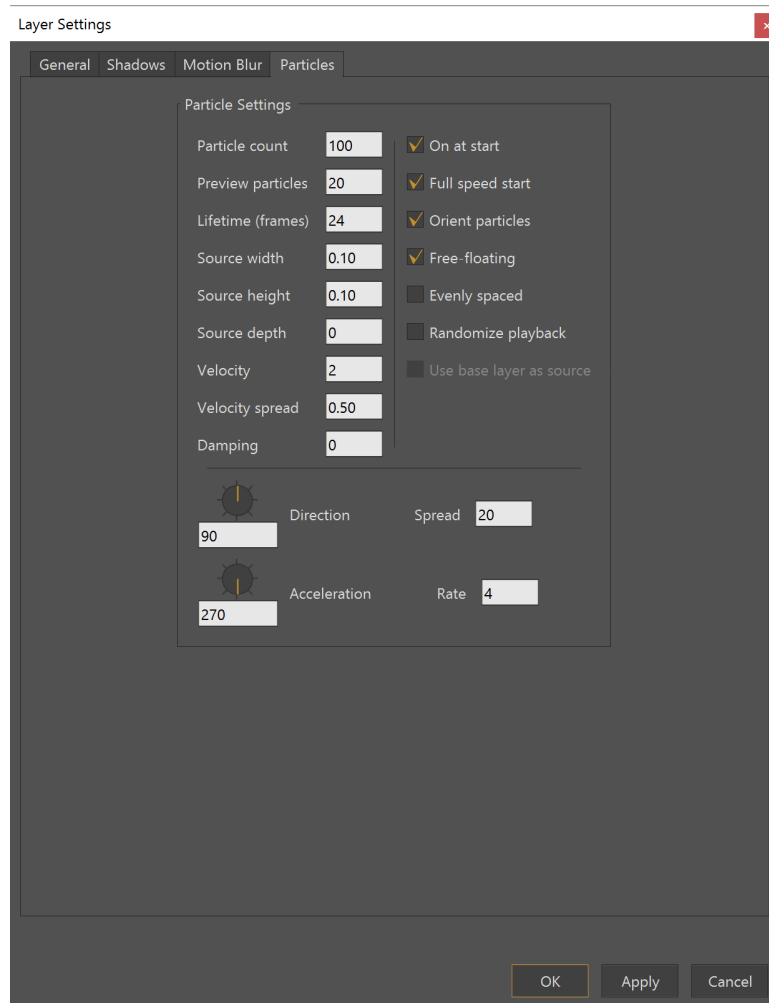
The direction that a particle layer sprays its particles is illustrated below.



Particle spray direction

During an animation, a particle layer can be turned on or off. When it is turned off, no more particles will be created, but those that already exist will continue to the end of their lifetime. To turn a particle layer on or off, right-click its entry in the Layers Window. A popup menu will appear to let you turn the particle layer on or off.

The complete list of settings for a particle layer is as follows. These settings are accessible in the Layer Properties dialog, under the **Particles** tab:



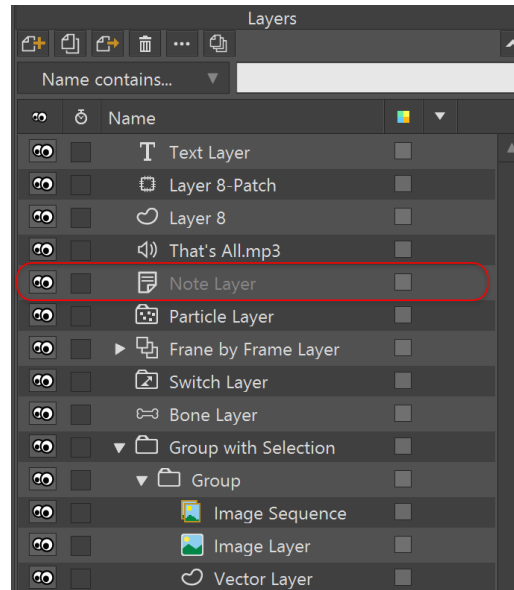
Particles Layer Settings

- **Particle Count:** The total number of particles visible at any one time
- **Preview particles:** The number of particles displayed in the working view (a smaller number than **Particle count** keeps the working view from slowing down too much)
- **Lifetime (frames):** The number of frames before a particle is recycled and sent back to the source. If set to zero, the particles will keep going for the duration of the animation.
- **Source width:** The width of the spray source
- **Source height:** The height of the spray source
- **Source depth:** The depth of the spray source. If set to a number greater than zero, then some particles will appear closer to the camera than others.
- **Velocity:** The speed that particles start at (a value of 2 will cause a particle to cross the entire screen vertically in one second)
- **Velocity spread:** The amount of random variation in the particles' velocity
- **Damping:** This acts kind of like air resistance, or backwards acceleration

- **On at start:** Whether the particle layer should be on at the start of the animation
- **Full speed start:** If the layer is on, this checkbox indicates if it should be running at full speed, or just starting
- **Orient particles:** If checked, then the particles will rotate to face the direction they're moving in
- **Free-floating:** If unchecked, then the particles will be tied to the particle layer if it is moved
- **Evenly spaced:** if checked, then the particles will be released in even time increments
- **Randomize playback:** Normally, particles will start their animation from the beginning when they are first created. If this box is checked, then particles will start playback at a random time. This is useful when simulating things like crowds of people when you use effects (see **"Effects" on page 233 in your Moho Tutorial Manual**).
- **Use Base Layer as Source:** Check this option if you want to use the bottommost layer as a shape that generates your particles. For more information on this feature, see **"Tutorial 6.9: Using 3D Models (Pro Only)" on page 269 in your Moho Tutorial Manual**.
- **Direction:** An angle indicating direction to spray particles in (see above figure)
- **Spread:** How wide the spray should be (see above figure) (a value of 360 will cause particles to spray in all directions)
- **Acceleration:** The direction of acceleration (straight down simulates gravity)
- **Rate:** The rate of acceleration
- **Copy all Particle settings to other selected layers:** When multiple layers are selected, check this option and click the **Apply** button to copy all particle settings to all other applicable selected layers.

Note Layers (Pro Only)

Moho's Note layers work kind of like sticky notes. You can add a note layer to remind yourself of something you need to work on, or to explain to other animators some important aspect of your project file. If you add a note layer at a frame other than zero, the note will only appear starting at that frame. That way, you can add notes that refer to specific parts of your animation (ex. "Use more exaggeration here!").



Note Layers

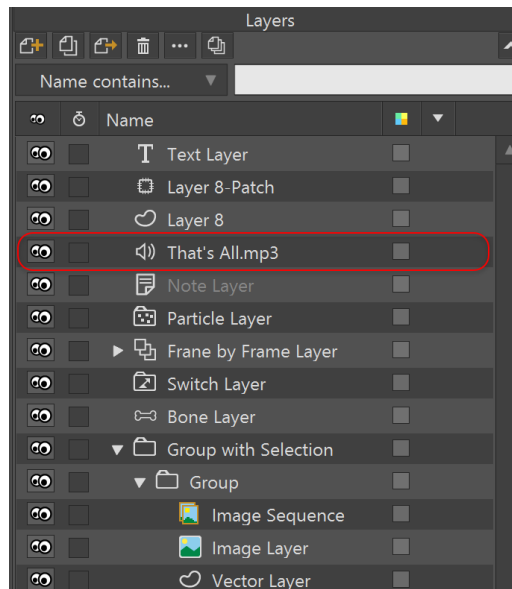
By default, Note layers do not appear in final rendered output, so your audience doesn't need to see your comments to yourself. However, if for some reason you do want a note to appear in the final product, you can do that by unchecking **Don't render this layer** in the Layer Settings dialog.



You can assign a color to the Note layer in the General tab. After you create the Note layer, open the Layer Settings dialog and switch to the General tab. Choose a color from the Layer Color drop-down menu, as described in "General Tab" on page 207. If the color is set to Plain, the note will appear against the default background color.

Audio Layers

Audio layers allow you to add an audio file to your project. You will be prompted to select a file after choosing this layer type. A graphic representation of the audio file appears in the timeline after the file is selected.



Audio Layers

3D Layers (Pro Only)

3D layers are a way for you to import true 3D models into Moho. When a 3D layer is rotated in space (or the camera moves around it), you actually see that backside of the model. Moho supports importing OBJ files into 3D layers - OBJ is a common 3D file format that most 3D programs can read and write.

When importing OBJ files, Moho will also load any associated material file, importing the objects' colors and texture maps.

3D layers can also be used with skeletons. Using a bone layer, you can warp a 3D model by moving bones around. Keep in mind that while 3D layers are truly three-dimensional, bone layers are only 2D. So, any manipulation you do with bones is going to be limited to some degree.

Because Moho is not a true 3D program, not all 3D features are supported. In particular, lighting. Any 3D model you import will be flat shaded. However, because Moho does support texture maps, you can simulate lighting if a texture map has lighting effects baked into it.

There are lots of quality 3D programs we recommend for use with Moho Pro. The following are products that will work well with Moho Pro:

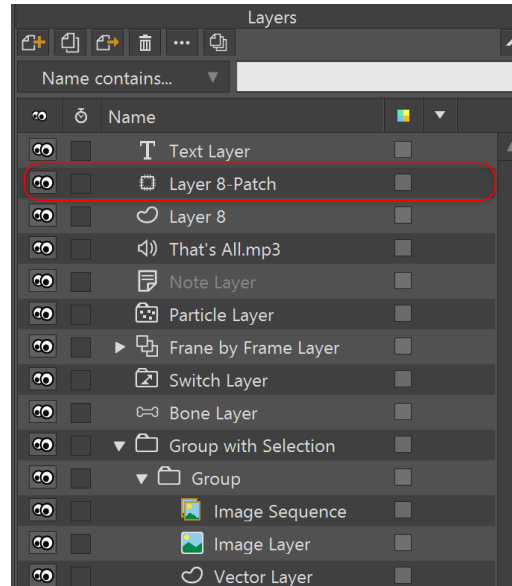
- Poser
- Amapi

For further information on importing 3D objects within Moho Pro please see the Moho Tutorials section at <http://youtube.com/mohoanimation>.

 When preparing a 3D model for use with Moho, it's usually a good idea to triangulate the model before exporting it as an OBJ file. This will eliminate any problems with concave or complex faces.

Patch Layers (Pro Only)

Patch layers are used in the Character Wizard to create objects that appear both in front of and behind objects on another layer. You can also create patch layers manually.

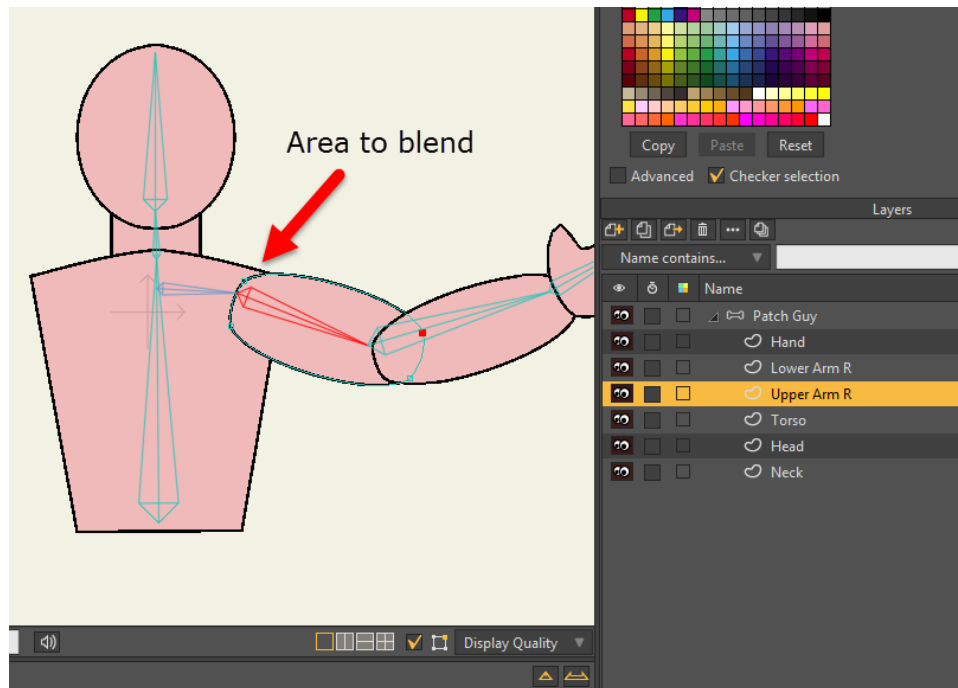


Patch Layers

Patch layers are intended for use when you are constructing a character such as a humanoid figure. For example, let's say you are drawing different body parts on different layers in a bone group. The head is on one layer, the torso on another, upper left and right arms on their own layers, and so on. Each layer has its own outline and fill.

However, when one joint meets another joint, there are outlines that overlap with other body parts. This is where patch layers come in, because you can blend the two layers together and "hide" the line where they connect.

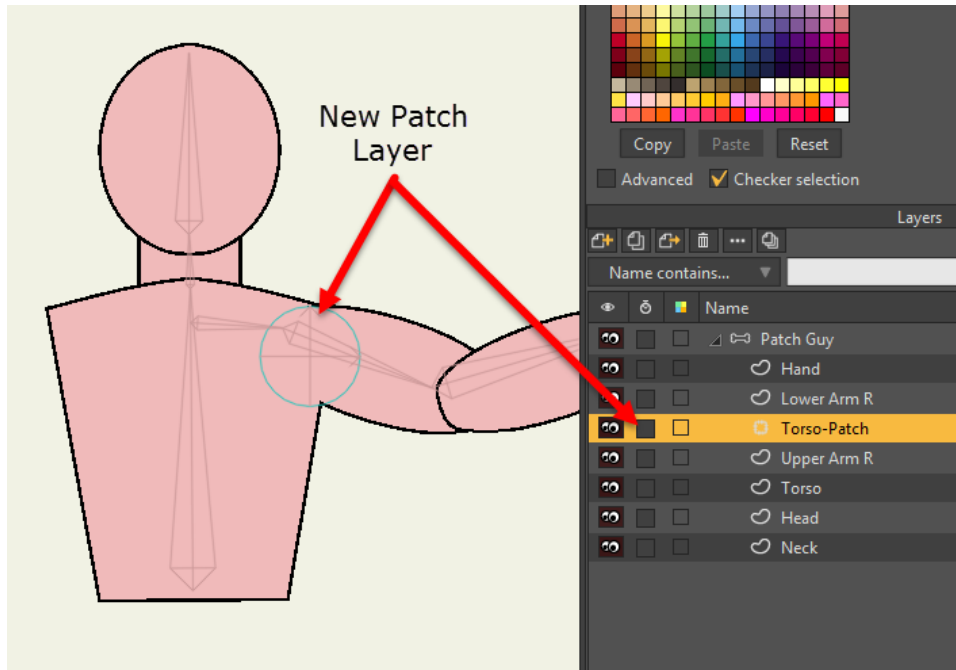
Look at the following example, which shows a number of body parts that are placed inside a Bone layer named Skeleton.



Determine the areas that you want to blend with underlying layers.


Let's say you want to blend the area between the torso and the right upper arm (Upper Arm R), which appears directly above the torso in the Layers Window. To do this, you would follow these steps:

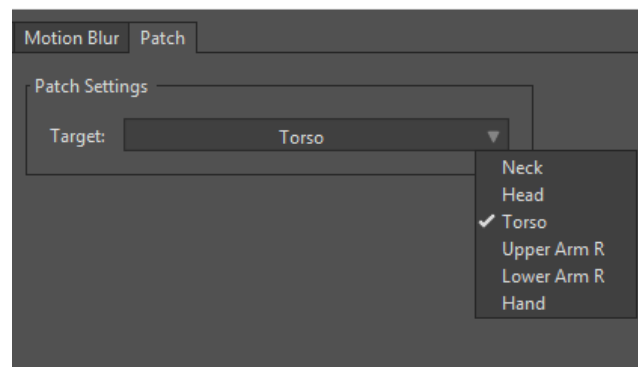
1. Select the Upper Arm R layer, so that the new Patch layer will appear above it.
2. Create a new Patch layer in the Layers Window.
3. A dialog asks you to select a target, and you can select the target layer from the Target drop-Down menu. Choose the Torso layer and click OK.
4. You'll see a new circle in the project window. The circle is the patch. The patch will be named according to the target layer that you selected in the Patch Layer dialog. In the case of our example, the patch layer is named Torso-Patch.
5. Use the Transform Layer tool to position and scale the patch so that the lines are covered. It should be positioned at the point where the shoulder will rotate.



The new Patch Layer in place.

6. Use the Manipulate Bones tool to test the positioning of your patch.

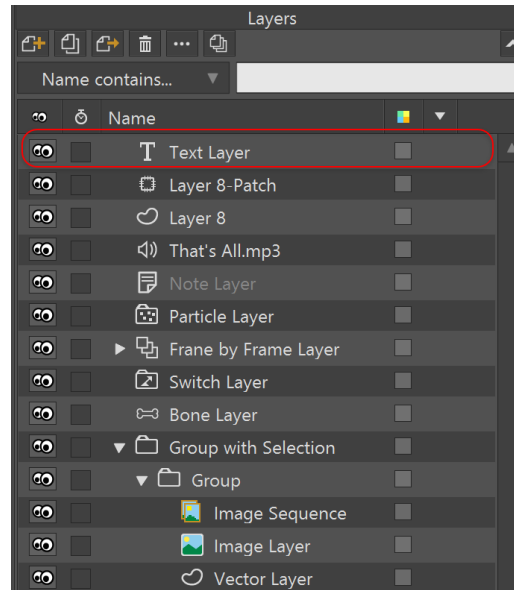
 If you need to change the target at any time, you can double-click the Patch layer and choose a new target from the Patch tab in the Layer Settings dialog.



Double-click the Patch layer to change the target if necessary.

Text Layers

The Text Layer option adds a text layer to your document, and works the same as the Text tool, the **Draw > Insert Text** command or by using the keyboard shortcut **Ctrl/Command+T**. For a description of the Insert Text dialog, see ["Insert Text"](#) on page 130.



Text Layers

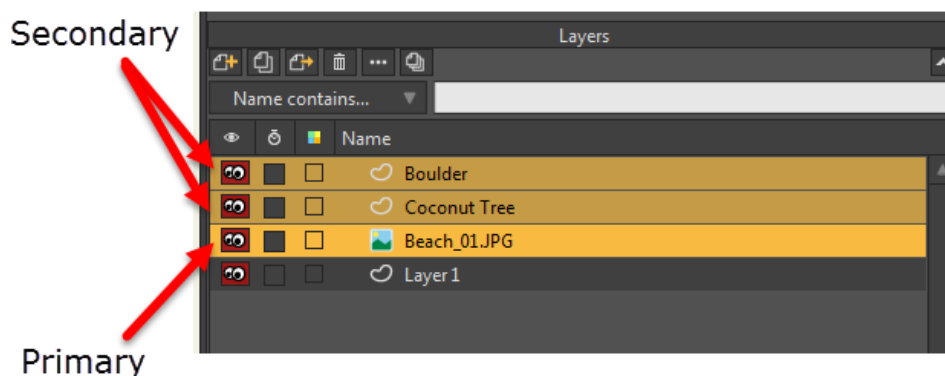
Chapter 12: Layer Settings

The Layer Settings dialog can be invoked either by double-clicking a layer in the layer list, or by selecting a layer, then clicking the Layer Settings button in the layer toolbar. The various controls are grouped into tabs that we'll describe in order.

Click the **Apply** button to apply changes in settings. The Layer Settings window will remain open so that you can make additional changes.

Editing Multiple Layers

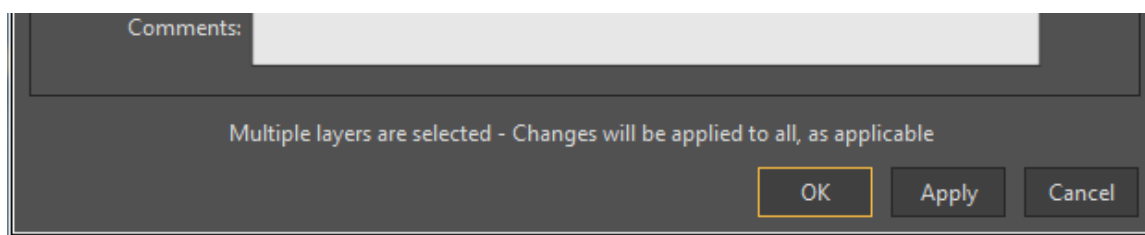
When you select a layer in the Layers Window, you can view the settings for that layer in the Layer Settings dialog. You can use the Shift or Command/Ctrl keys to make multiple selections in the Layers Window. The layers that you select don't have to be the same type of layer. For example, you can select an image layer and a vector layer as shown in the following figure:



Use the Shift or Command/Ctrl keys to select multiple layers in the Layers Window.

When multiple layers are selected, the last layer that you select becomes the primary layer. The primary layer is displayed in a slightly darker shade in the Layers Window. Secondary layers are displayed with a slightly lighter colored highlight.

A message appears at the bottom of the Layer Settings dialog to indicate that multiple layers are selected. In addition, a checkbox appears at the bottom, labeled **Copy all <Tab name> settings to other selected layers**. Check this option in the applicable tab and click the **Apply** or **OK** button to copy all settings from that tab to all the other selected layers, as applicable. Reference the General, Image, Audio, and Text tab sections in this chapter for minor exceptions that are not copied to the other tabs when this option is selected.



The Layer Settings window displays a message when multiple layers are selected.

The following rules apply when you are making changes to multiple selected layers:

- If different layer types are selected, the Layer Settings window will only display the tabs that apply to the primary layer. For example, if your primary layer is a vector layer but you have image layers as secondary layers, the Image tab will not be displayed. However, you will be able to edit settings that are common to image and vector layers in the Vectors tab.
- When you change a setting that is common to all selected layer types, those common changes will be applied to all of the selected layers when you click the Apply or OK button in the Layer Settings dialog. In other words, you can change the Blur or Opacity setting in the Vectors tab, and then apply that change to all of the layers in the selection, whether they are vector or image layers.
- If you make settings that are specific to the primary layer type, they will not be applied to sublayers of a different type. For example, if your primary layer is an Image layer and you make changes in the Images tab, those changes will not be applied to the vector layers in your selection.
- Where settings are grouped, any change to one of those grouped settings will cause all settings within that group to change on all of the selected layers. For example, the Outline section of the General tab groups three settings together: **Outline On**, **Width**, and **Color**. If you change the outline color, Moho will also update the outline state (on or off) and outline width to all of the layers when you click **Apply** or **OK**. Settings are grouped as follows:
 - **Outline** (“General Tab” on page 207): Outline On, Width, and Color.
 - **Colorizing** (“General Tab” on page 207): Colorize Layer, and Color.
 - **Layer Shadow** (“Shadows Tab” on page 217): Shadow On, Offset, Blur, Shadow color, Shadow threshold, Expansion, and Shadow direction.
 - **Layer Shading** (“Shadows Tab” on page 217): Shading On, Offset, Blur, Shading threshold, Shading color, Contraction, Inverted, and Shading direction.
 - **3D Shadow** (“Shadows Tab” on page 217): Perspective shadow on, Blur, Shadow threshold, Scale, Shear, and Color.
 - **Motion Blur** (“Motion Blur Tab” on page 222): Motion blur on, Frame count, Frame skip, Start opacity, End opacity, and Blur radius.
 - **Depth Sorting** (“Depth Sort Tab” on page 239): Sort layers by depth, Sort by true distance, Enable animated layer order.
 - **Toon Settings** (“Image Tab” on page 241): Toon effect, Edge level, Gray level, Black level, Saturation, Lightness, Quantization.



If you make any settings in the Image tab that apply to videos, they will only be modified in secondary image layers that have video files as their sources.

- **All Settings in the 3D Options tab** (“3D Options (Pro Only)” on page 250): In Moho Pro, any changes that you make in the 3D Options tab will be applied only to other layers if they are the same type as the primary layer. For example, if the primary layer is a 2D vector layer, the changes that

you make in the 3D options tab will only be applied to 2D vector layers. If the primary layer is a true 3D layer (such as an imported Poser scene), the changes will only be applied to other true 3D layers.

- **Physics Settings, Pro only** ("Physics Tab (Pro Only)" on page 253): Enable physics, Gravity direction, Gravity magnitude, Use baked physics.

General Tab

This tab is available for all layer types, and controls general layer properties.

Layer Settings

General Shadows Motion Blur Vectors 3D Options

Name: Vector Layer Layer color: Plain

☐ Hide in editing view ☐ Don't render this layer ☐ Allow animated layer effects

Compositing Effects (animated)

☒ Visible

Blur radius: 0

Opacity (%): 100

Auto shading radius: 0

Threshold (0-255): 0

Noise (0-255): 0

Pixelation (0-255): 0

☐ Flip horizontally

☐ Flip vertically

Outline (animated)

☐ Outline on

Width: 3

Color: [Color Picker]

Colorizing (animated)

☐ Colorize layer

Color: [Color Picker]

Options

☐ Rotate to follow path ☒ Scale compensation

☐ Use HSV modifier image ☐ Immune to camera movements

☐ Embedded script file ☐ Immune to depth of field

Rotate to face camera: No

Layer blending mode: Normal

☐ Copy all General settings to other selected layers (except Name)

Tags: [Text Field]

Comments: [Text Field]

Multiple layers are selected - Changes will be applied to all, as applicable

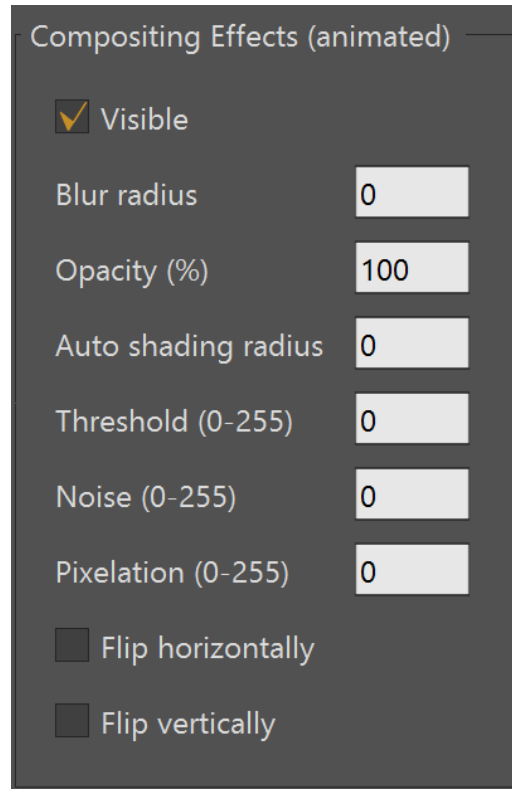
OK Apply Cancel

General Layer Settings

- **Name:** This field allows you to change the name of the layer. You can type in any name for the layer you want here, and the name will appear in the layer list after you click the OK button. Good names make working with large projects much easier. Examples of layer names might be **Background**, **Body**, or **Head**.
- **Hide in editing view:** Turn on this checkbox to hide the layer while editing. The layer will still appear in rendered output, but will be invisible in Moho's edit view. This can be useful to reduce clutter and improve performance. Things you might consider hiding in the editing view are background details, texture and detail layers, or special effects like particle layers. Note that if a hidden layer is the currently active layer, it will temporarily un-hide itself so that you can edit whatever it contains.
- **Don't render this layer:** If this box is turned on, then the layer will not appear in any rendered/exported movies. This option is usually used for some kind of helper layer. For example, you might draw a layer with some guide lines to help you draw and animate a scene, but you don't want those guides to appear in the final output. Note layers have this option turned on by default.
- **Allow animated layer effects:** When checked allows you to animate layer effects by varying settings through the timeline. When unchecked, layer effects do not animate.
- **Layer Color:** Layer colors are used to help you categorize the content in your project using colors of your choosing. Use the Layer Color selector to choose a color for the current layer. **Plain** will display the layer in the normal Moho interface color. Several other color choices are available for categorizing your layers.

Compositing Effects

This group of controls allow you to change certain layer properties over time. When you modify any of these at a frame greater than 0, you will add a keyframe to the corresponding layer effects channel. For example, if you go to frame 1 and uncheck **Visible**, then go to frame 20 and re-check Visible, that layer will not appear in the final animation until frame 20.



Compositing Effects

- **Visible:** Controls whether a layer is visible in the final output. It is important to note that this checkbox is totally independent of the visibility box displayed in the layer list: **these are two separate notions of visibility, and don't affect each other at all.** The visibility control in the layer list is meant for your editing convenience: you can turn one layer off while you work on another. The visibility checkbox in this dialog is meant to allow certain effects during an animation. For example, if you had a layer with a drawing of a glowing lightbulb, you could uncheck the visibility of this layer at frame 1, then turn it on at frame 10, off at frame 20, on at frame 30, etc. to create the effect of a blinking light.
- **Blur radius:** Lets you apply a blur (in pixels) to an entire layer to simulate such effects as camera focus. The blur can be animated over time to make a layer look like its coming in and out of focus. Decimal values are allowed to provide smoother transitions during animation.
- **Opacity:** Allows you to modify the transparency of an entire layer. An opacity value of 100 will not affect the layer at all, while a value of 0 will make it totally transparent. By changing the value from 0 at frame 1 to 100 at frame 10, the layer will seem to gradually appear out of nowhere, which in some cases is more desirable than the type of on/off visibility provided by the **Visible** checkbox.
- **Auto shading radius:** Allows you to simulate 2D ambient occlusion effects. Double-click the desired layer, or highlight a layer in the layers panel. Turn the Auto Shading option on and set the radius to a value other than zero. A good starting point is somewhere between 8 and 16 pixels.



Without Auto Shading



With Auto Shading

- **Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.

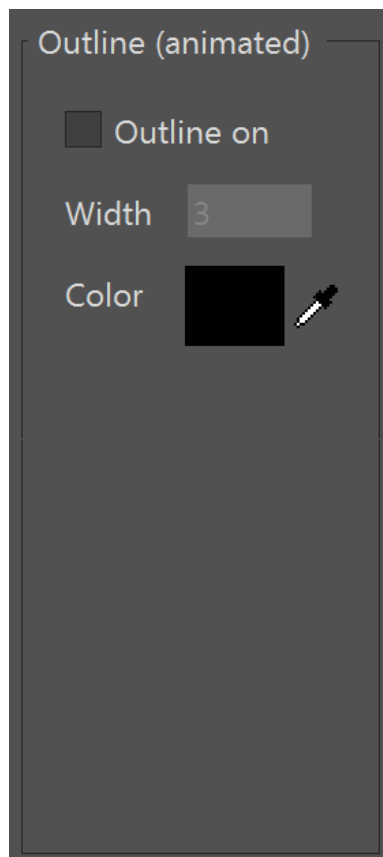


The threshold is applied to the RGB values at whatever you add in the threshold field. A value of 128 is a midpoint value. If you end up with unusual colors after applying the threshold, you can use Colorizing to overlay a color on the layer. For more information about colorizing, see "Colorizing" on page 212.

- **Noise:** Adds noise to the fills in the selected layer. Enter the amount of noise desired in the Noise field. Accepted values are 0 to 255. Visible in preview and final rendering.
- **Pixelation:** Adds pixelation to the objects in the scene. Enter a value, in pixels, for the size of the pixel blocks. Accepted values are from 0 to 255. Visible in preview and final rendering.
- **Flip horizontally** and **Flip vertically:** Clicking these boxes flips the entire layer in the direction specified. (If the layer is a group layer, then the sub-layers inside it get flipped as well.) This can be convenient in the case where you want to duplicate a layer and have the second copy face the first one as a mirror image.

Outline

The General Tab of the Layer Settings dialog displays the following options for outlines:



Outline Options

- **Outline on:** Check this option to create an outline around the objects on the layer.
- **Width:** Set the desired width of the outline, in pixels.
- **Color:** Click to set the color of the outline.

You can add an outline to a layer by enabling the option in this section and specifying the width and color of the outline.

You can set separate colors and widths for each layer to add nice effects to your drawings. If you set just one color and width on a bone group, but not on each layer of a bone group, the layer outline will only be applied to the outline of the character (and not each individual part).

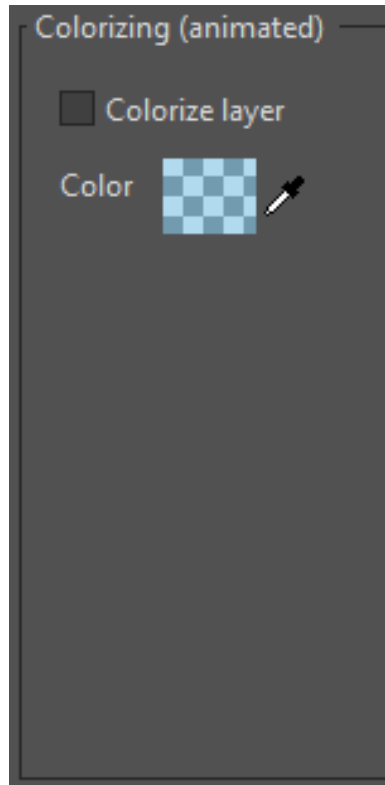
After you specify your outline parameters, you will need to preview your drawing with the File > Preview command, or use the shortcut Cmd R (Mac) or Ctrl R (Windows).



With 10 pixel blue outline around the bone group

Colorizing

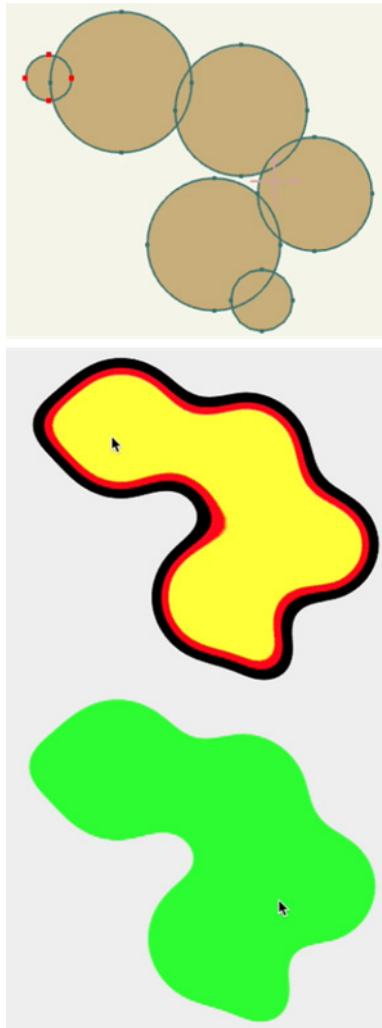
The Colorizing section allows you to overlay a color on the selected layer. The options are as follows:



Colorizing Options

- **Colorize layer:** Check this option to apply a color overlay to the selected layer.
- **Color:** Click to set the overlay color and properties.

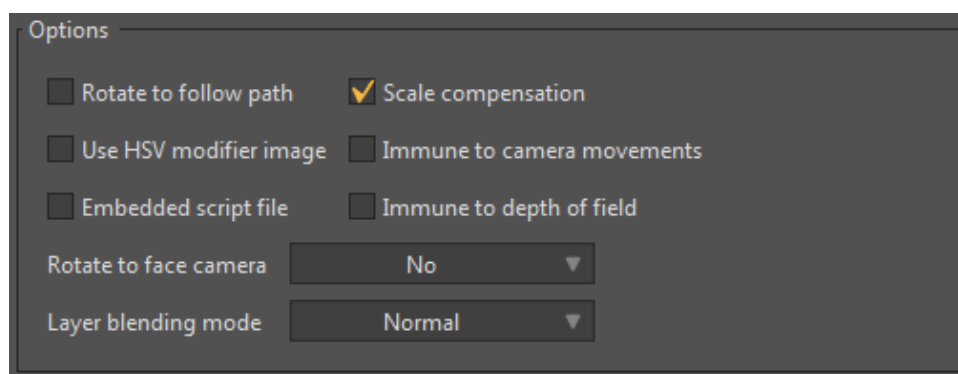
You can use the Colorizing feature to eliminate unwanted or objectionable colors that occur after you apply thresholding to objects on a layer (see [“Compositing Effects” on page 208](#) for information about the Threshold settings). The figure shown below shows several objects on a layer which have a blur setting applied (top). Thresholding is added to soften the shapes between the objects. After rendering, you may see unusual colors (middle) because the threshold is applied to the R, G, and B values in the original object color. To fix this, choose the Colorize layer option and select your overlay color. Render again to see the final result (bottom).



Original objects (top); threshold applied (middle); with color overlay (bottom)

Options

The Options section of the General Properties tab provides the following options:




General Options

- **Rotate to follow path:** When this checkbox is turned on, the layer will automatically rotate to follow its direction of movement. (Specifically, the up

direction will turn to follow the direction of layer translation.) This can be useful for creating things like flowing arrows that need to point in their direction of movement.

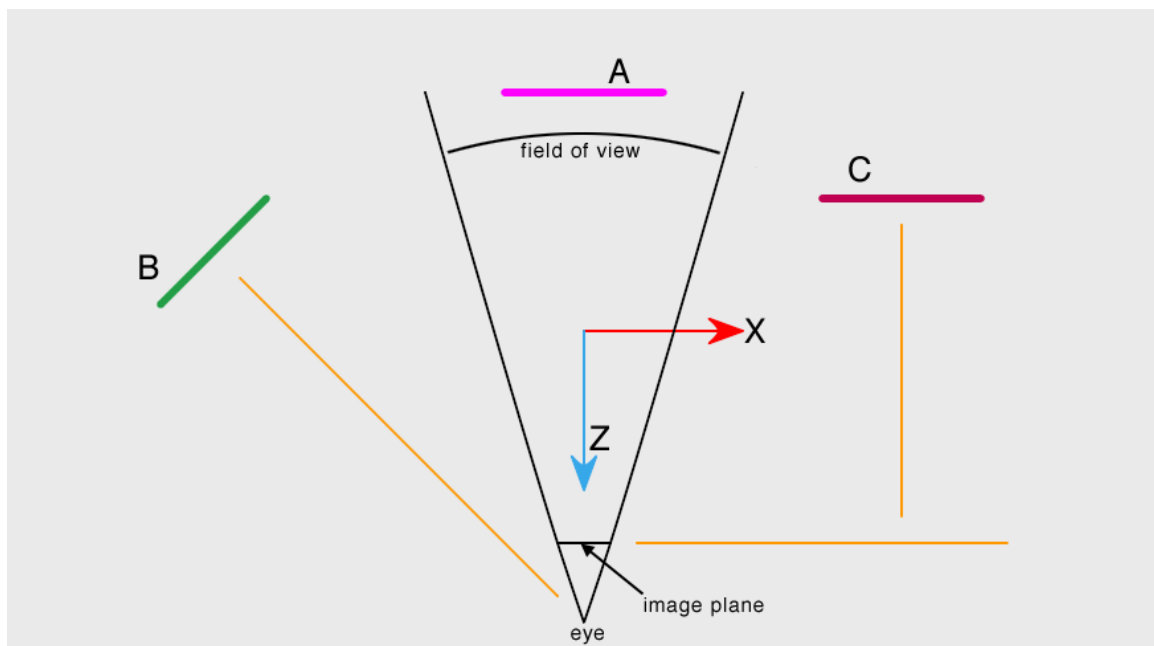
- **Scale compensation:** When this box is checked (as it is by default), and you scale an entire layer larger or smaller, the lines in the final rendered output will automatically get thicker or thinner so that they retain their relative weight in the overall image. Also, layer effects like blurs and shadows will become larger or smaller to match the scale of the layer.
- **Use HSV modifier image:** This checkbox lets you use an image file to distort the colors of the layer. Sometimes you may want to do this to break up the solid colors in your project and make it look less computerized. The exact behavior of this feature is difficult to explain. The best way to try it out is to use one of the HSV modifier images included with Moho. These images should be pretty close to 50% gray. Other images may produce bizarre, unexpected results. Feel free to experiment - you can always turn off this checkbox if you don't like the results.
- **Immune to camera movements:** Sometimes you may want to make some layers ignore camera movements. For example, certain backgrounds or title or logo layers you may want to stay in one place on the screen even while you move the camera around.
- **Embedded Script File:** Allows you to attach a lua script to a layer. When you play it back in the timeline or render a document, the script is executed to go with that layer.
- **Immune to depth of field:** The depth of field function (in the Project Settings dialog) lets you simulate the blurring of objects with different distances from the camera. This option allows you to turn off this effect for any particular layer.
- **Rotate to face camera:** In previous versions of Anime Studio, a layer would pivot only on the Y axis and face the center of the camera. In Anime Studio 9.5.2 or later, you can choose different pivot axes, and the layer can face the camera center or the image plane. This can be useful when using Moho's 3D camera - especially for scenery-type objects. Trees, for example, that always face the camera can save you a lot of work. Choose a rotation option from the popup menu:
 - **No:** Turns off the Rotate to Face Camera feature.
 - **Pivot X Axis:** Rotates the layer on its X (horizontal) axis as best it can to make the layer's Z axis point at the camera.
 - **Pivot Y Axis:** Rotates the layer on its Y (vertical) axis as best it can to make the layer's Z axis point at the camera.
 - **Free Pivot:** Rotates the layer on both its X (horizontal) and Y (vertical) axis as best it can to make the layer's Z axis point at the camera.
 - **Face Image Plane X Axis:** Rotates the layer on its X (horizontal) axis as best it can to keep the layer parallel to the camera plane.
 - **Face Image Plane Y Axis:** Rotates the layer on its Y (vertical) axis as best it can to keep the layer parallel to the camera plane.

- **Face Image Plane Free Rotate:** Rotates the layer on both its X (horizontal) and Y (vertical) axis as best it can to keep the layer parallel to the camera plane.

 In the diagrams that appear below, the X and Z Axes are shown in red and blue. The Y axis points straight up, so being that we are looking at the scene from the top, the Y axis points at you. The black pyramid represents the camera view, with the point of the pyramid representing the eye. An image plane appears in front of the camera. This image plane is like film, and represents where the rendered image gets focused.

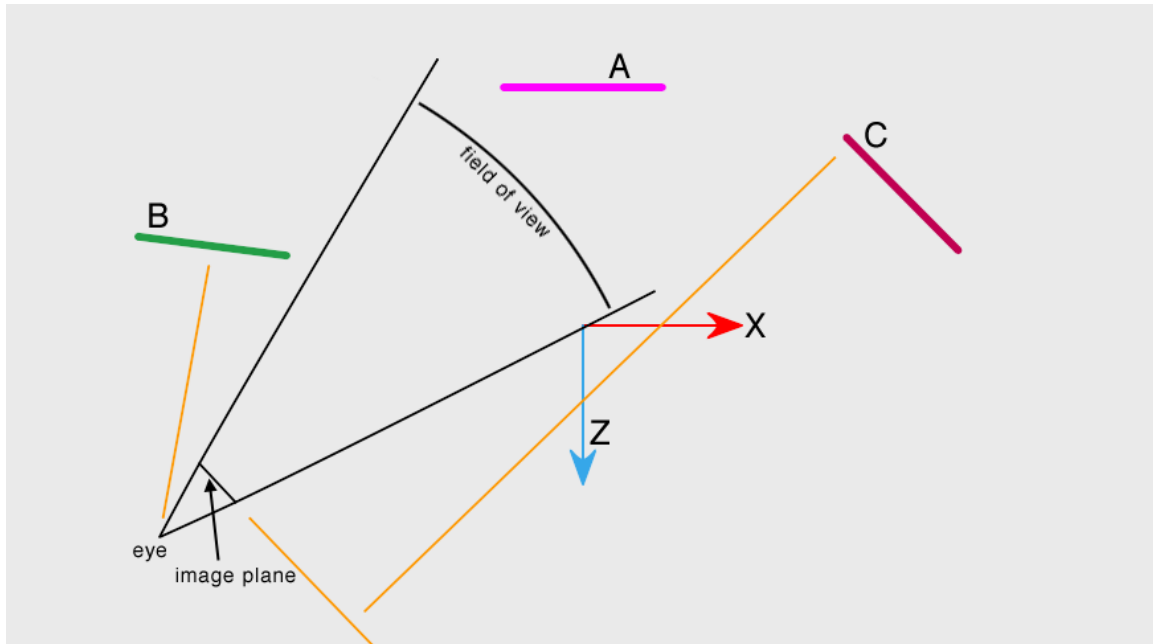
There are also three layers in the diagrams: Layer A is not set to face the camera. Layer B pivots on the Y axis so that it faces the center of the camera. Layer C is set to **Face Image Plane Y Axis**.

In the first image, the camera is in its default position and rotation. Layer A, which has the Rotate to Face Camera feature off, will not move when the camera is moved. Layer B, which is set to rotate on the Y axis, turns to face the camera. Layer C, which is set to rotate with the image plane, is rotated the same as the image plane.



A Moho scene, viewed from the top.

When the camera is moved to the left of the scene, and rotated to face the center, the image plane also rotates to the same angle. Notice now that Layer A remains in the same position because Rotate to Face Camera is off. Layer B, which is set to rotate with the Y axis of the camera, rotates to face the new position of the camera eye. And Layer C, which is set to rotate with the Y axis of the image plane, rotates in parallel with the image plane.

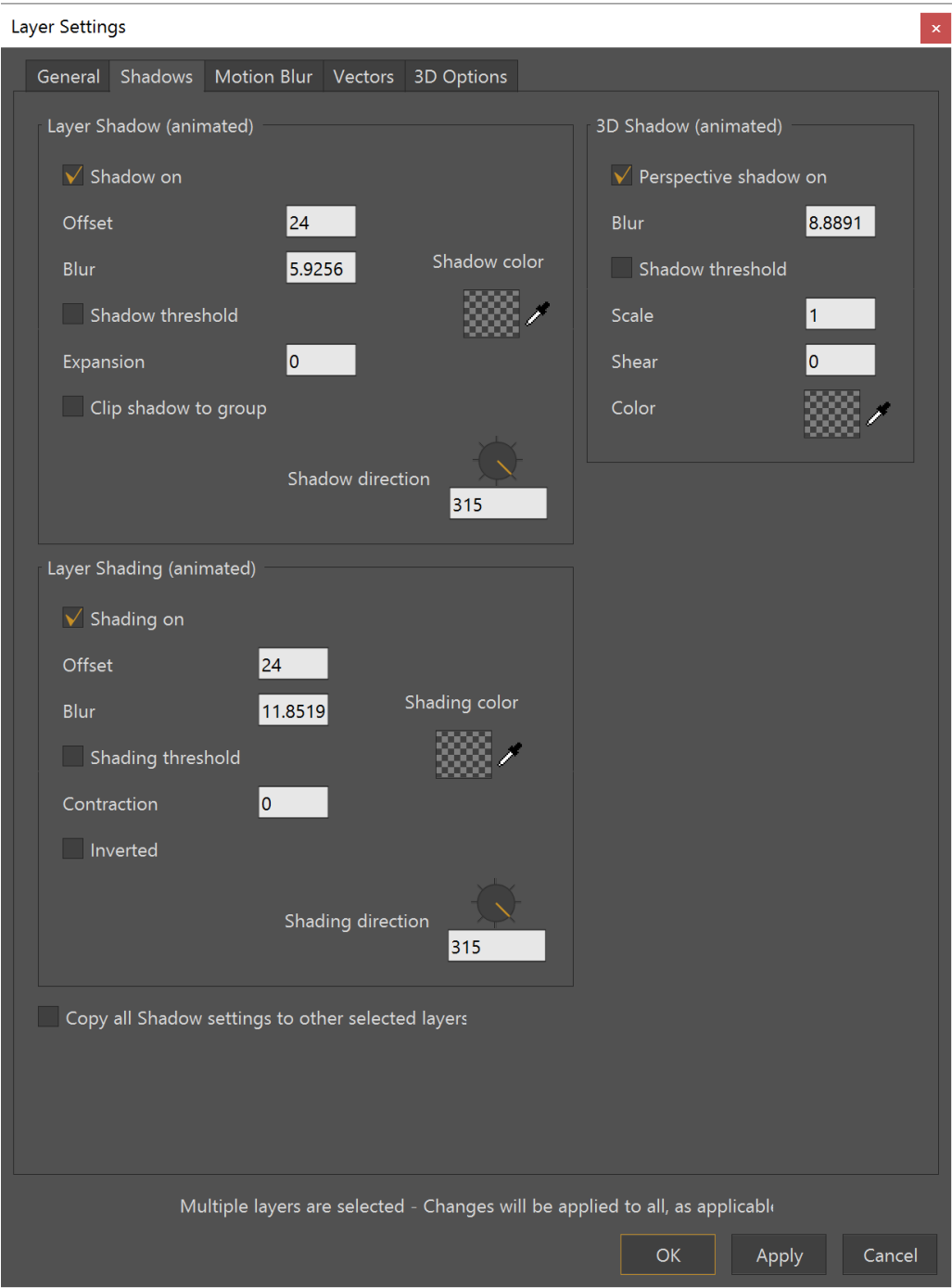


A Moho scene viewed from the top, with the camera moved to the left side

- **Layer blending mode:** Normally, layers are composited on top of each other simply according to the transparency of each layer. The layer blending mode popup lets you select a different blending mode for each layer. This can be very useful for simulating shading and lighting effects.
- **Tags:** (Pro only) You can now set your own tags for one or more layers. Enter a list of keywords, separated by a comma. This allows keywords to contain more than one word that is separated by a space.
- **Comments:** (Pro only) Enter comments for the selected layer(s).
- **Copy all General settings to other selected layers (except Name):** When multiple layers are selected, check this option and click the **Apply** button to copy all settings (except the name) to all other applicable selected layers.

Shadows Tab

The controls in this tab allow you to apply automatic shadows and shading to an entire layer.



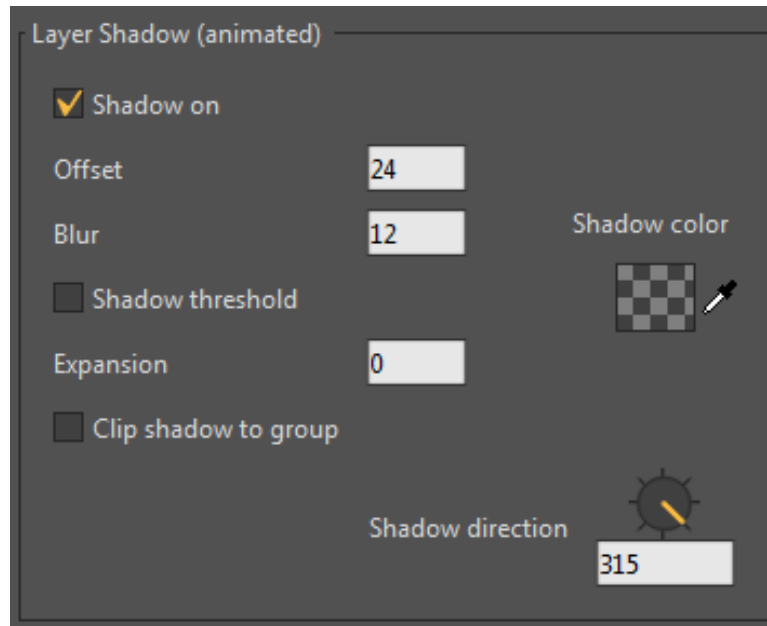
Shadows Layer Settings

The Shadows tab includes the following option that applies to layer shadow, 3D shadow, and layer setting options:

- **Copy all Shadow settings to other selected layers:** When multiple layers are selected, check this option and click the **Apply** button to copy all shadow tab settings to all other applicable selected layers.

Layer Shadow

This section lets you apply a drop-shadow effect to a layer. The options are:

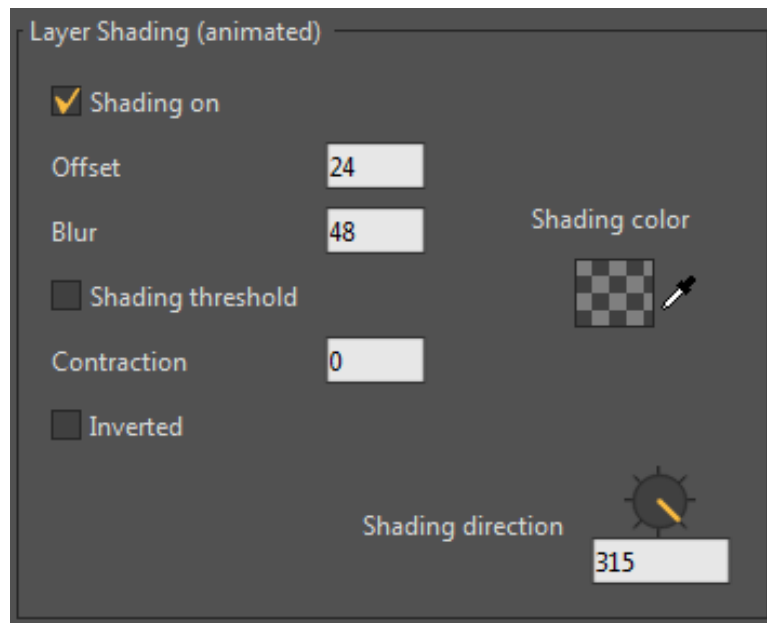


Layer Shadow options.

- **Shadow On:** Checking the **Shadow on** checkbox will make all objects in the layer cast shadows on the layers underneath.
- **Offset:** Controls how far the shadow appears from the actual objects. A larger offset makes objects appear higher up above the layers below them.
- **Blur:** Determines how hard or soft the edges of the shadow appear.
- **Shadow Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.
- **Expansion:** Allows you to expand the reach of the shadow. This can be useful for halo-type effects. Try an Offset of 0, Blur of 8, and Expansion of 8.
- **Clip shadow to group:** Clips the layer shadows to the contents of the enclosing group.
- **Shadow Color:** Clicking on the "Shadow color" swatch lets you change the color of the shadow that is being cast. You can also modify the transparency of the shadow with this control.
- **Shadow Direction:** Controls the direction the shadow is cast. Just drag the knob in circles to change the direction of the shadow.

Layer Shading

This section is similar to the "Layer Shadow" section above. However, instead of producing a shadow effect **behind** the layer, these controls let you apply a shading effect on top of the layer.



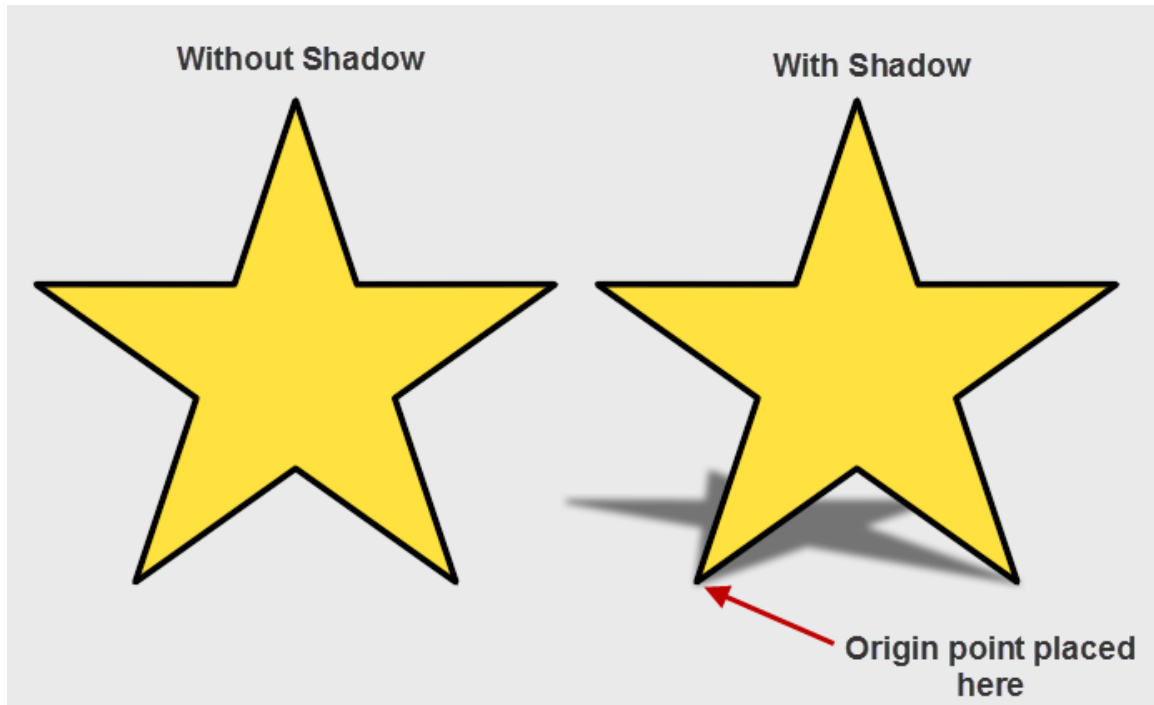
Layer Shading options.

- **Shading On:** Checking the “Shading on” checkbox will make all objects in the layer appear shaded, giving them a rounded edges effect.
- **Offset:** Controls how far inside the layer the shading appears. A larger offset makes objects appear to have more “rounded” edges.
- **Blur:** Determines how hard or soft the edges of the shading appear.
- **Shading Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.
- **Contraction:** Allows you to pull the shading further into the center of the layer.
- **Inverted:** Inverts the shading effect so that the object looks like it has a rim highlight.
- **Shading Color:** Clicking on the “Shading color” swatch lets you change the color of the shading that is applied. You can also modify the transparency of the shading with this control.
- **Shading Direction:** Controls the direction the shading appears. Just drag the knob in circles to change the direction of the shading.

3D Shadow (Perspective Shadows)

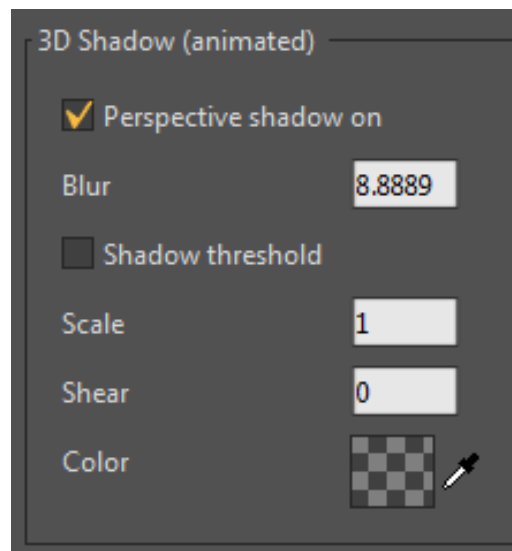
Moho allows you to easily create perspective shadows for the objects in your scene. Select a layer from the Layers Window and open the Layer Settings dialog. Click the Shadows tab, and adjust the settings in the 3D shadow area. You can animate this feature by applying different settings at different points in the timeline. You will not see the shadow until after you render the current frame, or all or part of a movie.

The position of the shadow is determined by the Set Origin tool in the Layer section of the toolbox. When you set a perspective shadow, pay attention to the location of the origin of the object. The shadow is cast from the origin point. The origin represents the ground point, so you can position it to make the object look as though it is resting on the ground, or as if the object is floating in the air.



Position the origin point at “ground” level.

The settings for perspective shadows are as follows:



3D Shadow options.

- **Perspective Shadow On:** Check this button to turn Perspective Shadows on. Uncheck it to turn Perspective Shadows off.
- **Blur:** Sets the amount of blur on the perspective shadow. Higher values create a softer shadow.

- **Scale:** Controls the “depth” of the shadow. Higher values make the shadow seem more elongated, while lower values make the shadow shorter
- **Shear:** Allows you to control the slant of the shadow (the direction that the light source is coming from).
- **Color:** Allows you to select a color for the shadow. Default color is black.

Motion Blur Tab

The controls in this tab control the motion blur effect for this layer. Motion blur can be turned on and off during the course of an animation.

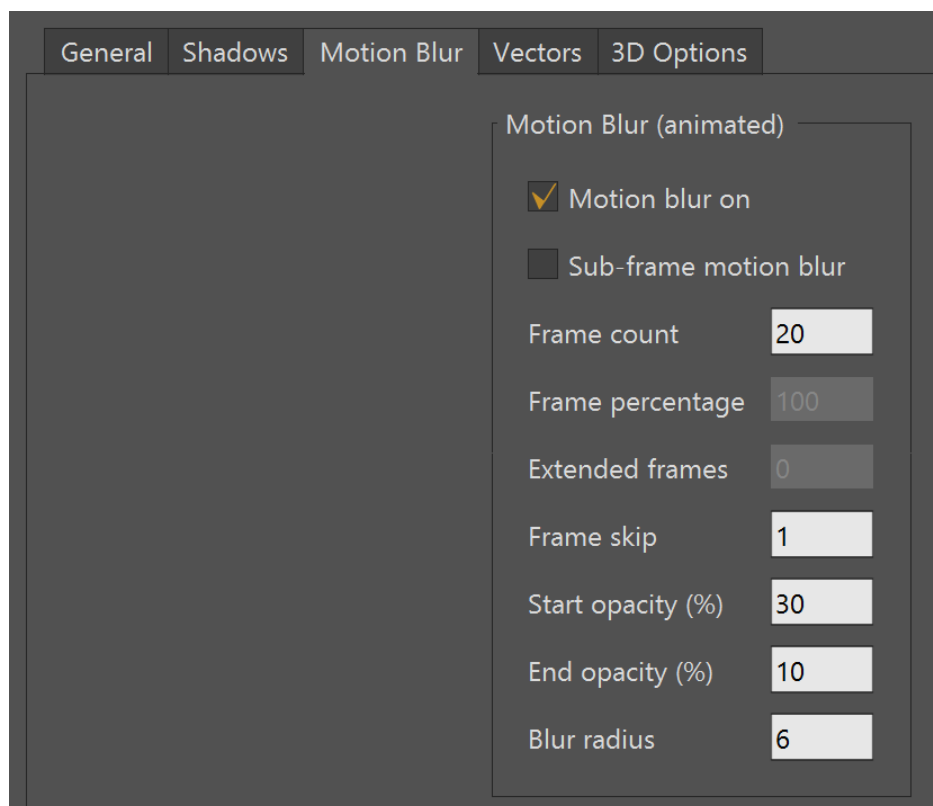
Moho's motion blur feature simulates how an object moves while the shutter of a camera is open. Double-click the layer or layers that you want, and enable the Motion Blur On option in the Motion Blur tab.

- **Motion Blur On:** Checking “Motion blur on” turns on the effect. When this option is not checked, motion blur will not be applied.

Legacy Motion Blur

Legacy motion blur is available in both Moho Debut and Moho Pro. To use Legacy motion blur in Moho Pro, uncheck the Sub-frame motion blur setting.

The following settings apply to Legacy motion blur:

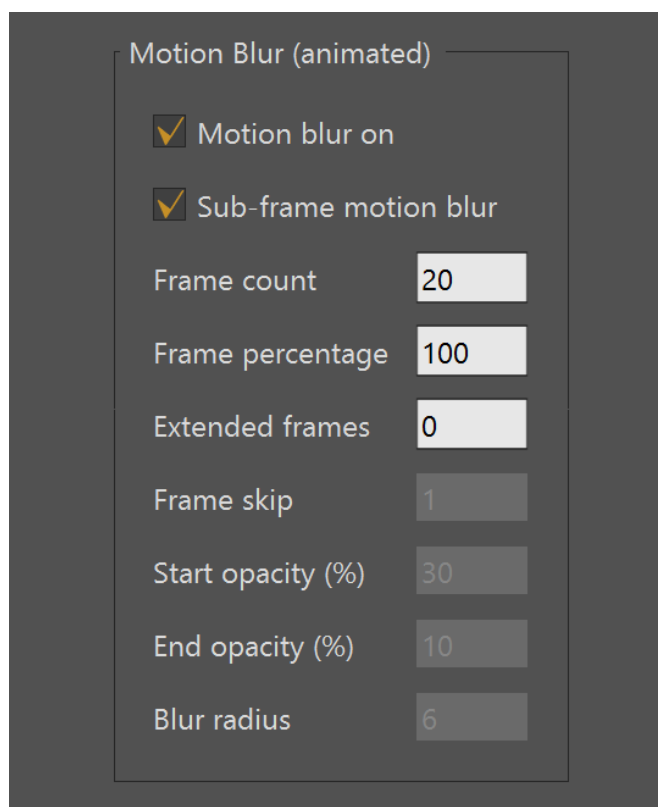


Legacy Motion Blur Layer Settings (Pro shown)

- **Frame Count:** Used with Sub-frame motion blur. Controls the amount of blur that is applied in a single frame. Lower values will create less smearing, and higher values will create more blur. The following image shows (from left to right) sub-frame counts of 2, 10, 20 (default) and 40.
- **Frame Skip:** Used with Sub-frame motion blur. Controls the separation between blur frames. A larger number will cause the blur effect to trail farther out behind the current position.
- **Start Opacity and End Opacity:** Used with Sub-frame motion blur. Control how the blur fades away behind the layer. Generally, a motion blur effect will fade a bit as it trails behind the layer. For some special effects, however, you may not want the motion blur to fade at all. In those cases, set both values to 100 to keep the motion blur completely opaque.
- **Blur Radius:** Used with Sub-frame motion blur. Controls the radius (in pixels) of the motion blur effect.
- **Copy all Motion Blur settings to other selected layers:** When multiple layers are selected, check this option and click the **Apply** button to copy all motion blur settings to all other applicable selected layers.

Enhanced Motion Blur (Pro Only)

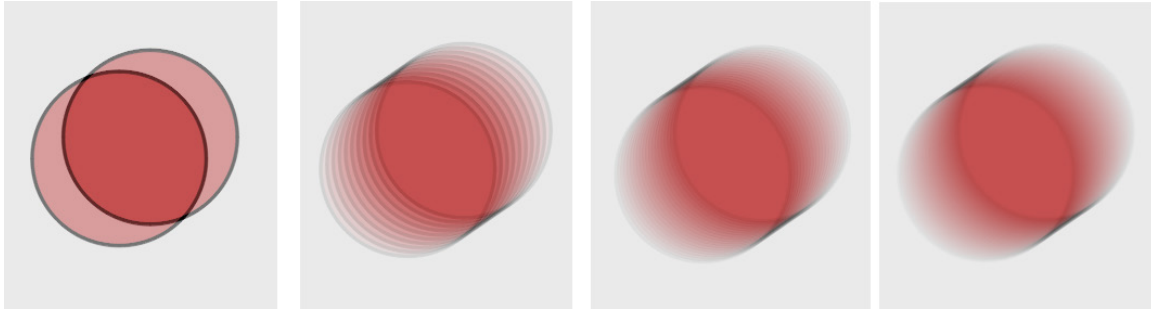
In addition to legacy motion blur, Moho Pro offers an enhanced motion blur that more accurately simulates motion blur found in real world cameras. To enable this feature, check the Sub-frame motion blur option in the Motion Blur tab (Pro only).



Enhanced Motion Blur Layer Settings (Pro only)

The settings relating to sub-frame motion blur are as follows:

- **Sub-frame motion blur:** Check this option to use the new sub-frame motion blur. Leave it unchecked to use legacy motion blur, described previously.
- **Frame Count:** Used with Sub-frame motion blur. Controls the amount of blur that is applied in a single frame. Lower values will create less smearing, and higher values will create more blur. The following image shows (from left to right) sub-frame counts of 2, 10, 20 (default) and 40.

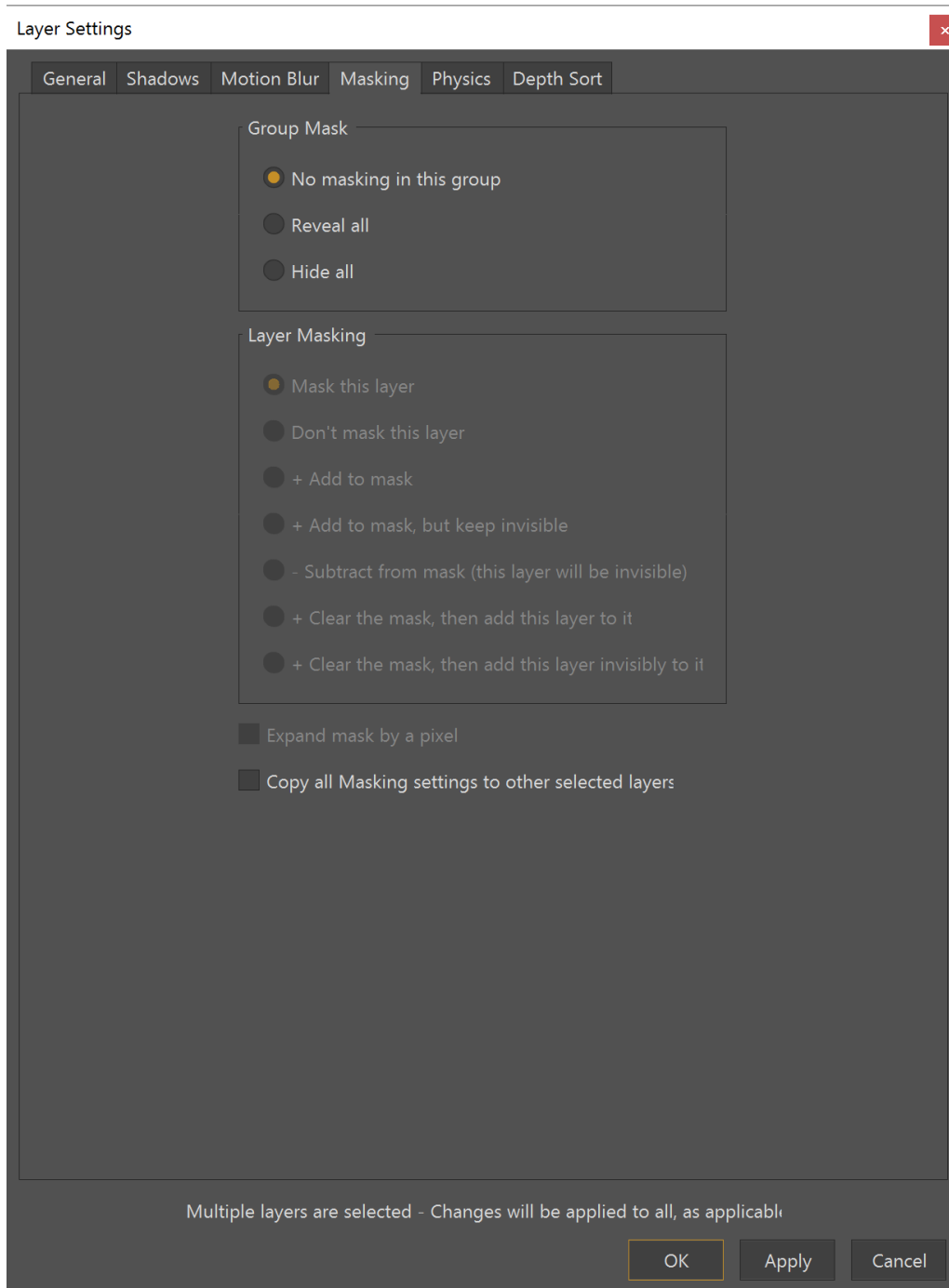


Sub-frame settings of 2, 10, 20, and 40

- **Frame percentage:** Used with Sub-frame motion blur. In real-world cameras, the shutter does not stay open for the entire duration of the frame. The value you enter in this field represents the percentage of the frame that should remain open for the blur effect. A value of 50 is similar to a real camera, and is more subtle than a value of 100 (which blurs the movement through the entire frame).
- **Extended frames:** Used with Sub-frame motion blur. This setting goes beyond real-world motion blur. It not only takes the blur between one frame and the next, but you can also use multiple frames for an exaggerated blur. Enter the number of extra frames that you want to include to create an exaggerated motion blur. A value of 0 will be most like real-world animation.

Masking Tab

This tab is used to control layer masking. Layer masking controls the visible region of a layer - objects in a layer that are not within the visible region of the mask will not appear in the final output. This tab is available when a group or bone layer is selected.



Masking Layer Settings

If the layer is a group or bone layer, then the following options are available:

No masking in this group: Means that no masking will occur in this group.

- **Reveal all:** Means that masking is on, and by default all sub-layers will be fully visible.
- **Hide all:** Means that masking is on, and by default all sub-layers will be invisible (this is the most common option when using layer masking).

All other layers inside a group will have the following options for layer masking:

- **Mask this layer:** Clip this layer against the current mask.
- **Don't mask this layer:** Skip all masking operations for this layer.
- **+ Add to mask:** Add this layer to the mask. Any higher layers will be visible wherever this layer is visible.
- **+ Add to mask, but keep invisible:** Add this layer to the mask, but don't show it in the final output.
- **- Subtract from mask:** Use this layer to cut a hole in the current mask.
- **+ Clear the mask, then add this layer to it:** This makes the mask identical to the transparency value of the current layer.
- **+ Clear the mask, then add this layer invisibly to it:**
- **Exclude Strokes:** Check this option to exclude outlines from the mask.
- **Expand mask by a pixel:** Adds an additional pixel around a layer mask.
- **Copy all Masking settings to other selected layers:** When multiple layers are selected, check this option and click the **Apply** button to copy all masking settings to all other applicable selected layers.



The masking controls are simple but powerful options that can be used for all kinds of creative tricks. The best way to explain these is with a hands on example. See “Tutorial 2.6: Brushes” on page 73 in your Moho Tutorial Manual.

Masking Tips and Tricks

When setting up masking in a group, the best approach is to first set up the mask, then set up the objects to be masked. The bottom-most layers should define the mask by either adding to it or subtracting from it. Then the layers above that should be masked against the defined mask.

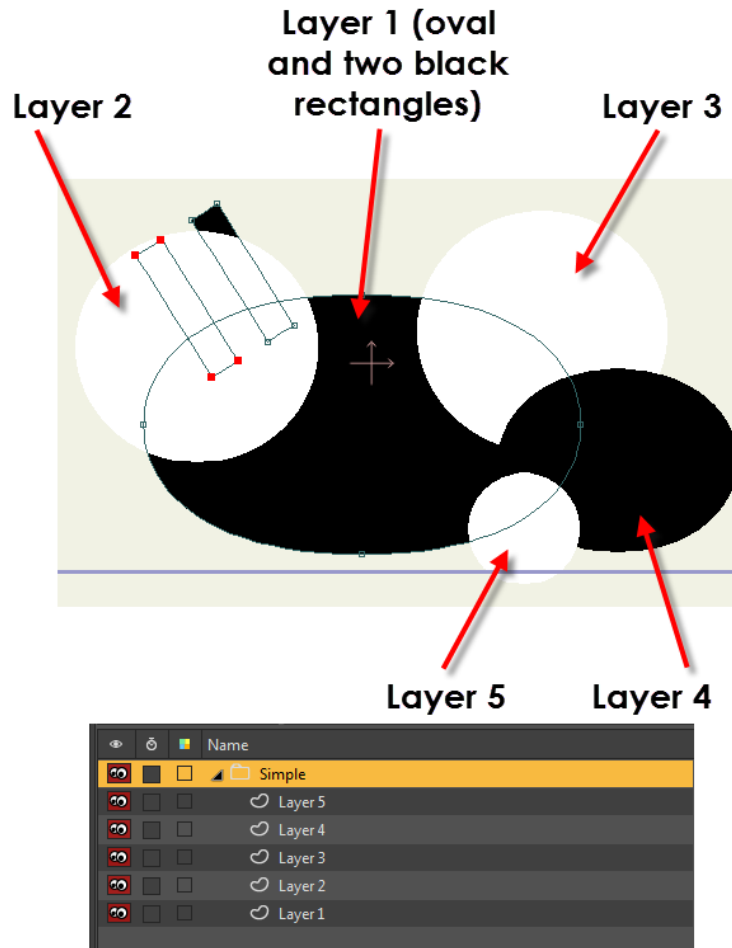
For masking to be fringe-free, try to follow these guidelines:

- Masking should only increase in a one-way direction. The alpha channel must increase monotonically.
- Use additive masks only (use Hide All, instead of Reveal All)
- Don't use any of the following modes for child layers in the group:
 - Subtract from mask
 - Clear this mask then add this layer invisibility to it
 - Don't Mask This Layer (unless all other layers in the group above this one also use Don't Mask This Layer)
 - Exclude Strokes (unless all layers in the group above are set to Masked)

The following examples demonstrate some do's and don'ts in masking techniques.

Simple Masking (Produces No Fringing)

This example starts with a group that contains five layers, each with a different shape. This group renders with no fringe because it follows the rule of only adding to a mask.

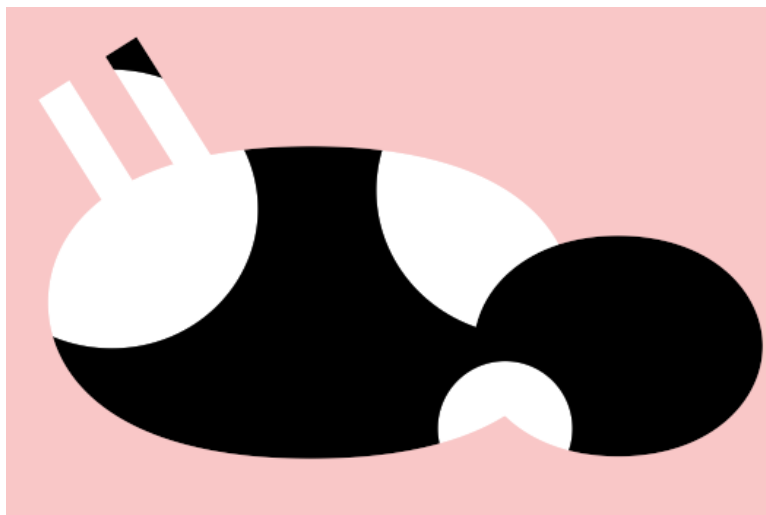


A group with five layers, each with a different shape.

To mask an example such as this, use the following settings:

- **Group mask:** In the **Group Mask** section, choose **Hide All**. In the **Layer Masking** section, choose **Mask this layer**.
- Layer 1: Set to **+Add to mask**.
- Layer 2: Set to **Mask this layer**.
- Layer 3: Set to **Mask this layer**.
- Layer 4: Set to **+ Add to mask**.
- Layer 5: Set to **Mask this layer**.

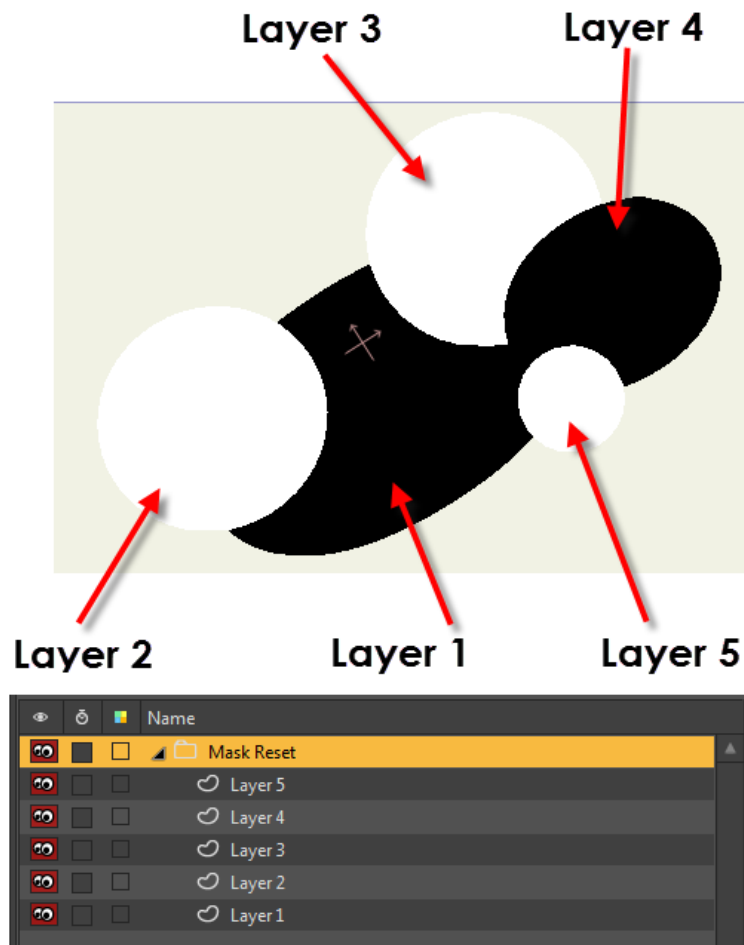
After you apply the above settings, the end result will look as shown in the following figure, when rendered.



Result of simple masking.

Mask Reset (Produces Fringing)

This example consists of a group with five layers, each with an oval shape. This group doesn't follow the rules. It renders with fringe because Layer 4 is set to "Clear and Add to the Mask."

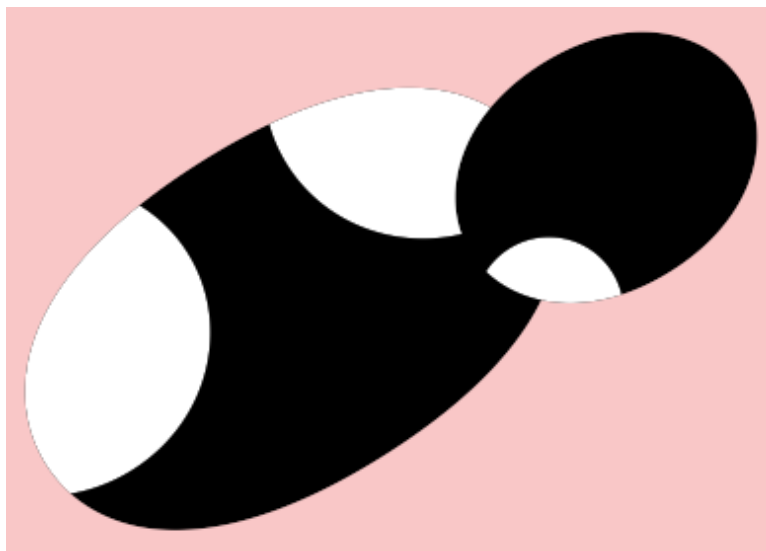


A group with five layers, each with a different shape.

This example uses the following settings:

- **Group mask:** In the **Group Mask** section, choose **Hide All**. In the **Layer Masking** section, choose **Mask this layer**.
- Layer 1: Set to **+Add to mask**.
- Layer 2: Set to **Mask this layer**
- Layer 3: Set to **Mask this layer**
- Layer 4: Set to **+ Clear the mask, then add this layer to it**.
- Layer 5: Set to **Mask this layer**

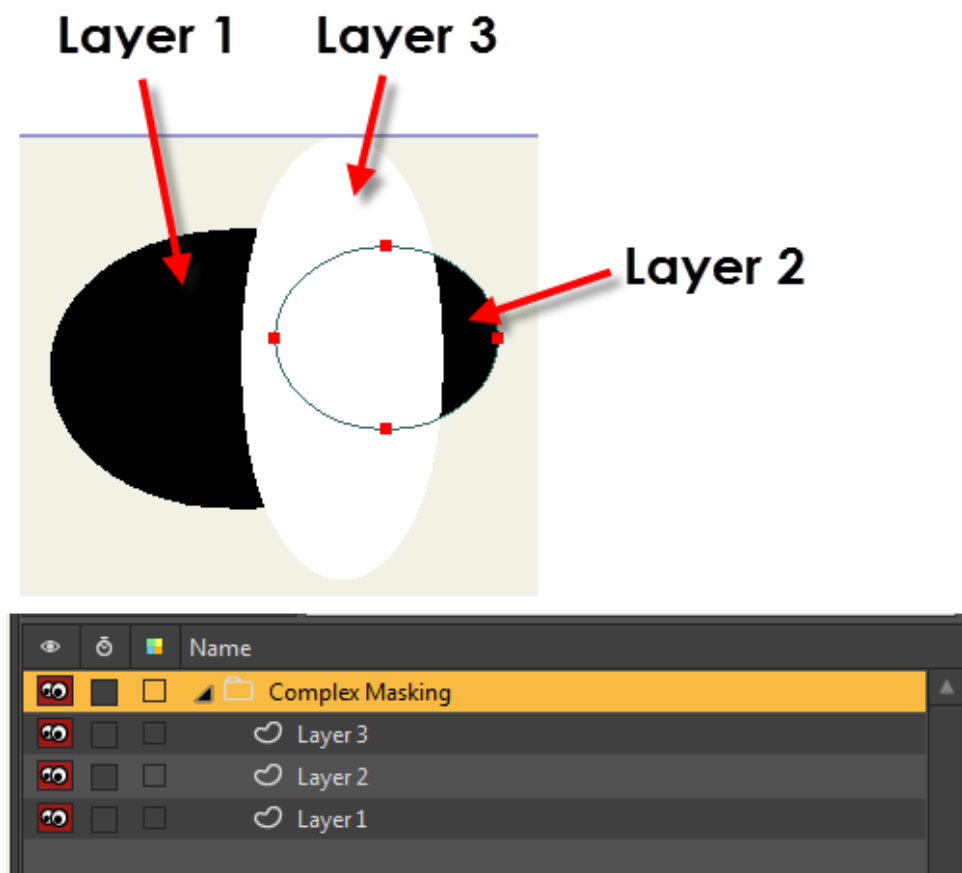
After you apply the above settings, the end result will look as shown in the following figure, when rendered.



Result of mask reset.

Complex Masking (Produces Fringing)

This example starts with a group that contains three layers, each with an oval shape. This masking example also renders with fringe, because it breaks the rules by combining additive and subtractive masking in the same group.

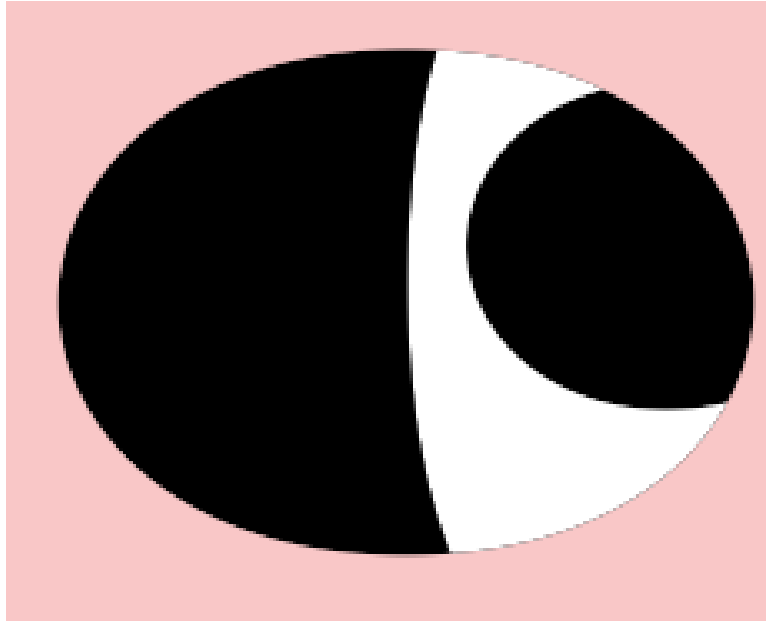


A group with three layers, each with a different shape.

This example uses the following settings:

- **Group mask:** In the **Group Mask** section, choose **Hide All**. In the **Layer Masking** section, choose **Mask this layer**.
- Layer 1: Set to **+Add to mask**.
- Layer 2: Set to **-Subtract from mask (this layer will be invisible)**
- Layer 3: Set to **Mask this layer**

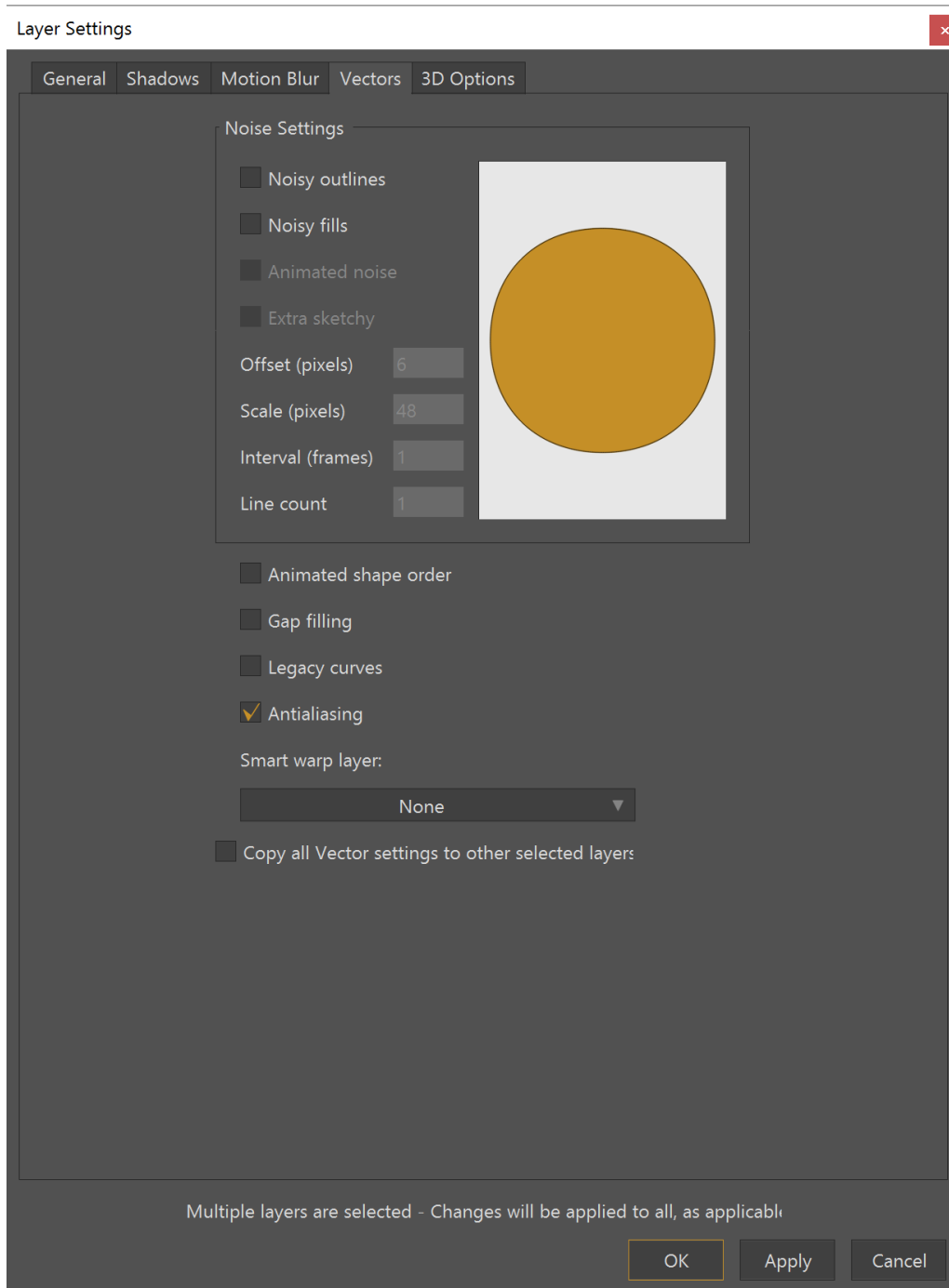
After you apply the above settings, the end result will look as shown in the following figure, when rendered.



Result of complex masking.

Vectors Tab

This tab is only available for vector layers, and controls the appearance of lines and fills in the layer. The controls here enable the vector “noise effect”. By adding “noise” to a layer, you can make it look more hand-drawn, or at least get rid of some of that pesky computer precision. Of course, that’s up to artistic interpretation: if you like computer precision, the noise effect may not be the feature for you.

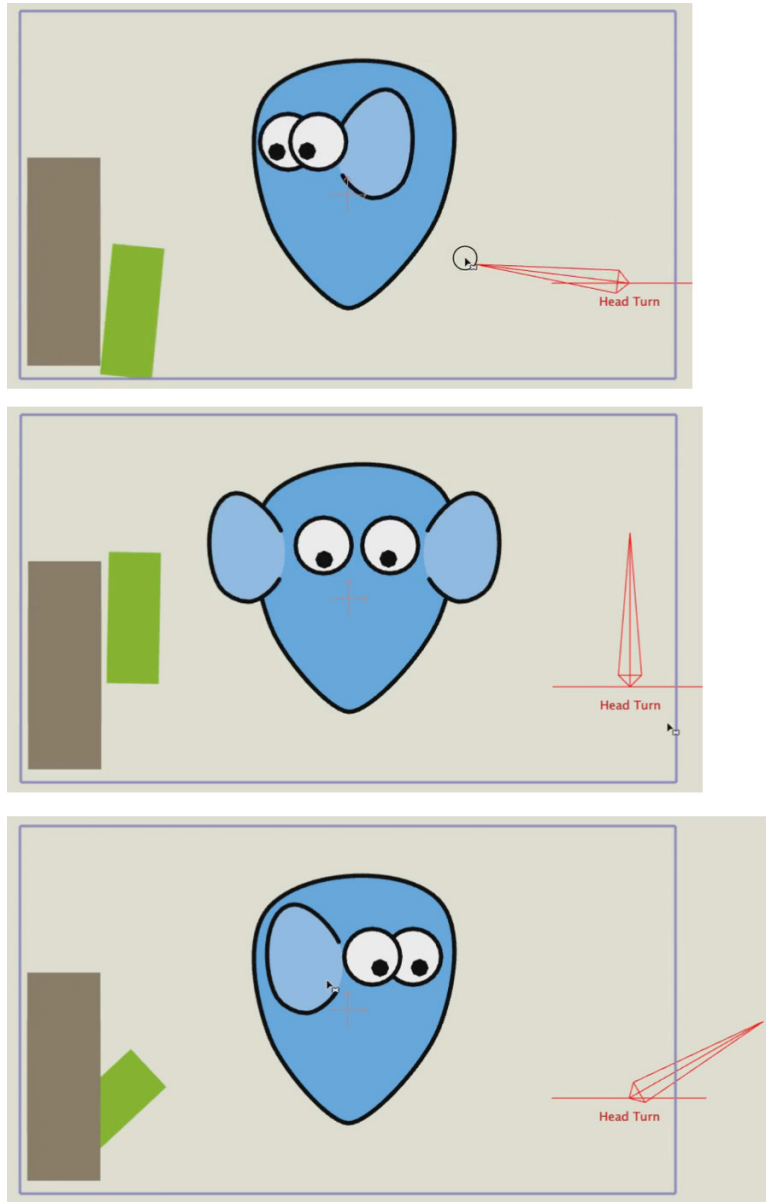


Vectors Layer Settings

- **Noisy Outlines** and **Noisy Fills**: The first two checkboxes turn on noise for outlines and/or fills. If you turn on both of these, all the shapes in the layer will become distorted. However, if you check only one, the effect will look like someone was coloring but didn't stay in the lines. The circle displayed on the right side shows a preview of what your noise effect settings will do to the final drawing. (The best way to understand this feature is to just start clicking the checkboxes and watch the circle.)
- **Animated noise**: Controls whether the noise factor will vary over time in your animation. This can lead to either a very distracting look, or a very sketchy, free-

form one, depending on your tastes. Again, experiment with this and watch the circle.

- **Extra Sketchy:** (Associated with noise settings). Creates gaps in the outlines. If you have a curve being drawing you might actually have little gaps in it.
- **Offset:** Determines how far in pixels (on average) your drawing will be distorted from its original shape.
- **Scale:** Determines the “jaggedness” of the distortion. Larger scale numbers will result in smoother, lumpier distortion, while smaller numbers will give you a more scribbled look.
- **Interval (Frames):** When vector noise is set to be animated, you can set an interval so that the noise changes every nth frame, with n being the number that you enter in this field. Increase the number to reduce the amount of noise.
- **Line Count:** Tells Moho to draw a number of lines, distorting each in a different way.
- **Animated Shape Order (Pro only):** Check this option if you want to enable animated shape order on the selected layer, using the **Draw > Raise Shape**, **Lower Shape**, **Raise to Front**, or **Lower to Back** commands (or their equivalent shortcuts: **Up arrow**, **Down arrow**, **Shift Up arrow** or **Shift Down arrow**). This will allow you to select shapes on the current layer and animate the order in which they are stacked in relation to the camera. In the following example, animated shape ordering is used in combination with smart bones to position the ears above or below a character's head as the head turns. When the smart bone is positioned toward the left, the character is looking to the left, the right ear is above the head and the left ear is below the head. When the smart bone is in its center position, the character looks to the center, and both ears are above the head. Finally, when the smart bone is positioned to the right, the character looks to the right, the left ear is above the head and the right ear is below the head.



Animated shape ordering allows you to position the ears of a character as its head turns.

See “Tutorial 5.11: Animated Shape Ordering (Pro Only)” on page 229 in your Moho Tutorial Manual for a hands on tutorial on how to use animated shape ordering.

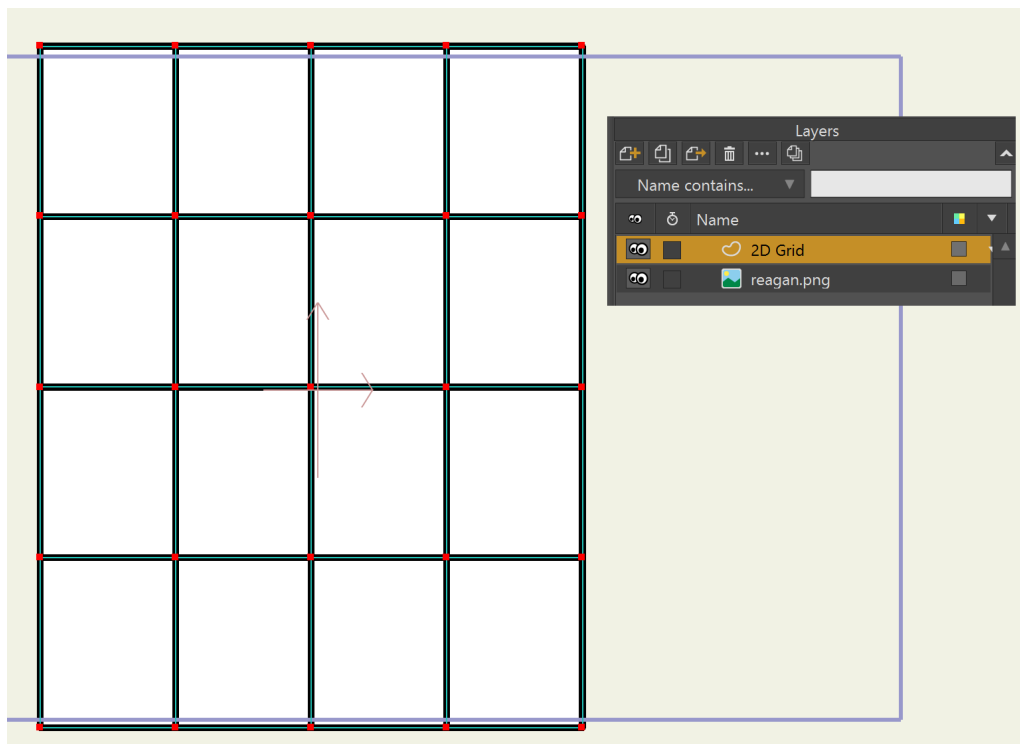
- **Gap Filling:** Sometimes two shapes are drawn that line up exactly side-by-side with no overlap whatsoever. In some situations, a small crack can appear between them. Turn this option on to enable Moho to fill in these cracks.
- **Legacy Curves (Pro only):** Switches a layer back to the curve drawing method used in Anime Studio 7 and earlier. Documents created in Anime Studio 7 and earlier should open in the application with this option turned on so that the existing artwork does not suddenly change.

- **Antialiasing (Pro only):** Applies antialiasing to the currently selected vector layer(s).
- **Smart Warp Layer:** Allows you to assign a 2D triangulated mesh as a Smart Warp layer that deforms the currently selected layer. For more information, see ["Smart Warp Layers \(Pro only\)" on page 236](#).
- **Copy all Vector settings to other selected layers:** When multiple layers are selected, check this option and click the **Apply** button to copy all vector settings to all other applicable selected layers.

Smart Warp Layers (Pro only)

Smart Warp layers allow you to deform another vector or image layer using a 2D triangulated mesh. The following example shows a very quick way to create a smart warp layer from a 2D grid. You can also use the Add Point tool to draw selections around areas that you want to warp.:

1. Create a new vector layer in the Layers Window.
2. Select the Draw Shape tool. Use the **Grid** option to create a two-dimensional grid that can be used as a start point for a triangulated mesh.
3. Enter the number of horizontal and vertical divisions for the grid in the **Horizontal** and **Vertical** fields for the shape grid. By default, the grid will have four horizontal and four vertical divisions.
4. Draw the grid in the workspace. Make a grid that is large enough to completely enclose the layer that you want to warp.



Use the Draw Shape tool to create a grid that is large enough to cover the area you want to warp.

5. Use the **Draw > Triangulate 2D Mesh** command to triangulate the Grid layer. The grid will turn transparent and all points in the grid will be triangulated.



*Triangulate the grid layer with the **Draw > Triangulate 2D Mesh** command.*

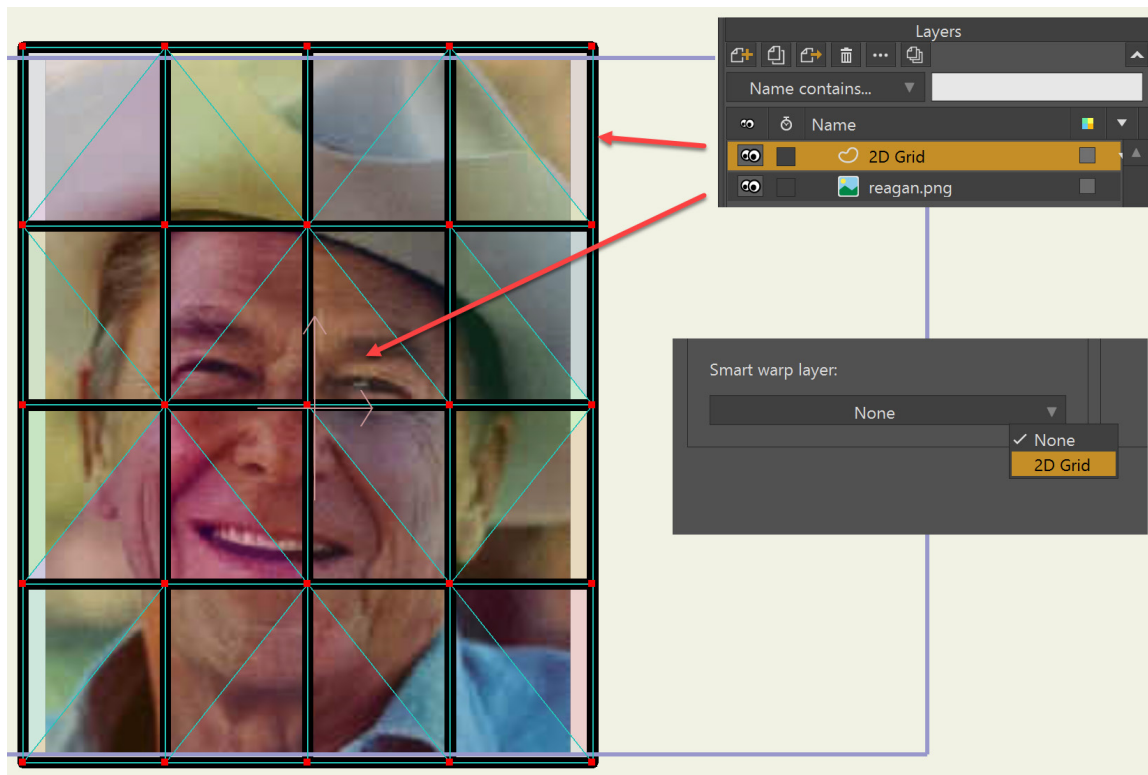
6. Double-click the layer that you want to morph to open the Layer Settings dialog. Expand the **Smart Warp Layer** selector to choose the layer that contains the 2D triangulated mesh.
 - If the layer that you want to morph is an image layer, you will find the Smart Warp Layer selector in the Image tab of the Layer Settings dialog.
 - If the layer that you want to warp is a vector layer, you will find the Smart Warp Layer selector in the Vectors tab of the Layer Settings dialog.



When you use a vector layer to warp an image, the vector layer will automatically be marked "Don't render this layer."



When a vector layer is triangulated, the alpha of the triangles is reduced, and the original edges will be preserved for visual reference.



Assign a 2D triangulated mesh as a Smart Warp layer.

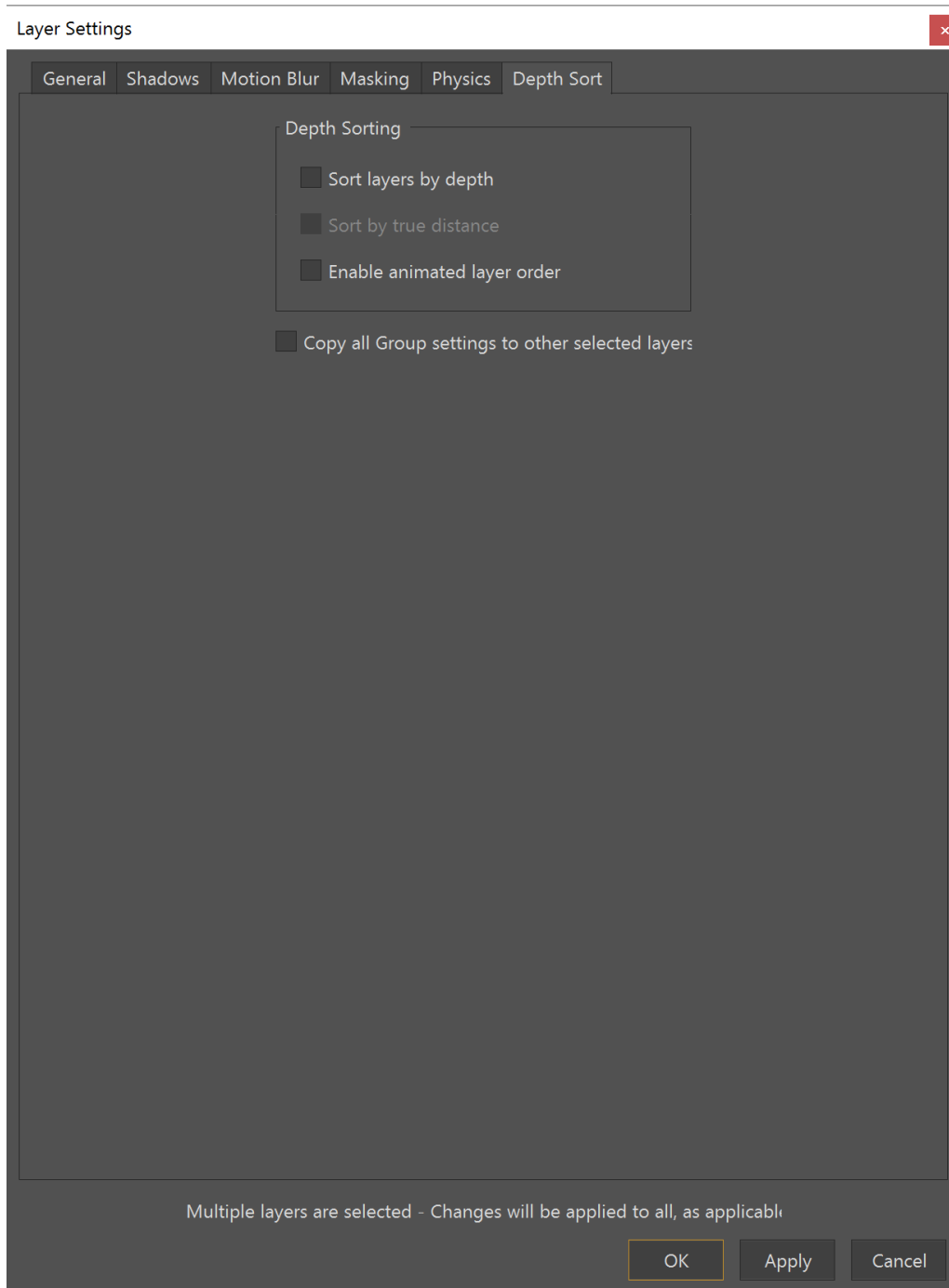
After you choose the Smart Warp layer in the Layer Settings dialog, choose the grid layer in the Layers Window. When you use the Transform Points tool to animate the points in the grid, you will notice the image or vector warp beneath the grid.



Animate the points in the grid to warp the image or vector layer.

Depth Sort Tab

This tab is only available for group and bone layers. Depth Sort has two controls that can be used with Moho's 3D features.



Depth Sort Layer Settings

- **Sort Layers by Depth:** Allows sub-layers to move in front of and behind each other during an animation. Normally, layers are drawn in the order they appear in the Layers Window. However, with this option turned on, layers are displayed according to how far they are from the camera. Typically, layers are sorted by their depth from the camera, but if you're trying to create a 3D object using multiple Moho layers (like a cube or pyramid), you may want to turn it on.
- **Sort by True Distance:** Tells Moho to sort layers by the distance from the camera to the layers' origins, rather than by depth. Usually this option will be left unchecked.

- **Enable animated layer order:** During the course of an animation, you may want to move objects in front of or behind each other. One example is when simulating head turns. The children of a group layer have the ability to move back and forth in layer order over the course of an animation, but you need to turn this option on to allow it. If it's off, then moving one layer in front of another affects them for the entire timeline.
- **Copy all Group settings to other selected layers (except Name):** When multiple layers are selected, check this option and click the **Apply** button to copy all group settings to all other applicable selected layers.

Image Tab

This tab is only available for image layers. There are five options in this tab.

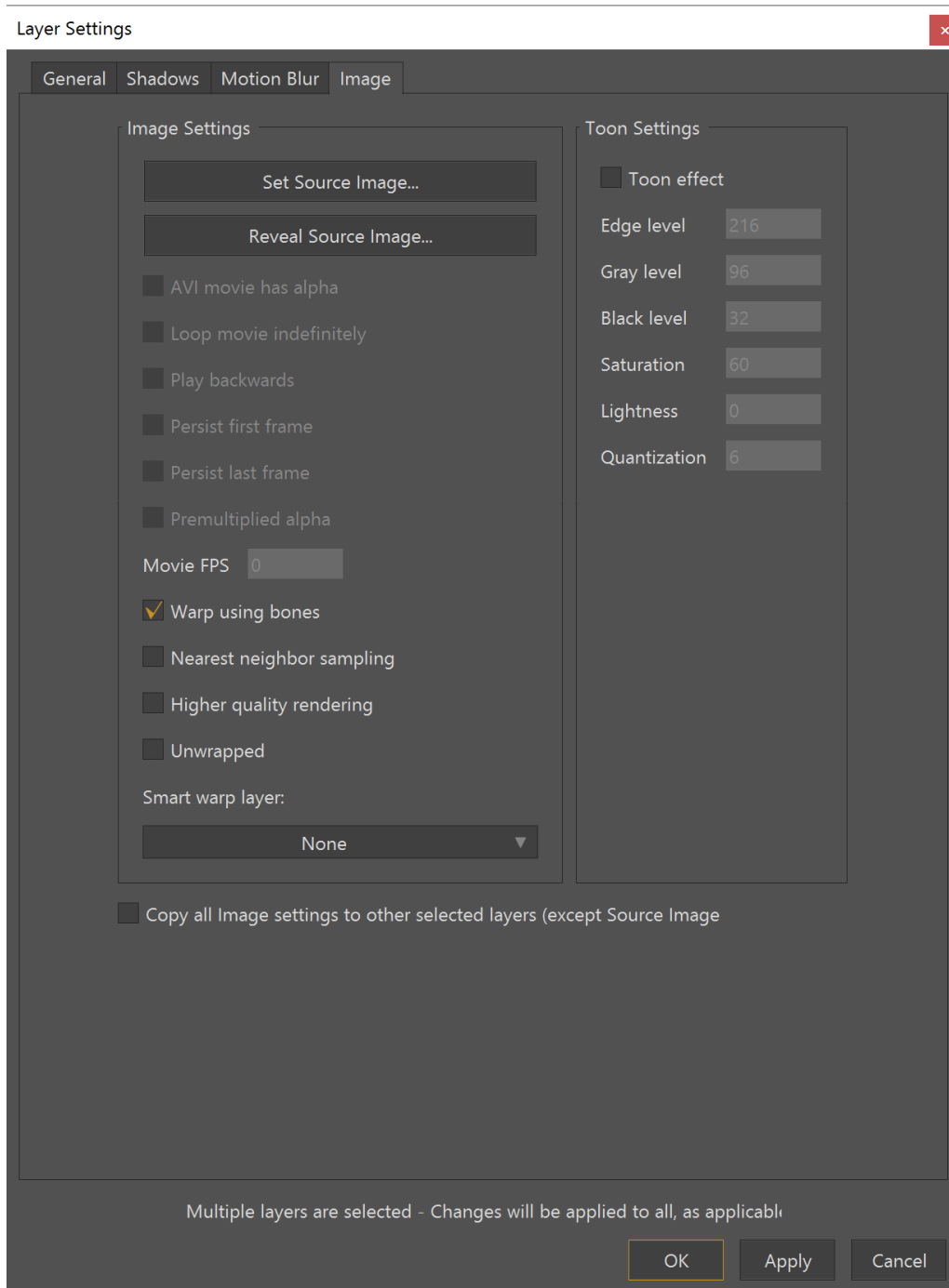
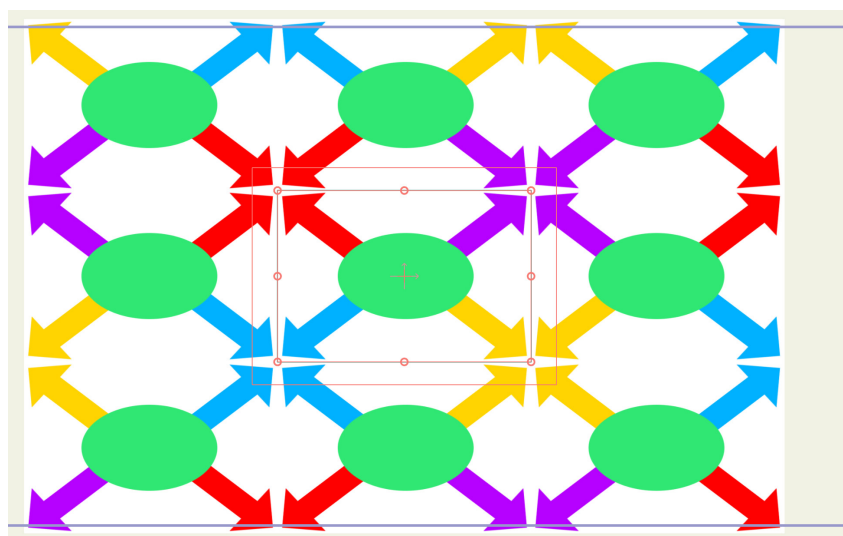


Image Layer Settings

- **Set Source Image:** Lets you select the image to be used in the image layer. Use this if you want to change the image, or if it got lost for some reason.
- **Reveal Source Image:** Click the button to open Explorer (Windows) or Finder (Mac) to the folder that the current source image is contained within.
- **AVI movie has alpha:** Turn this on if the image layer is using an AVI movie, and that movie includes an alpha channel.

- **Loop movie indefinitely:** When checked, the movie plays in a loop for as long as required in the animation. When unchecked, the movie plays once and stops when it reaches its end.
- **Play backwards:** When checked, plays a movie layer backwards (in reverse frame order).
- **Persist First Frame:** When checked, displays the first frame of a movie continually until the playhead reaches the frame at which the movie begins to play. When unchecked, the movie will not appear in the project until the playhead reaches the first frame in the movie.
- **Persist Last Frame:** When checked, displays the last frame of a movie continually after the playhead reaches the last frame of the movie in the timeline. When unchecked, the movie will no longer appear in the project after the playhead moves beyond the last frame in the movie.
- **Premultiplied Alpha:** If an imported movie has an alpha channel and the edges look bad after importing, it may be because the movie has premultiplied alpha. Check this option to improve appearance.
- **Movie FPS:** Sets the speed of the movie in Frames per Second
- **Warp using bones:** If this box is checked and the image layer is placed inside a bone layer, the bones can be used to warp the image as if it were printed on a rubber sheet.
- **Nearest neighbor sampling:** When this option is not checked, Moho will try to smooth out the areas in between pixels when you enlarge the image. If you want the images to look blocky when they are resized, turn this option on. Moho will not smooth the image and it will start to look blocky when it is enlarged.
- **Higher quality rendering:** Renders the image at twice the size, and then scales it down. This is useful to reduce antialiasing in the image.
- **Unwrapped:** Mirrors an image both horizontally and vertically to create a seamless tile.



Unwrapped image (original image in center)

- **Smart Warp Layer:** (Pro only) Use the **Draw > Triangulate 2D Mesh** command to create a triangulated 2D mesh layer that will be used to morph the image. Then double-click the image that you want to morph. Expand the **Smart Warp Layer selector** in the Image tab to choose the layer that contains the triangulated mesh. You can use 2D triangulated meshes to warp either vector or image layers. For additional information, see “**Smart Warp Layers (Pro only)**” on page 236.

Toon Settings

The Toon Effect filter is used with images and movies. Load an image or movie into a new layer. Open the Layer Settings dialog to the Image tab and check the Toon Effect option. The image or movie will be processed through the Toon Effect filter.

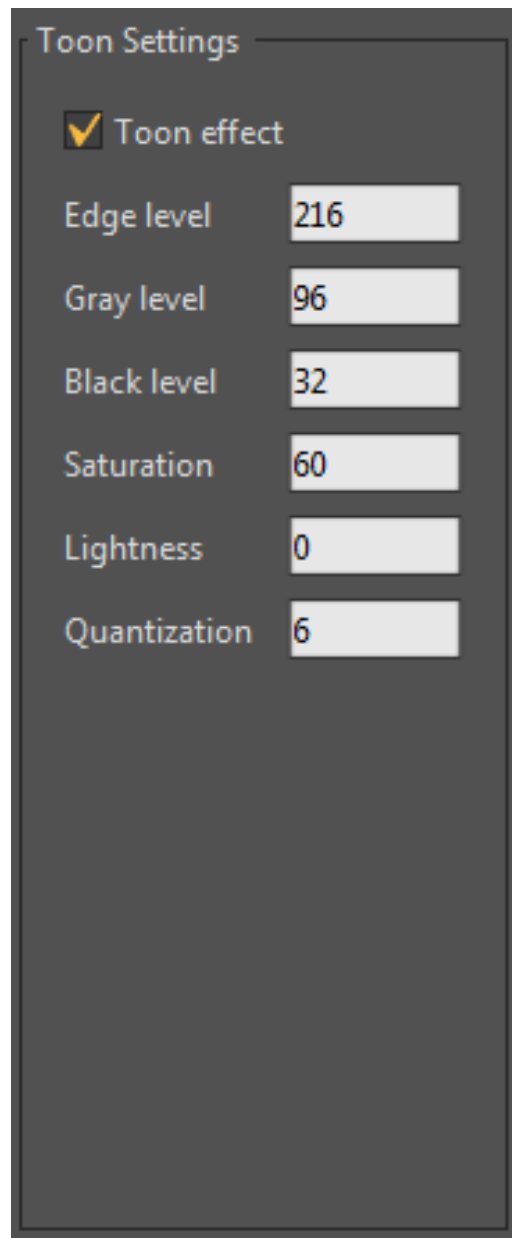


Toon effects on a photograph

When used with videos, the processing can take quite a while. When working with videos, open up the movie file and apply the toon effect filter. Immediately afterward, import the animation as a new movie file. Use the new movie file, with the toon effect applied, in your final project.

Some types of images work better than others. Faces should be pretty large in the image. If the face is small then a lot of detail will be lost or blurred together.

The Toon Effect filter has several parameters in the Image tab:



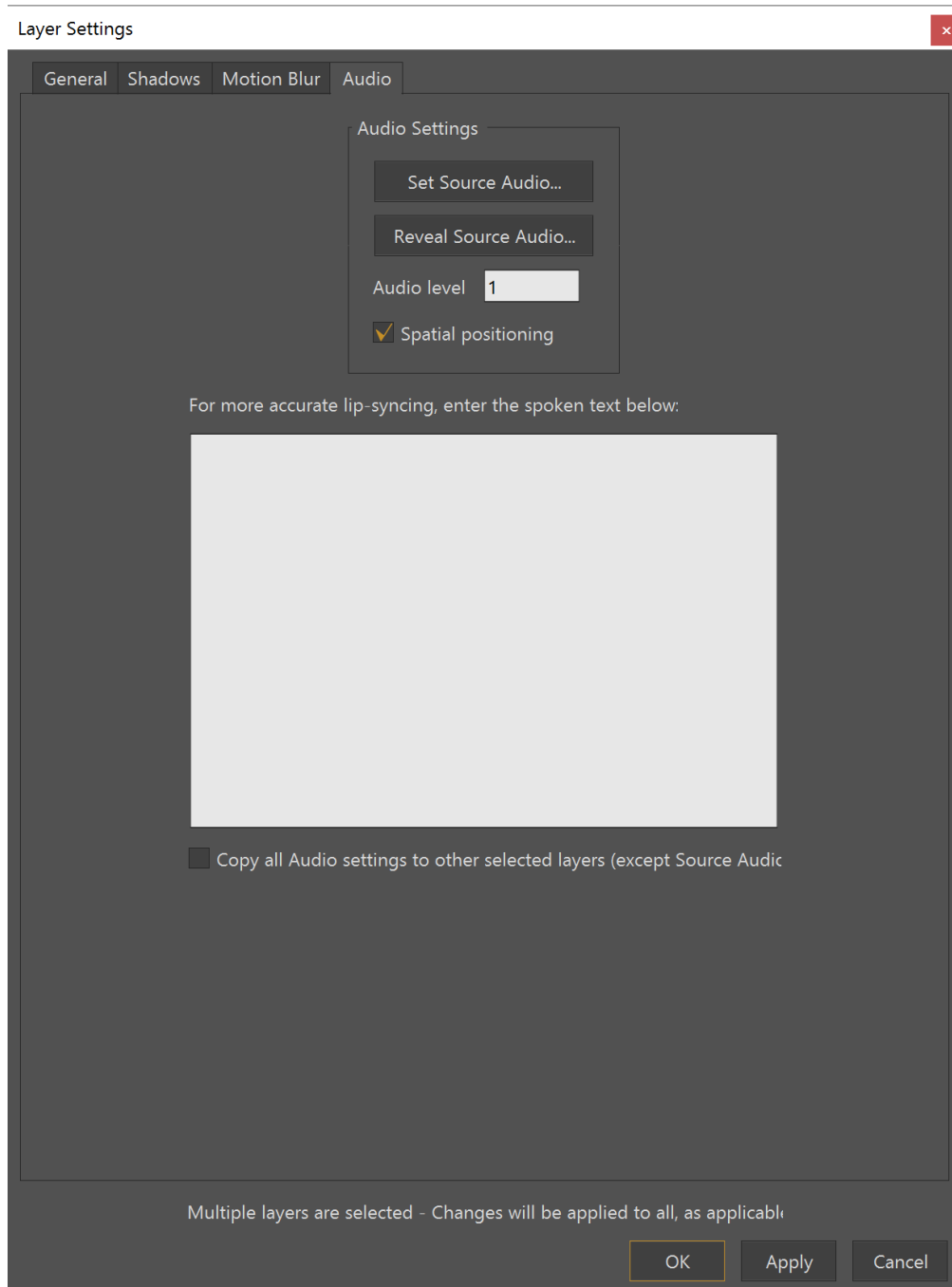
Toon settings in the Layer Settings Image tab

- **Toon effect:** Check this option to enable toon effect settings.
 - **Edge level:** Controls the width of the edges in the toon effect. Increase the setting to make the edges wider, and decrease to make the edges thinner.
 - **Gray level:** Darkens the middle areas of the toon effect.
 - **Black level:** Darkens the dark areas of the toon effect.
 - **Saturation:** Increases or decreases the amount of color. Negative values make the toon more black and white.
 - **Lightness:** Increase the setting to make the image appear more faded.

- **Quantization:** Sets the number of colors in the image. When set at 0, the quantization works the same as found in Anime Studio 7 and earlier. When set to a value greater than 1, the value you enter is the number of colors in the image.
- **Copy all Image settings to other selected layers (except Source Image):** When multiple layers are selected, check this option and click the Apply button to copy all image settings (except the source image) to all other applicable selected layers.

Audio Tab

This tab is only available for audio layers. The options are:



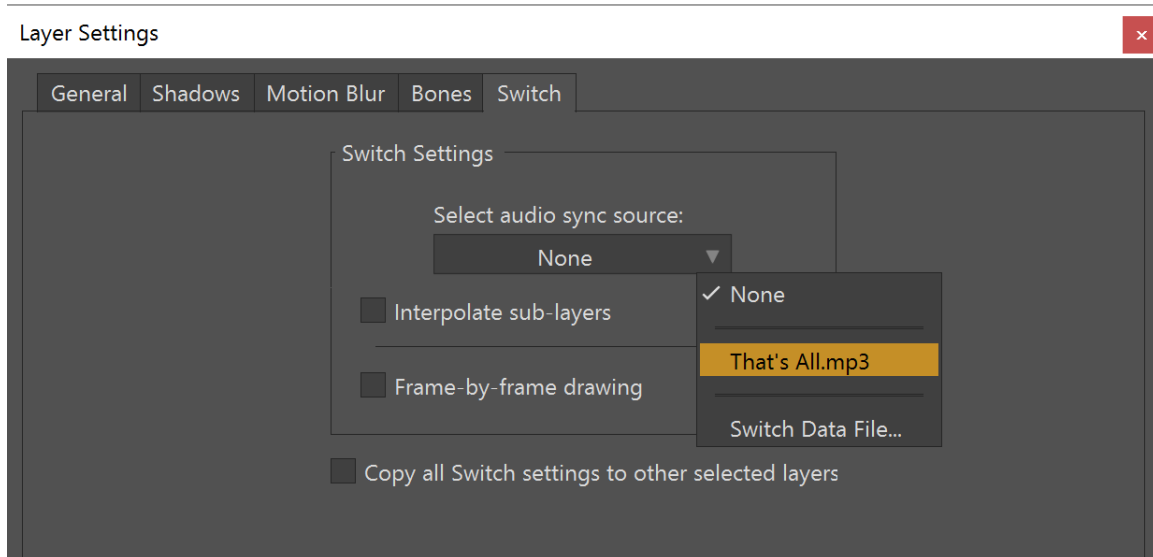
Audio Layer Settings

- **Set Source Audio:** Click the Set Source Audio button to select an audio source file on your system.
- **Reveal Source Audio:** Click this button to locate the audio source file in its folder location.
- **Audio level:** Displays a numeric value for the audio volume, with 1 being equal to the default volume of the audio file.
- **Spatial Positioning:** Enabled by default. When enabled, Moho will use and play back.

- **For more accurate lip syncing, enter the spoken text below:** If your audio file consists of dialog, you can enter the text in the field provided.


Switch Tab


This tab is only available for switch layers.



Switch Layer Settings

- **Select Audio Sync Source:** Lets you select a data file used to control the switch layer. A data file is not required (you can control a Switch layer manually by right-clicking its entry in the Layers Window), but if you do want to use a data file you have two choices:

 If you want a quicker lip-sync solution, you can use an audio file as a data file. In this case, your switch file should contain several version of a mouth shape, ranging from closed to wide open. The volume of the audio file will control which mouth shape is used at which frame. If you do use an audio file to control the Switch layer, you can either use automatic volume gain (recommended) or set the gain manually. The gain controls how wide the mouth gets. When using manual gain, start with a value of 1 - if the mouth seems too wide, try smaller values (0.75 or 0.5). If the mouth isn't wide enough, try higher gain values (1.5 or 2).

 See “Tutorial 5.1: Automatic Lip-Sync” on page 180 in your **Moho Tutorial Manual** and “Tutorial 5.2: Phoneme Lip-Sync” on page 182 in your **Moho Tutorial Manual** for examples of using audio lip-syncing functions.

- **Interpolate sub-layers:** If this box is checked Moho will do smooth transitions between the sub-layers as long as they're all vector layers and contain the same number of points.

- **Frame-by-frame drawing (Pro only):** Check this option to enable Frame-by-frame drawing features on the selected switch layer. This option is used in conjunction with frame-by-frame animation layers. For a thorough example of using frame by frame animation in Moho, see **“Tutorial 5.10: Using Frame by Frame Layers for Animation (Pro Only)” on page 221 in your Moho Tutorial Manual.**
- **Copy all Switch settings to other selected layers:** If other Switch layers are selected, the settings you choose in the Switch tab will be applied to the other selected Switch layers.

Particles Tab (Pro Only)

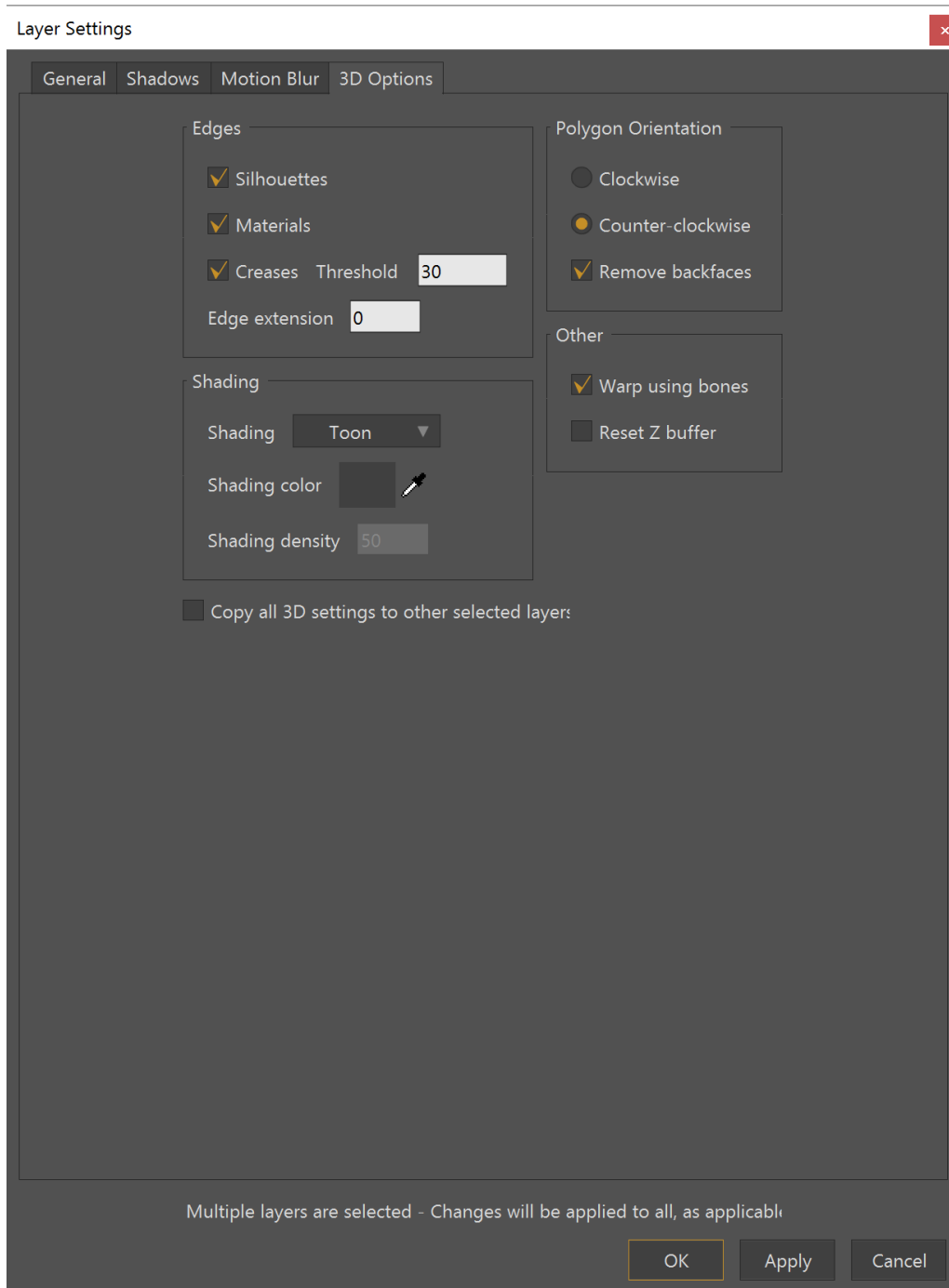
This tab is only available for particle layers. The description for how these controls affect a particle layer can be found in **“Particle Layers (Pro Only)” on page 195.**



Particles Layer Settings

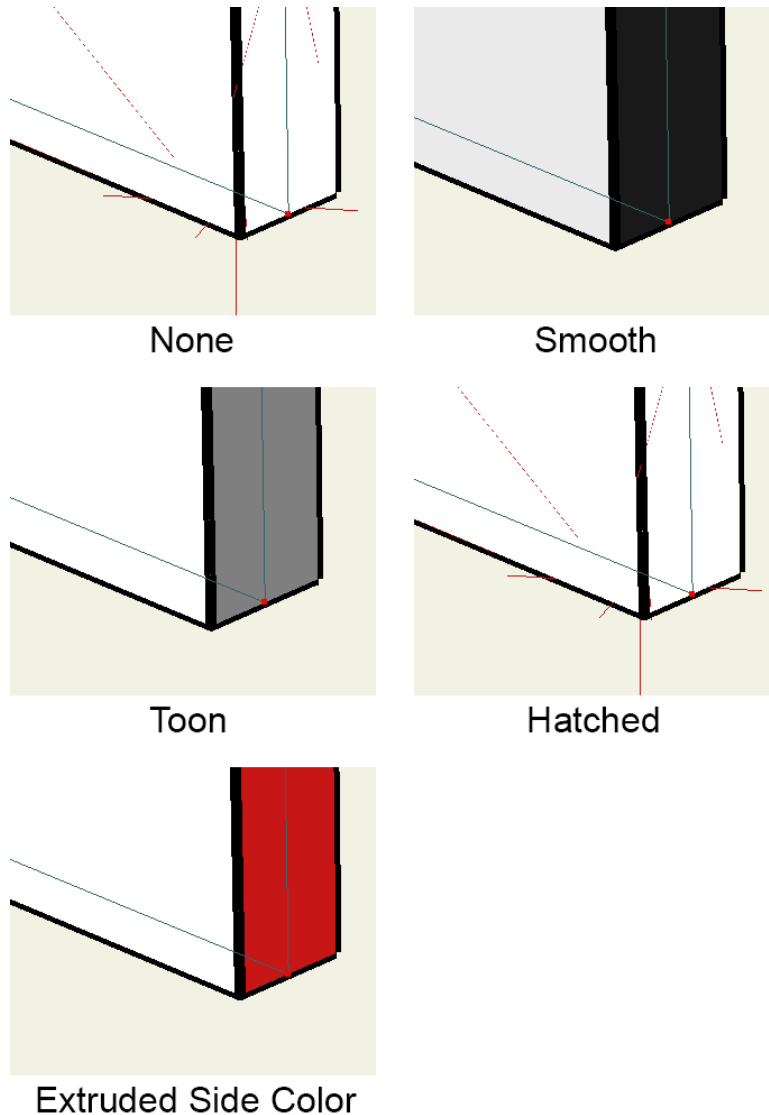
3D Options (Pro Only)

This tab is only available for 3D layers.



3D Options Layer Settings

- **Edges:** Allows you to control which elements get edges (or outlines) and to what degree. You can choose to enable or disable outlines around silhouettes, materials, or creases. The Crease Threshold setting controls the level of crease outline that will appear. The Edge Extension setting makes the outline thicker.
- **Shading:** Controls the type of shading that appears on the 3D object, along with the shading color and density. Choices of shading include None, Smooth, Toon, Hatched, or Extruded Side Color.



3D Shading Options

- **Polygon orientation:** Allows you to adjust whether the polygons in your model are oriented clockwise or counter-clockwise. After importing a model, if it looks turned inside-out or otherwise distorted, try switching the polygon orientation.
- **Warp using bones:** If this box is checked and the 3D layer is placed inside a bone layer, the bones can be used to warp the 3D model. Be aware that although the model is three-dimensional, bone layers are only two-dimensional, so you will be limited in the ways you can control the 3D object using bones.
- **Reset Z buffer:** Moho uses a z buffer rendering algorithm and the result is that all 3D objects in the scene interact in a visually consistent way. Objects that are closer appear in front of those further away, regardless of the layer order. However, if you turn this checkbox on for layer X (a 3D layer), then when layer X gets rendered it first resets the z buffer. This is a way to force a 3D layer to appear in front of other 3D layers that it might actually be behind. In other words, sometimes you may want multiple 3D layers to interact in the Z dimension (hide behind each other, or even interpenetrate so that some parts

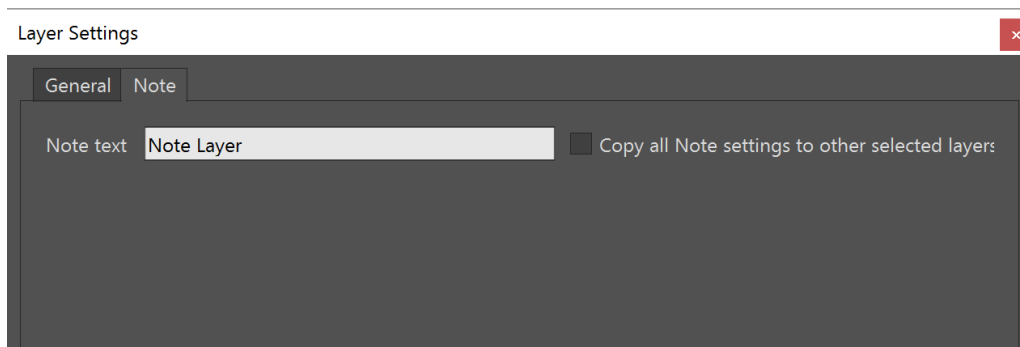
of one object are in front of another and some parts behind). This is the normal behavior. Turning on the **Reset Z Buffer** option forces 3D objects to act like regular 2D layers and just be in front of or behind each other according to the layer order in the Layers Window.

- **Copy all 3D settings to other selected layers:** When multiple layers are selected, check this option and click the Apply button to copy all 3D settings to all other applicable selected layers.

Note Tab (Pro Only)

This tab is only available for note layers, and lets you change the text label in the note.

- **Copy all Note settings to other selected layers:** When multiple layers are selected, check this option and click the Apply button to copy all Note settings to all other applicable selected layers.




Notes Layer Settings

Physics Tab (Pro Only)

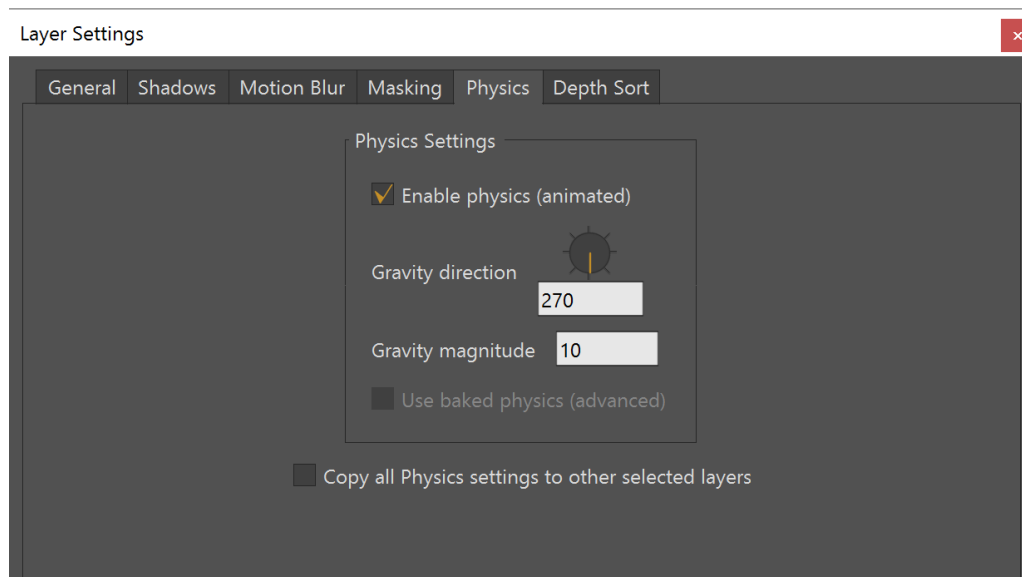
The settings in the Physics tab are as follows:

- **Enable physics:** Check this option to turn the physics simulator on.
- **Gravity direction:** Use the directional slider to point to the direction from which gravity is originated. By default, the direction is straight down (270 degrees). 0/360 degrees is at the 3:00 position of the dial.
- **Gravity magnitude:** Controls the strength of the gravity. Lower values make the gravity less forceful (objects are lighter) and higher values make the gravity more forceful (objects are heavier).
- **Use baked physics (advanced):** Turn this option on to stop the physics simulation from running. It will play back results from the last time you played back the animation.
- **Copy all Physics settings to other selected layers:** When multiple layers are selected, check this option and click the Apply button to copy all physics settings to all other applicable selected layers.

 Normally, physics simulations are re-run every time you play back an animation so that they can respond to other objects in the scene. The advantages to using baked physics are (1) it is faster to re-use simulations rather than to re-run the physics; (2) If the physics simulation doesn't give you the results you want, you need to tweak results. You can't manually animate objects if they are under the influence of physics, but you can use the precomputed physics while you modify keyframes as you see fit. (3) If you get a result that you like, you can turn this option on to make sure it doesn't change.

 Physics will only work with objects that are filled.

For more information on how to use physics in your Moho projects, see “**Tutorial 5.9: Basic Physics (Pro Only)**” on page 214 in your Moho Tutorial Manual.




Physics Settings

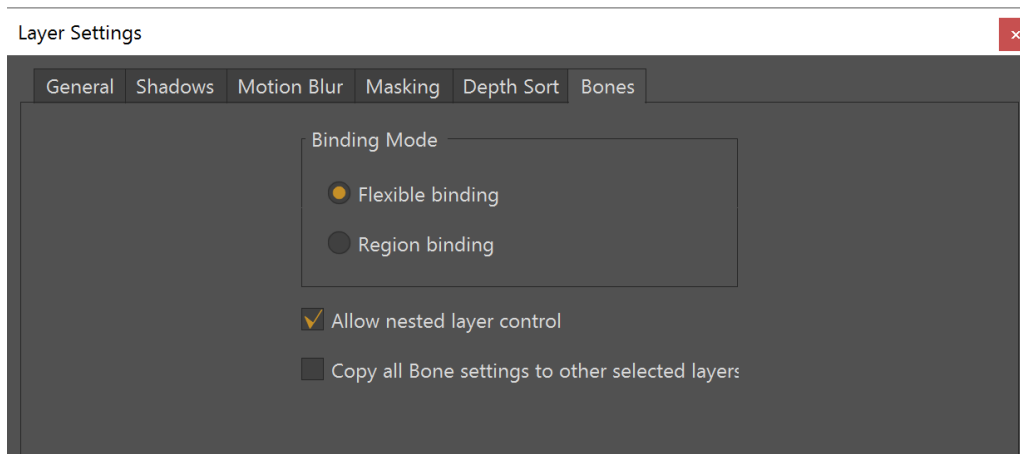
Bones Tab

The settings in the Bones tab are as follows:

- **Binding Mode:** Check one of the following to select the binding mode that you want to use for bones.
 - **Flexible Binding:** This option is selected by default. This uses Flexi-Binding, which allows greater control over how bones affect different layers in a bone group. See “**Tutorial 3.5: Flexi-Binding**” on page 136 in your Moho Tutorial Manual.
 - **Region Binding:** Uses the binding style that was used by Anime Studio prior to version 9.5. See “**Tutorial 3.4: Character Setup**” on page 125 in your Moho Tutorial Manual.

- **Allow Nested Layer Control:** Allows you to control the children of their children, making it easier to work with bones on images and vector art.
- **Copy all Bones settings to other selected layers:** When multiple layers are selected, check this option and click the Apply button to copy all bone settings to all other applicable selected layers.

 *Moho provides an option that allows you to control the children of a bone's children, making it easier to work with bones on images and vector art. In other words, if you have a group inside a bone layer, and vector layers inside that group, the bone layer can warp the artwork in those vector layers if **Allow nested layer control** is turned on in the Bones tab of the Layer Properties palette and if the group layer is not bound. This allows more powerful bone rigging while also allowing you to organize your layers in a hierarchy. This allows you to have parent bones and “Grandpa” bones ... bones that affect more than one layer of bones beneath them.*



Bones Settings

Chapter 13: Style Window

The Style window is where you set up colors, line widths, fill effects, and other properties to control the appearance of your vector artwork. The Style window has two views, Basic and Advanced.

The Advanced checkbox in the lower-left corner of the dialog will toggle the Styles palette between Basic and Advanced views. Check the option to display in Advanced view, and uncheck it to display in Basic view.

The options in the Style window are displayed and listed on the following page.

When you edit the fill color, stroke color, or brush settings, the changes will be displayed live on the canvas so that you can see the effects of your changes.

Style Window Options:

Red numbers in the image at the right indicate controls that are available in basic view. Blue numbers indicate controls that are only available in Advanced view.

1. Shape selection drop-down menu
2. Style management drop-down menu (Pro only)
3. Window mode indication
4. Name field
5. Fill enable checkbox
6. Fill color selector
7. Fill color override checkbox (Pro only)
8. Fill effect drop-down menus
9. Fill effect settings buttons
10. Stroke enable checkbox
11. Stroke color selector
12. Stroke brush selector
13. Stroke color override checkbox (Pro only)
14. Stroke width override checkbox (Pro only)
15. Stroke line width field
16. Stroke effect drop-down menu
17. Round end caps checkbox
18. Stroke effect settings button
19. Applied styles drop-down menus (Pro only)
20. 3D conversion thickness field
21. Color swatch drop-down menu
22. Color swatch
23. Copy button
24. Paste button
25. Reset button
26. Advanced window checkbox
27. Checker selection (Pro only)

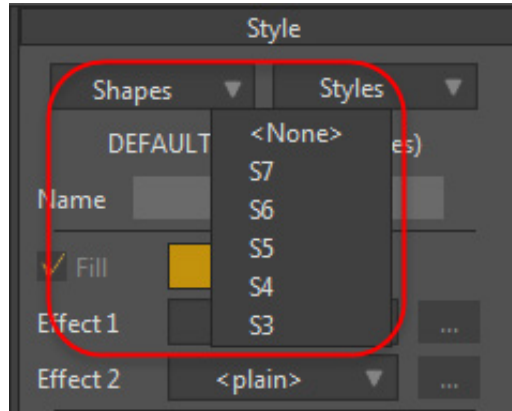


Shapes

The Shapes controls appear only when the Style window is set to Advanced view. It consists of the controls mentioned below.

Shape Selection Drop-Down Menu (1)

This menu appears in Advanced view only. You can use this menu to select any existing and named shape on the current vector layer. Select **<None>** to deselect all shapes.



Shape Selection Drop-Down Menu

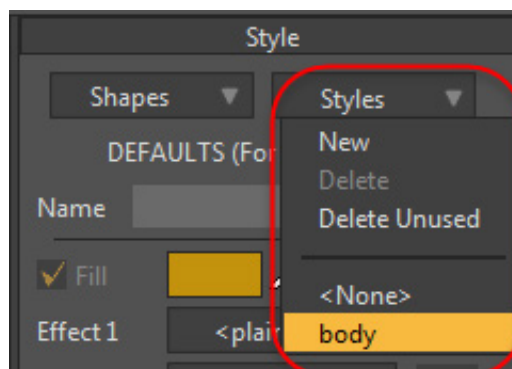
- Shapes:** The fill and/or stroke that make vector construction visible when rendering/exporting. For example, if you use the Draw Shape (E) tool with the Auto-fill and Auto-stroke options unchecked, you will create a vector construction without any shape and it will not be visible when rendered/exported. You can always use the Create Shape (U) tool to make a shape using this vector construction. Enabling either or both of these Auto options before using the Draw Shape tool will create a visible shape with the properties chosen.



Choose **Edit > Preferences...** and in the Option tab, you can select **Auto-name new shapes** so that all of your shapes have names when created. Refer to "General Tab" on page 435 for more information.

Style Management Drop-Down Menu (2, Pro Only)


A style contains all of the properties which define how a shape should look. Use the Styles menu to create, delete, and edit your styles.



Style Management Drop-Down Menu

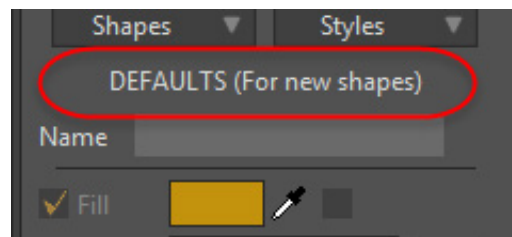
These are the options of this menu:

- **New:** This option allows you to create a new saved style.
- **Delete:** This option allows you to delete a selected style.
- **Delete Unused:** This option allows you to delete all styles that are not currently applied to any shapes.
- **<None>:** This option deselects all saved styles.
- **List of style names:** If you have created any saved styles there will be a list of their names. Selecting one of these will open that style for editing.

 *Style names are now referenced internally by a unique ID rather than by name. This allows you to have more than one style of the same name, and also prevents naming collisions when you import styles of the same name from another document.*

Window Mode Indication (3)

This control is visible in Advanced view only. It indicates the current mode of the Style Window. There are three modes:

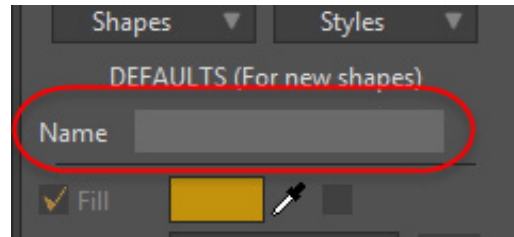


Window Mode Indication

- **DEFAULTS (For new shapes):** In this mode the style you define will be applied to any new shapes you create. This default will retain the style of the last shape you had selected. This is the default mode when there are no shapes or styles selected.
- **SHAPE:** In this mode the style you define will edit the style of the currently selected shape. Selecting a shape in the workspace or in the shape selection drop-down menu will enter shape mode.
- **STYLE:** In this mode the style you define will either create a new style or edit an existing one, depending on the option you select from the style management drop-down menu.

Name Field (4)

This control is visible in Advanced View only. The name field allows you to name or rename any selected shape or style and displays any existing name. In Moho Pro, it is only active in **SHAPE** or **STYLE** mode.



Name Field

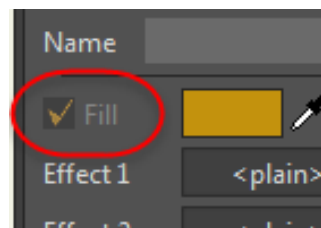
Fills

Two controls appear in the Fill section when in Basic view. Three additional controls appear in Advanced view. These controls are as follows:

Fill Enable Checkbox (5)

This checkbox determines whether a selected shape has a fill.

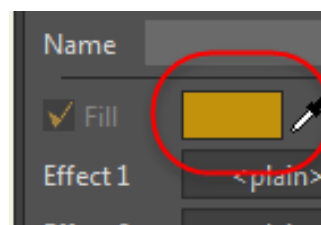
A fill is the color inside of a closed shape. This option is only available when you have an existing shape selected.



Fill Enable Checkbox

Fill Color Selector (6)

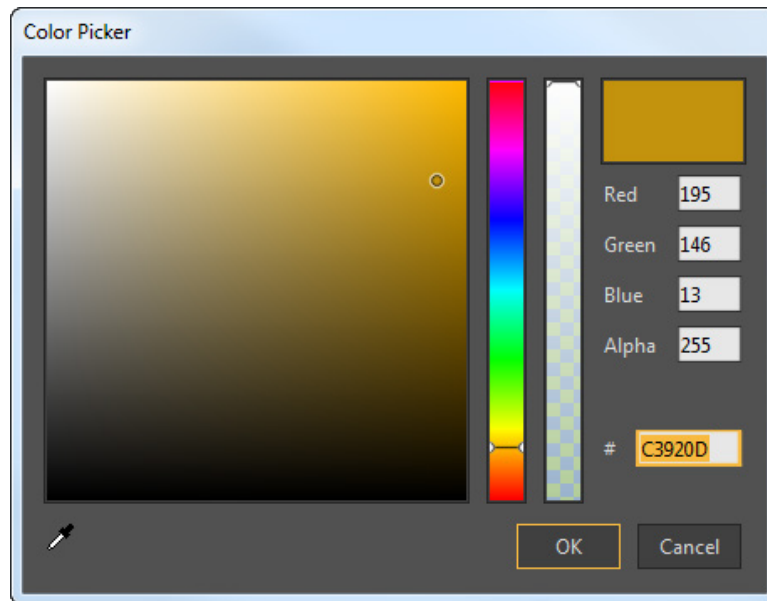
This displays the fill color for the default style, the selected shape, or the selected style, depending on the style window mode. Clicking on it allows you to edit the color with the color picker, or by using the Eyedropper tool to pick a color.



Fill Color Selector

The color picker allows you to select the color and transparency of the fill or stroke of your style. The large field to the left is where you can choose the color saturation and brightness. The vertical colored bar to the right of this is where you choose the color hue. The next, checkered bar is where you set the color alpha value (opacity). At

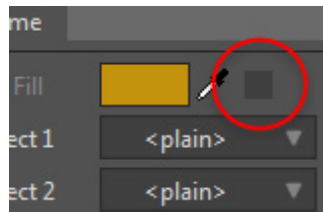
the top right are two color chips. The top one is the current color and the lower one is the previous color (click to restore). Below these are manual inputs for the red, green, blue, and alpha values. And last is a hexadecimal field where you can copy or paste hex values to set the color.



Color Picker

Fill Color Override Checkbox (7, Pro Only)

This option appears in Advanced view only. If checked, the color displayed in the fill color selector will override any other fill color in the style.



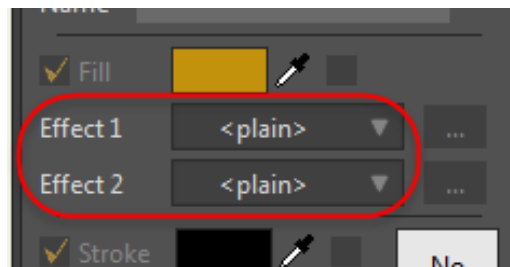
Fill Color Override Checkbox

This works slightly different, depending on which mode the window is in:

- **DEFAULTS** and **SHAPE**: In these modes the override is only available if a saved style has been applied (see 19). Enabling this will override the applied style fill color with the current color in the fill color selector.
- **STYLE**: In this mode the override determines what properties are included in the saved style. There is an override for fill, stroke (see 12), and line width (see 14). You can create styles with any combination of these properties.
- When a style is applied any overrides checked in that saved style will override those properties in the shape or default.

Fill Effect Drop-down Menu (8)

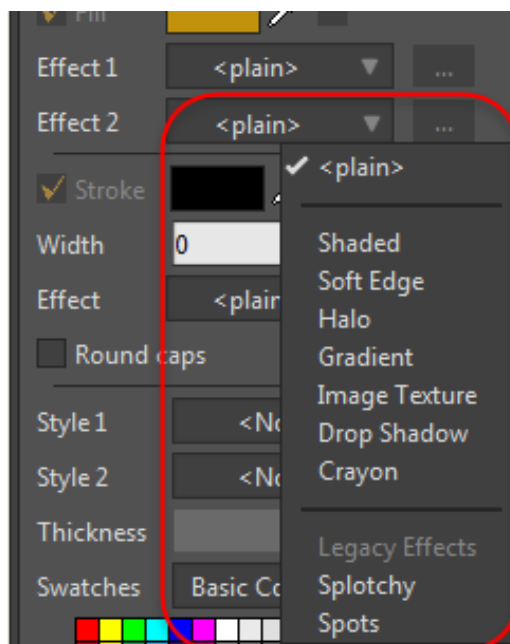
These drop-down menus in advanced view allow you to select two different fill effects. There are many effects to chose from:



Fill Effect Drop-Down Menu


- **<plain>** indicates that no effect is applied in this drop-down.


This is followed by a list of fill effects. Some fill and line effects can be animated, with keyframes being added to the timeline when you change colors, blur radius, angles, offsets, blurs, and more.



Expanded Menu (Moho Pro shown)

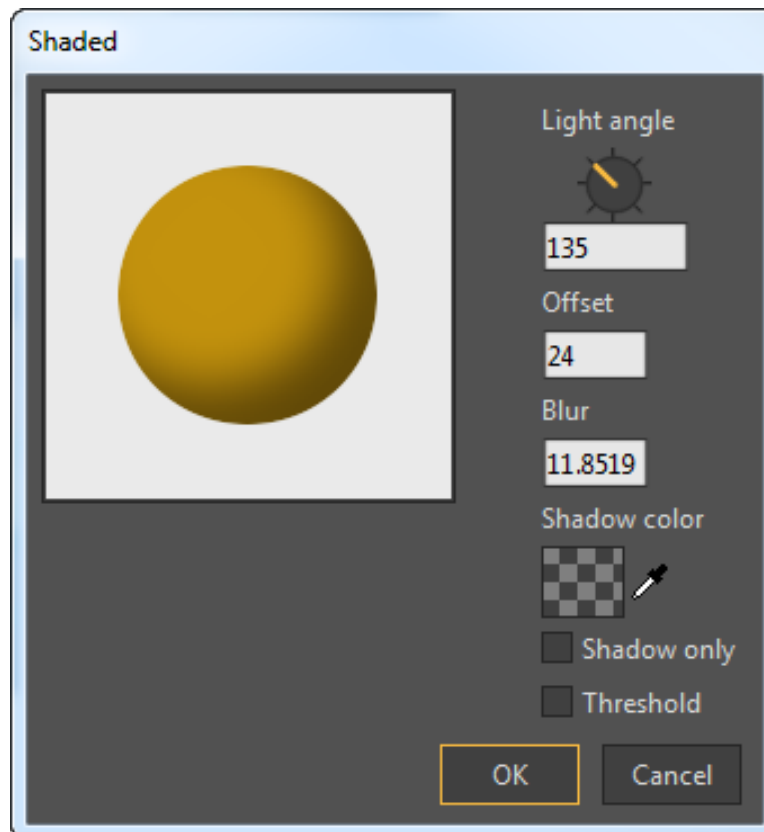
Selecting an effect will bring up an effect settings dialog, each of which are described in the sections that follow. Each effect has a variety of specific parameters for the user to adjust, as well as an effect preview that updates as changes are made to these settings.

 You will only be able to view the results of some effects on your shapes by rendering a single frame (Cmd/Ctrl R) or exporting the animation (Cmd/Ctrl E).

 Many of the fill and stroke effects can be shown in the workspace, while others can only be seen once rendered. This can slow down performance, so it is disabled by default. To enable effects in the Moho Pro workspace, open the Display Quality settings drop-down at the bottom of the workspace and enable the **Shape effects** checkbox.

Shaded Fill Effects

When you choose Shaded Fill effects, a dialog displays the following options:



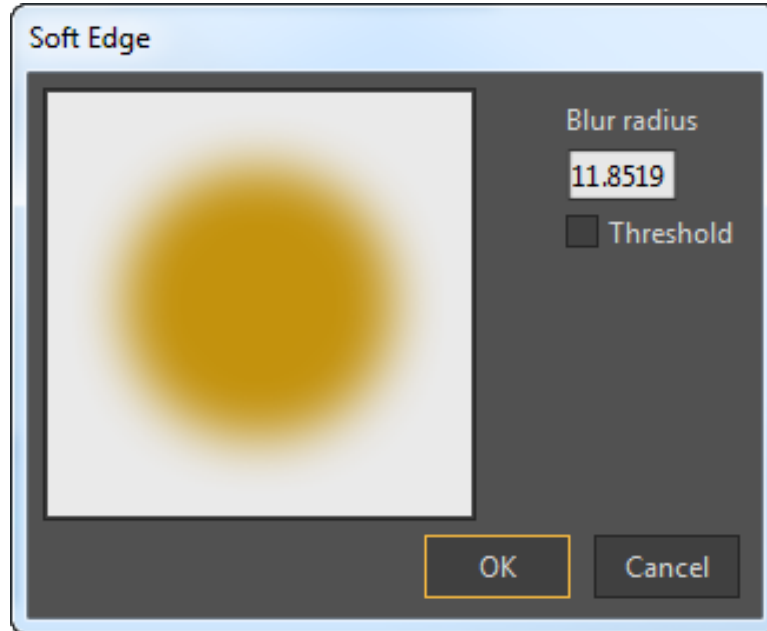
Shaded Effect Options

- **Light Angle:** Provides a dial that allows you to change the direction that the light is coming from. You can also enter a numerical value. Zero degrees is located at the bottom of the dial.
- **Offset:** Allows you to assign a value for how far the shadow is offset from the filled area
- **Blur:** Controls the softness of the shadow.
- **Shadow Color:** Allows you to choose the shadow color from a color palette.
- **Shadow Only:** Check this option to only display the shadow, without the fill.
- **Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the

threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.

Soft Edge Fill Effects

When you choose Soft Edge Fill effects, a dialog displays the following options:

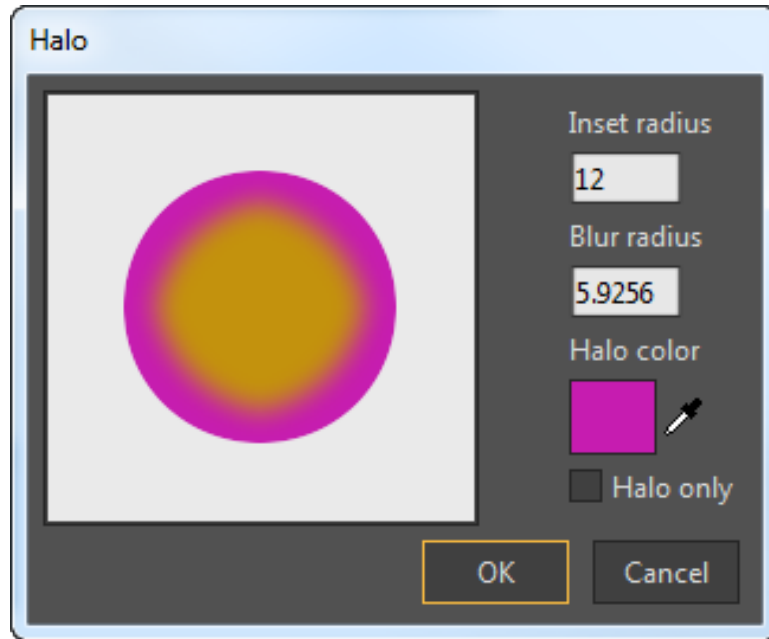


Soft Edge Effect Options

- **Blur Radius:** Allows you to increase or decrease the softness, or blur, around the edge of the fill.
- **Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.

Halo Fill Effects

When you choose Halo Fill effects, a dialog displays the following options:



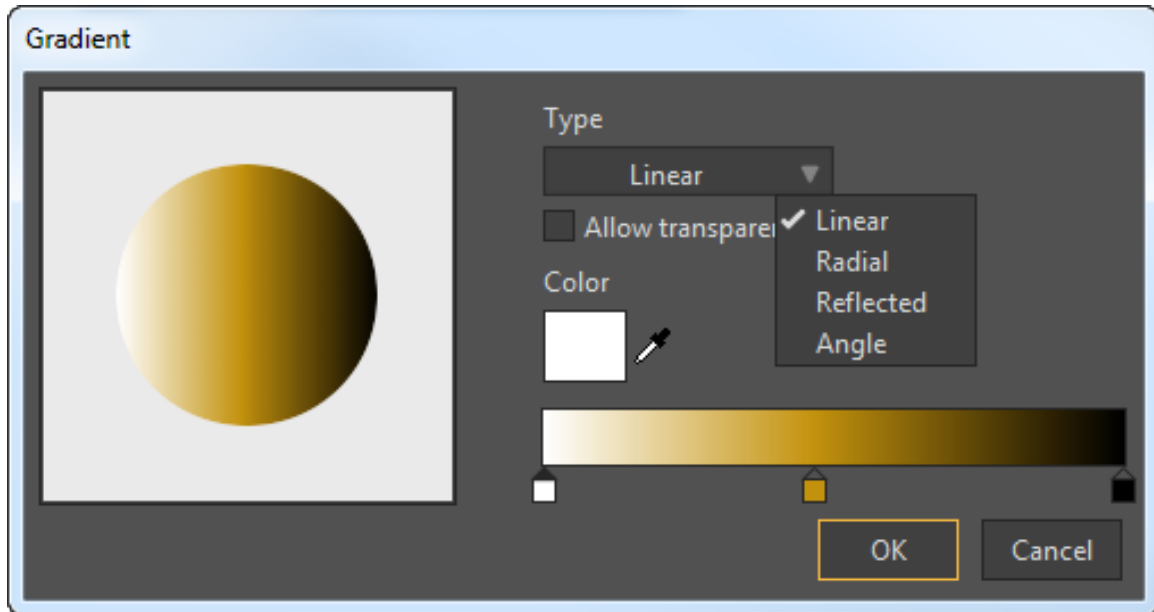
Halo Effect Options

- **Inset Radius:** Adjusts the radius of the inner area
- **Blur Radius:** Adjusts the softness around the halo
- **Halo Color:** Click the Color chip to select a color for the halo.
- **Halo Only:** Check this option to only add the halo effect without the fill.

Gradient Fill Effects

Gradient fill effects can be animated and can also respond to bone warping. You can animate the location and color of all of the color markers in the gradient. All changes in color will show up in the timeline when added.

This is the dialog used to control the gradient effect. The following options appear:



Gradient Effect Options

- **Type:** Allows you to choose one of four types of gradient effects: Linear, Radial, Reflected, or Angle. The preview shows an example of each type.
- **Allow transparency:** Check this option if you want the gradient to appear partially or completely transparent in some areas.
- **Color:** Allows you to select a color and transparency for the selected gradient marker (below).
- **Gradient bar:** This bar shows the current gradient.
- **Gradient markers:** Below the gradient bar are initially three markers that define the start, middle, and end colors of the gradient. The middle color is the underlying color of the object. Double-click any of the markers to display or choose a color from the Color selector. These markers can be moved anywhere along the gradient bar.
- You can also add additional color markers to the gradient by clicking anywhere just below the gradient bar. You can copy an existing marker by holding the Alt key when you select a marker. You can then drag this copied marker to a new location on the gradient bar, or even click the color selector to change its color.

Image Texture Fill Effects

When you choose Image Texture Fill effects, a dialog displays the following options:

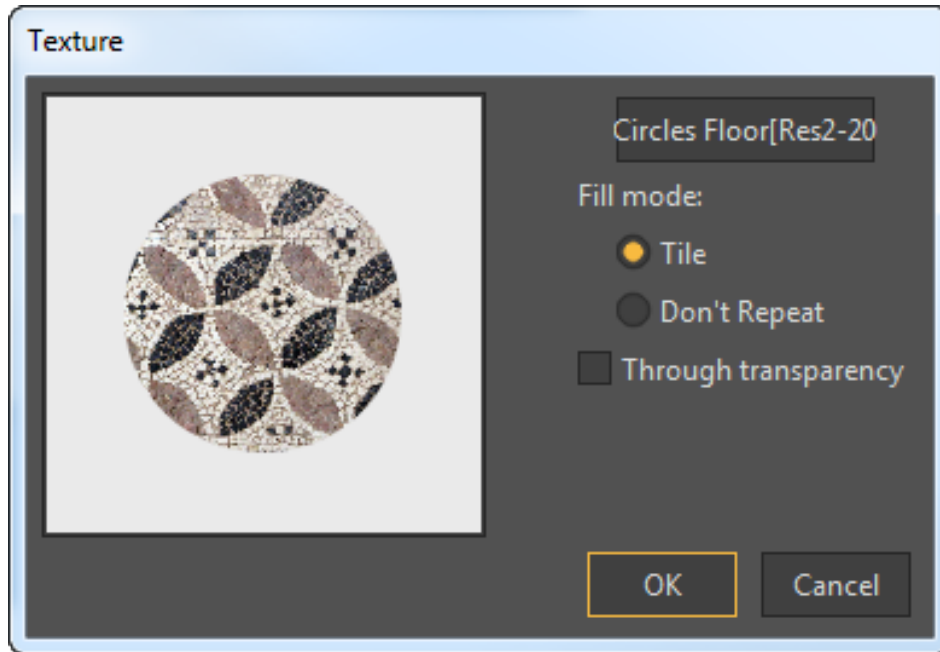
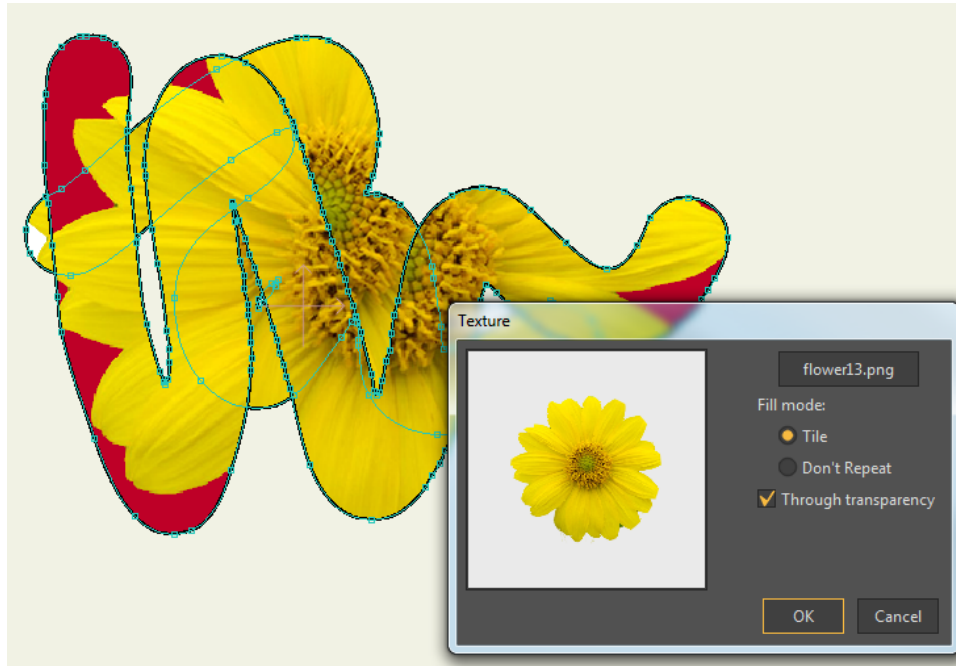


Image Texture Effect Options (Moho Pro shown)

- **Select Texture:** Click this button to choose an image file to be used as a texture fill.
- **Tile:** Choose this option if you want the image to repeat more than once to fill the selected area
- **Don't Repeat:** Choose this option if you do not want to repeat image used for the fill. The image will be rescaled proportionally as needed to fit the width or height of the area that will be filled.
- **Through Transparency (Pro only):** Check this option to mask areas of an underlying shape with transparent areas in a texture fill.

When you apply a texture fill effect, you can select images that are partially transparent. After you select the image, the preview in the Texture dialog will apply the partially transparent image over the shape so that you can see the underlying color through the texture.

When the **Through Transparency** option is checked, you will see a change after you render a preview. The transparent areas in the texture will now be transparent through the entire shape. This causes the transparencies in the image to function similar to a mask.

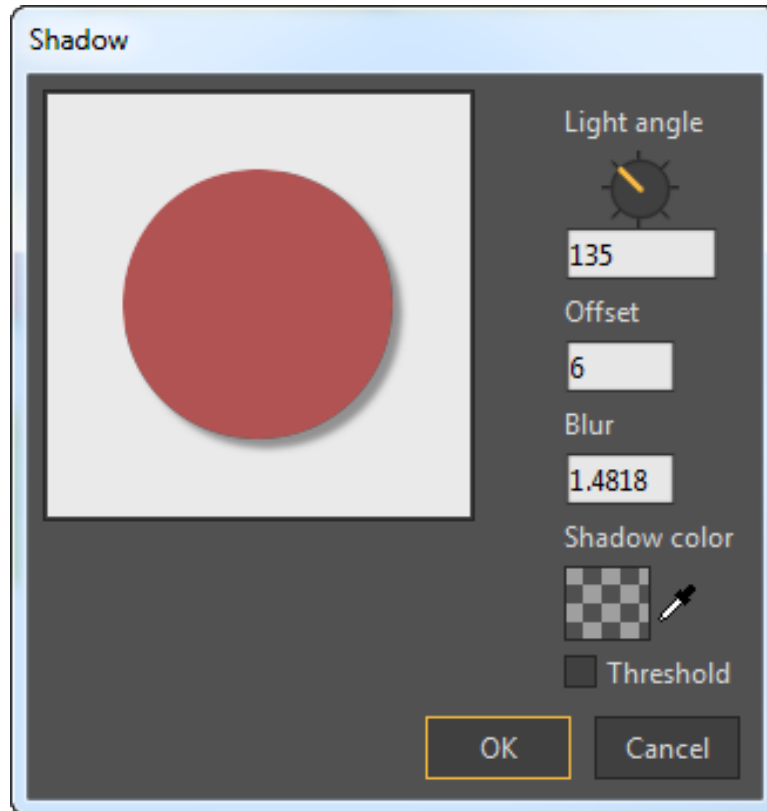


A shape filled with a partially transparent image.

Drop Shadow

The Drop Shadow feature allows you to quickly and easily create a drop shadow for your objects. The feature allows you to set the angle from which the light shines, how much the shadow is offset from the object, and the blur radius (or softness) of the shadow. In addition, you can set the color of the shadow through a color swatch.

When you choose a Drop Shadow, a dialog displays the following options:



Drop Shadow Effect Options

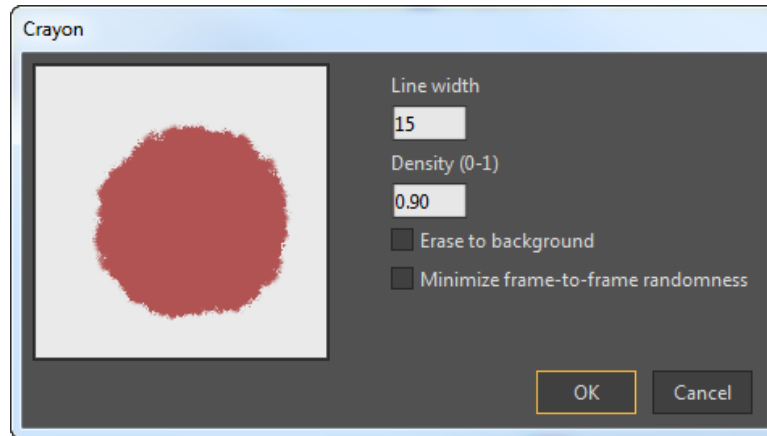
- **Light Angle:** Provides a dial that allows you to change the direction that the light is coming from. You can also enter a numerical value. Zero degrees is located at the bottom of the dial.
- **Offset:** Allows you to assign a value for how far the shadow is offset from the filled area
- **Blur:** Controls the softness of the shadow.
- **Shadow Color:** Allows you to choose the shadow color from a color palette.
- **Threshold:** Works in conjunction with blur, and can be used to produce smoother transitions in corners. The more an object is blurred, the more the threshold will have an effect. The blur is computed first, and then the threshold is added on top of it to smooth out the overall shape.

A preview of the settings appears in the preview window as you adjust them. When you are satisfied with the appearance of your shadow, click **OK** to apply the settings. You will need to preview the frame (Cmd/Ctrl R) or export the animation (Cmd/Ctrl E) to see the results.

Crayon (Pro Only)

The Crayon feature allows you to simulate the effect of something that is drawn with a crayon. The feature allows you to adjust the width and density of the crayon stroke. You can also use the crayon as an eraser.

When you choose the Crayon effect, a dialog displays the following options:



Crayon Effect Options

- **Line Width:** Allows you to increase or decrease the width of the crayon stroke.
- **Density:** Decrease the setting to give the crayon a more grainy appearance. Increase the setting to make the crayon more “solid.”
- **Erase to Background:** Check this option to erase underlying strokes with the crayon.
- **Minimize frame-to-frame randomness:** Check this option to keep the crayon effect from jittering during the animation.

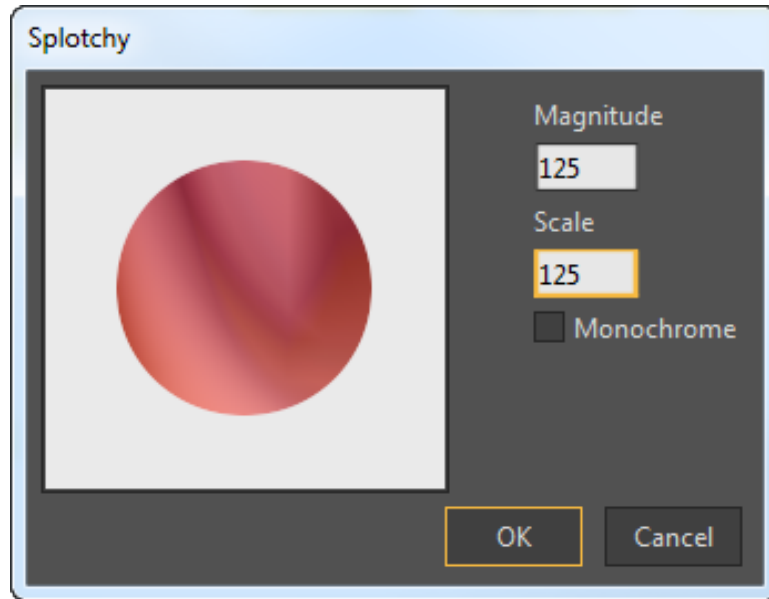
A preview of the settings appears in the preview window as you adjust them. When you are satisfied with the effect preview, click **OK** to apply the settings.

Legacy Effects (Pro Only)

Legacy Effects (Moho Pro only). These are older effects that significantly slow down render speeds, do not respond to bone influence, and may have other limitations and drawbacks. You must decide for yourself whether these effects are worth the extra time to render an animation that makes use of them.

Splotchy (Pro Only)

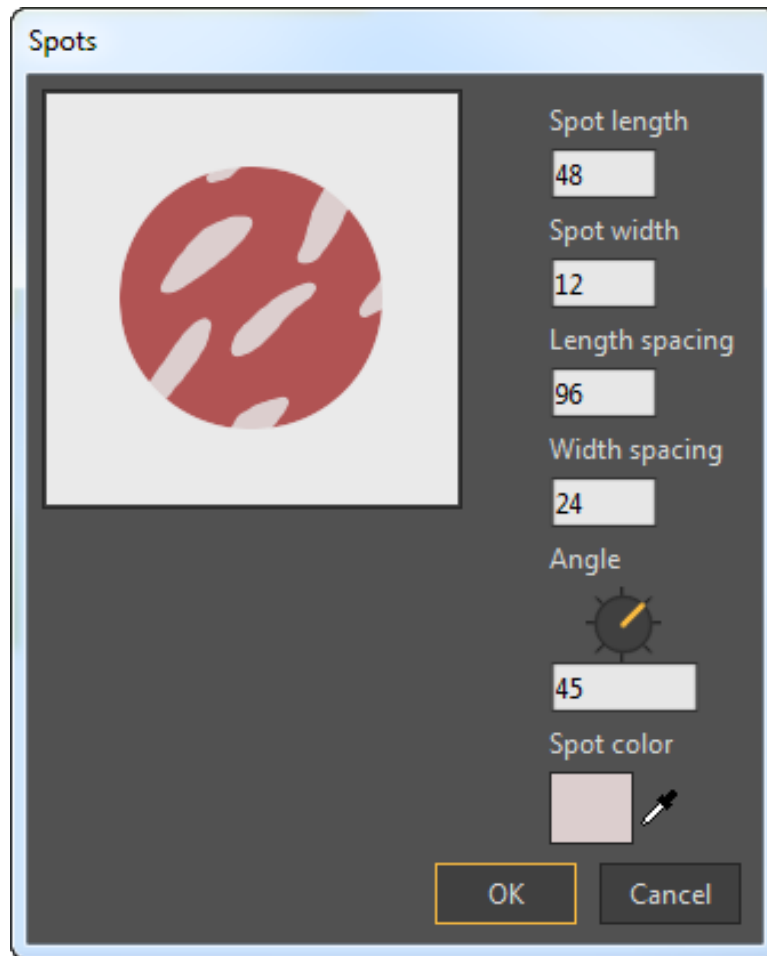
This effect fills the selected area with a splotchy pattern. You can control the contrast, scale, and chromatics of the pattern fill.



Splotchy Options

- **Magnitude:** Allows you to adjust the contrast of the splotchy pattern.
- **Scale:** Adjusts the scale of the splotchy pattern.
- **Monochrome:** When this option is checked the splotchy pattern will only use shades of the fill color.

Spots (Pro Only)

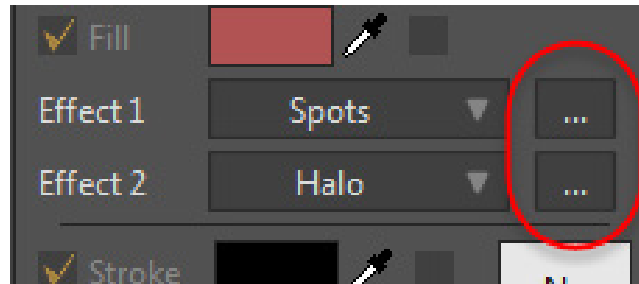


Spots Options

- **Spot length:** This option determines the length of the spots.
- **Spot width:** This option determines the width of the spots.
- **Length spacing:** This option determines the space between the ends of the spots.
- **Width spacing:** This option determines the space between the sides of the spots.
- **Angle:** Provides a dial that allows you to change the direction of the spots. You can also enter a numerical value. Zero degrees is located at the right of the dial.
- **Spot color:** Allows you to choose the spot color from a color palette.

Fill Effect Settings Button (9)

Each of these buttons in advanced view become active when you have an effect selected in the effect drop-down menu next to it. These buttons allow you to access and edit the effect settings dialog of the selected effect.



Fill Effects Settings Button

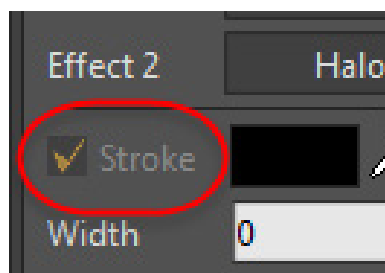
Stroke

The Stroke area consists of six options in basic view, and two additional controls in Advanced view. They are described in the following sections.

Stroke Enable Checkbox (10)

This checkbox determines whether a selected shape has a stroke.

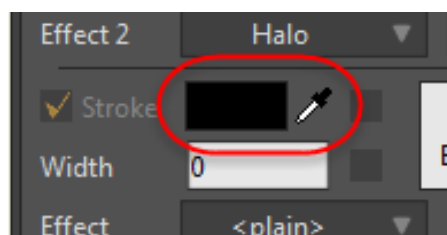
A stroke is the outline of a shape. Shapes can exist without a stroke or only composed of a stroke. This option is only available when you have an existing shape selected.



Stroke Enable Checkbox

Stroke Color Selector (11)

This displays the stroke color for the default style, the selected shape, or the selected style, depending on the style window mode. Clicking on it brings up the color picker.

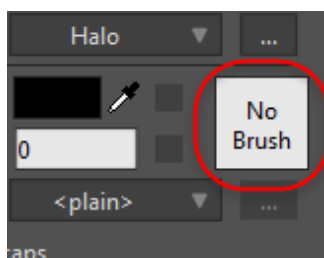


Stroke Color Selector

Stroke Brush Selector (12)

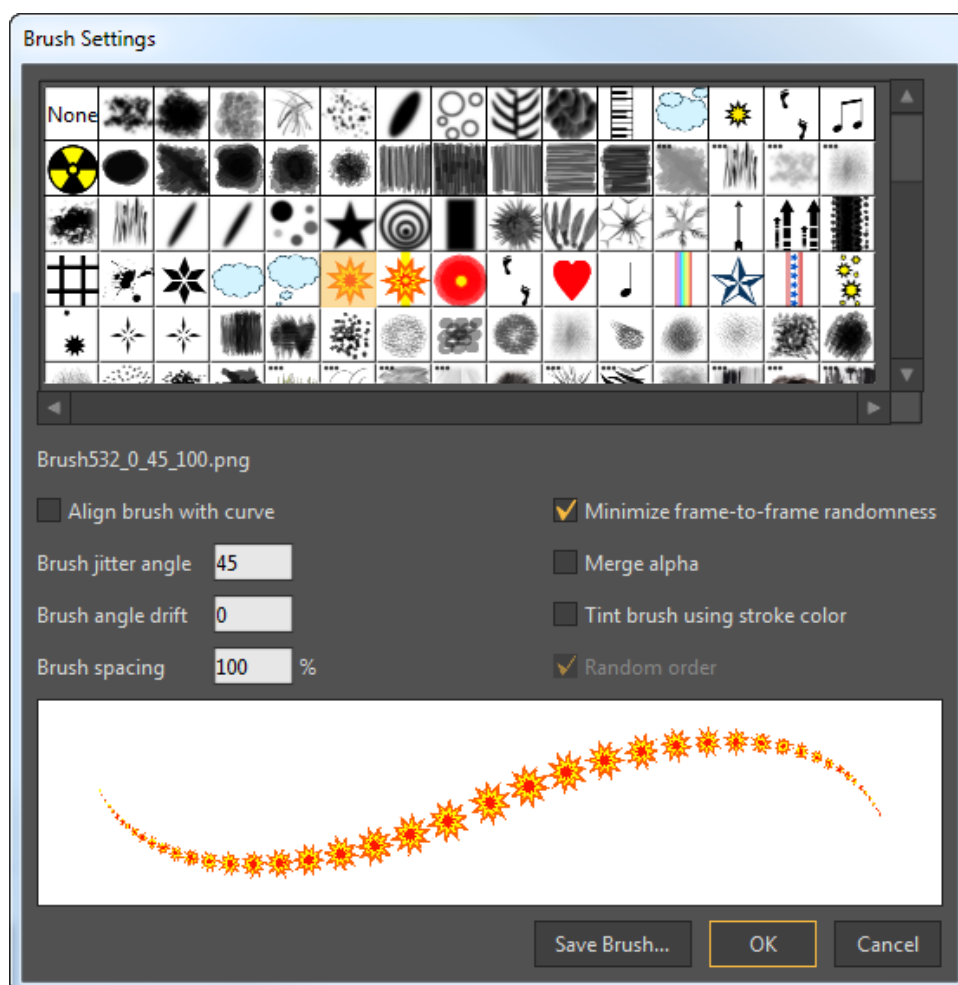
This displays the current brush used for the stroke of the default style, selected shape, or selected style.

 If a brush style references a brush that is not found in the Style window, the Stroke Brush Selector will display **Missing Brush** instead of **No Brush**.



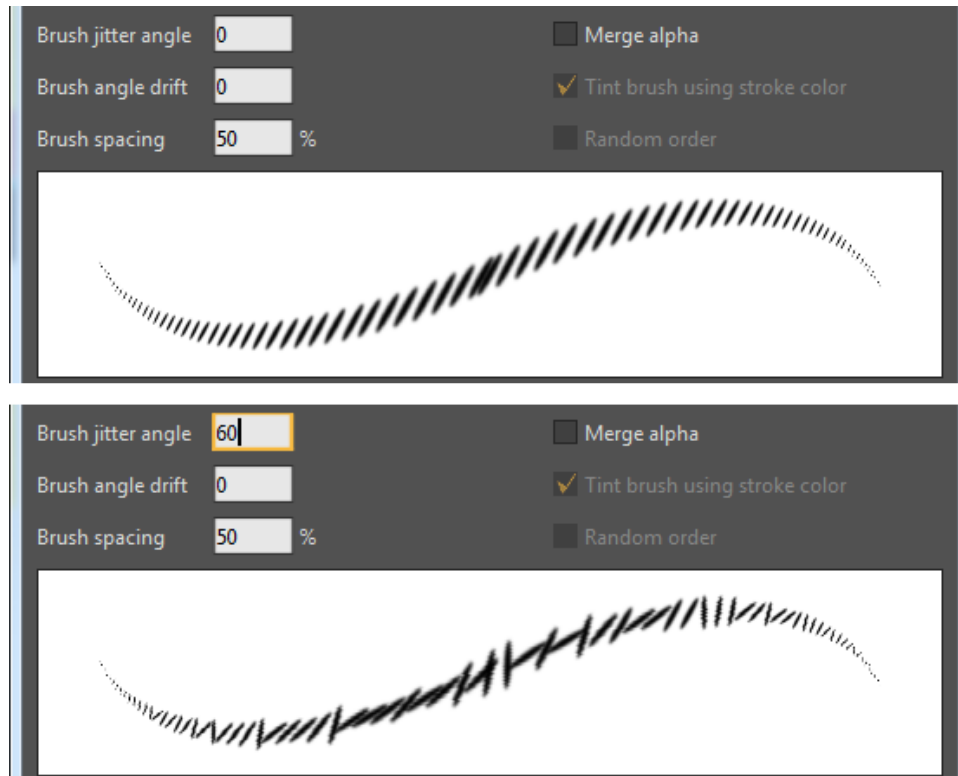
Stroke Brush Selector

Clicking this box opens the Brush Settings dialog:



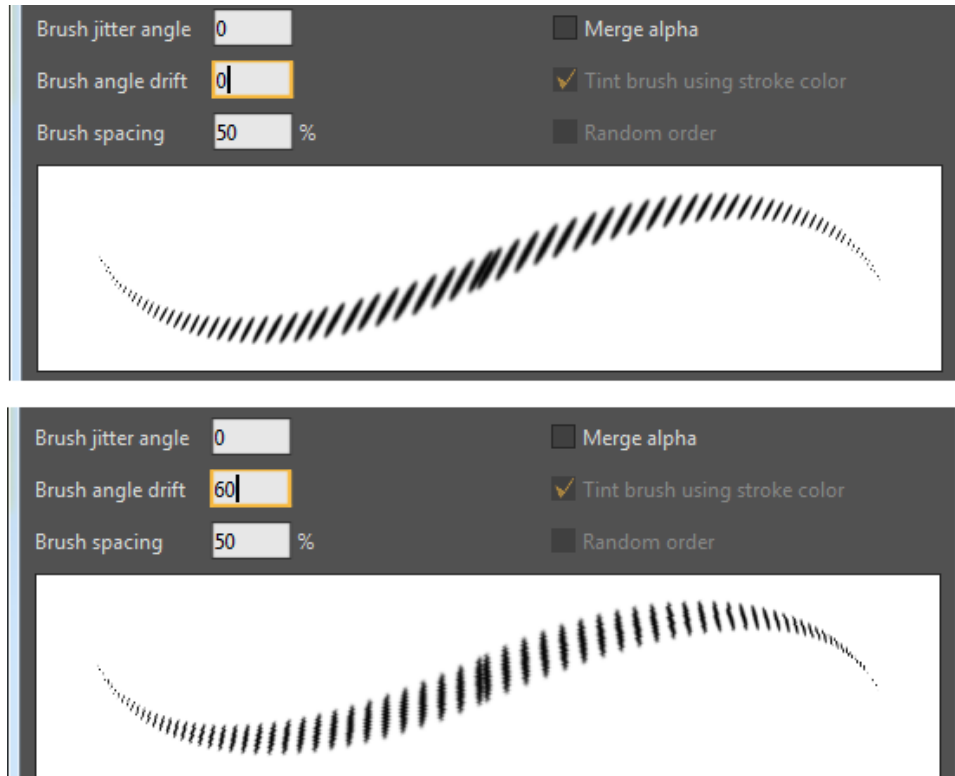
Brush Settings Dialog (Moho Pro shown)

- **Brush selection menu:** This displays all of the available brushes. You can click on one to select it for use or select None for no brush.
- **Selected Brush:** Displays a tooltip for the name of the currently selected brush, even if the image is not found.
- **Align brush with curve:** This option changes the orientation of the brush to the vector curve it is applied to.
- **Brush jitter angle:** This option determines how much the orientation angle varies, with zero being no variance.



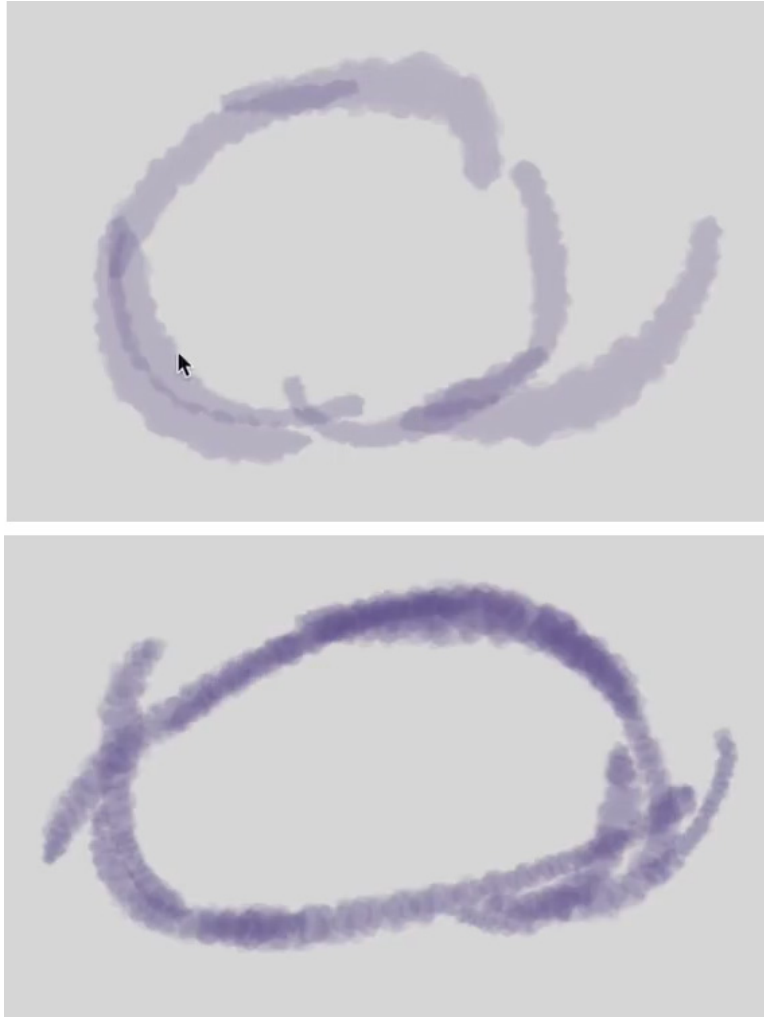
Brush jitter angle off (top) and on (bottom)

- **Brush angle drift (Pro only):** This setting works well with multibrushes that have some sort of obvious alignment. With brush angle drift on (see bottom stroke in the figure below), the alignment angles will vary depending on the drift angle value that you enter. Smaller values will produce less angle drift than larger values.



Brush angle drift off (top) and on (bottom)

- **Brush spacing:** This allows you to set the spacing between each instance of the brush. Improvements to brush spacing have been made so that brush spacing remains consistent whether the brush curve follows curve points that are either pointed or curved.
- **Minimize frame-to-frame randomness:** Check this option to keep the brush from jittering during the animation.
- **Merge alpha (Pro only):** With merged alpha turned on (see top stroke in following figure), an alpha value will be applied uniformly on strokes that were made with multibrushes. With merged alpha turned off (see bottom stroke in following figure), multibrush strokes are allowed to build up and the strokes appear more like natural media (as shown in the two strokes on the left in the following figure).




Merge alpha on (top) and off (bottom)

- **Tint brush using stroke color:** For brushes that are colored (not all black) this option allows the brush to take on the selected stroke color instead of the color displayed in the brush selection menu.
- **Random Order:** When checked, randomizes the order of the Multi-Brush shapes while the stroke is painted.
- **Brush preview:** This displays a preview of the chosen brush settings.
- **Save Brush:** Allows you to save a brush with the current settings. Click this button to enter a name for your new brush. The settings for the brush will be encoded onto the end of the name. You are also allowed to choose where the brushes are saved. Click **Custom Content Folder** to save the new brush in one of your user content folders. Click **Choose Folder** to save the new brush to another folder on your hard drive.



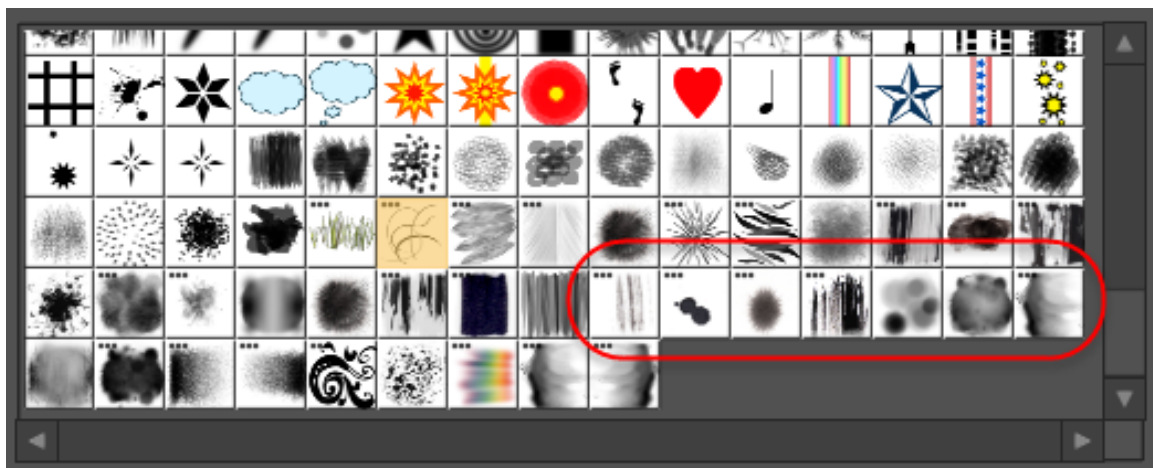
*New brushes will be saved with a **.mohobrush** extension. These brushes will be loaded first. Older brushes with the same name will not be loaded.*

 The name that you assign to the brush must be a legal filename for your system. Underscore characters that appear in the base filename will be converted to dashes to preserve encoding requirements in Moho.

 If you save a new brush into the Brushes folder in your User Content folder, they will not show up in the Brushes picker until you reload the brushes. You will be given the option to reload the brushes when you save the new brush to the User Content folder.

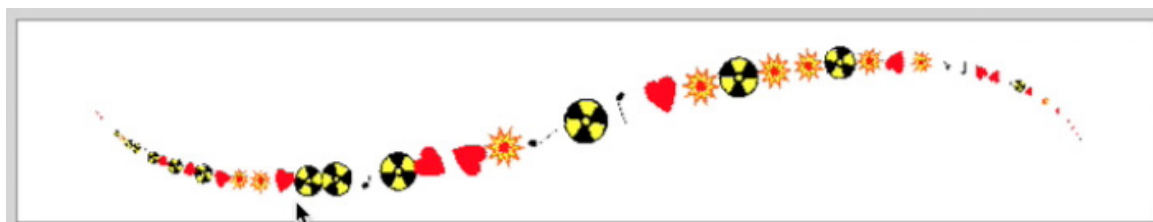
Using Multi-Brushes (Pro Only)

Moho Pro includes a feature called Multi-Brushes. If you go into the Brush Settings dialog you will notice several new brushes. Multi-brushes are indicated in the Brush Settings dialog with three dots in the upper left corner of the brush preview.



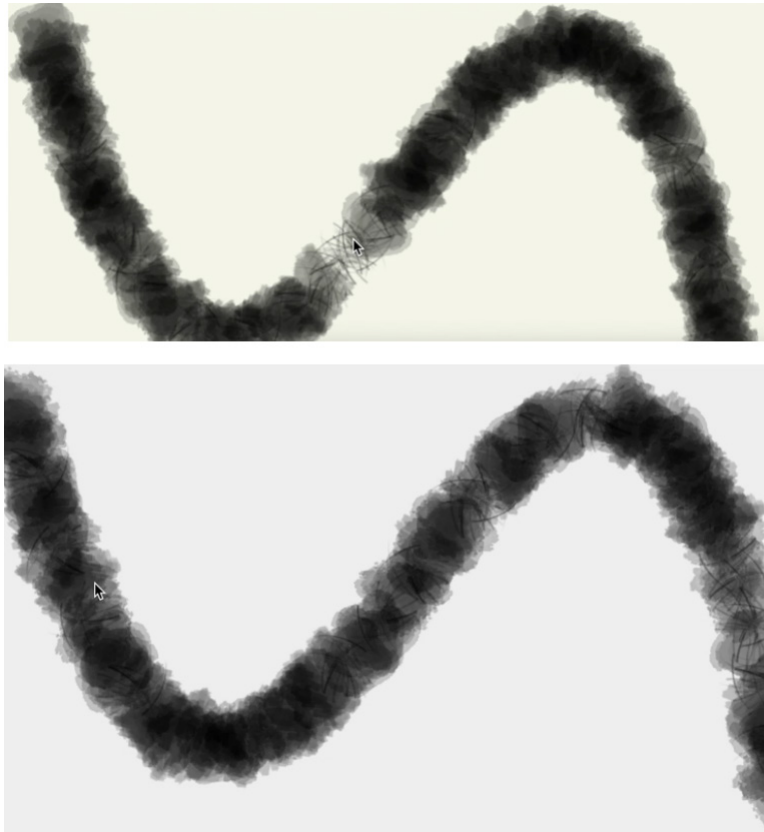
Multi-Brushes are indicated with three dots in the upper left corner of the brush preview.

When you select a Multi-brush, the preview window at the bottom of the Brush palette displays a preview of the selected brush. You will notice that there are multiple images mixed into a single brush stroke.



Multi-Brushes allow you to add multiple shapes in a single brush stroke.

Some Multi-Brushes mix different textures into a single stroke. The differences in texture may appear to be more subtle in the preview window, but the variations will be more obvious after you render a preview.



Subtle Multi-Brush differences will be more clear after rendering (as seen in the bottom)

Creating Multi-Brushes (Pro Only)

It is very easy to create your own Multi-Brushes. First, locate your User Content folder. If you did not create a User Content folder when you first ran Moho (as described in ["Creating a Content Folder" on page 16](#)) you can specify a custom content location in the General tab of the Preferences dialog.

Your Custom Content folder includes a **brushes** category folder within it. Beneath this brushes folder, create a new folder that has the same name as the Multi-Brush that you want to create.

The following naming convention can be used to save settings that apply to the brush. The foldername can contain six numbers, separated by underscores as follows:

Brushname_#_###_###_#_#_#

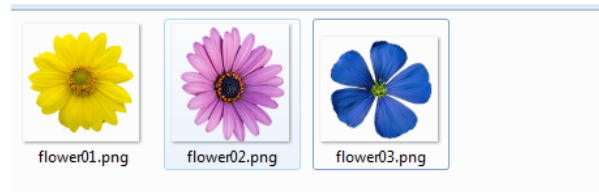
The numbers represent the following brush settings:

- **First number:** Align brush with curve off (0) or on (1).
- **Second number:** Represents the Brush Jitter angle.
- **Third number:** Represents the Brush Spacing setting.
- **Fourth number:** Minimize Frame to Frame Randomness off (0) or on (1).
- **Fifth number:** Tint Brush Using Stroke Color off (0) or on (1).

- **Sixth number:** Random Order off (0) or on (1).

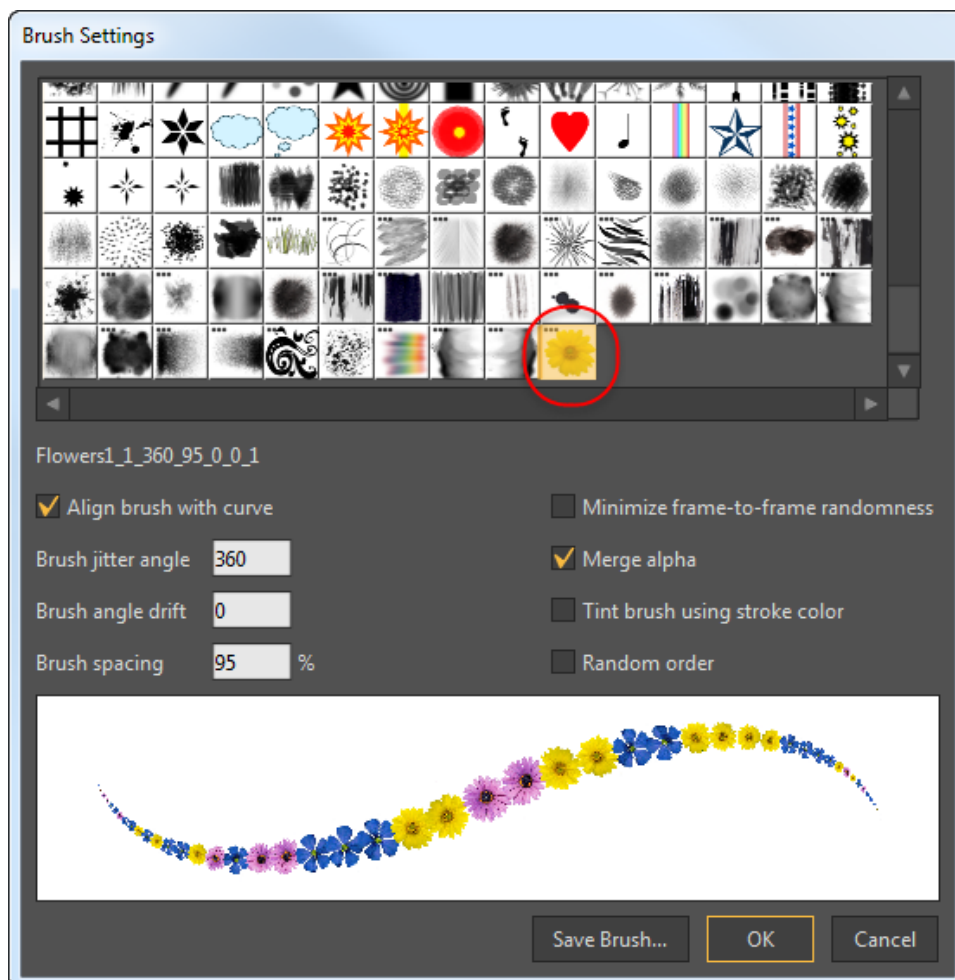
After you create the folder, place PNG files, with transparent backgrounds, for each shape that you want the Multi-Brush to paint. The following figure shows three different flower shapes added to the **Flowers 1** Multi-Brush folder.

› Mod0 Content › Assets › Brushes



Create a Multi-Brush folder in your custom content folder, within the brushes category folder, and place PNG files into the new folder.

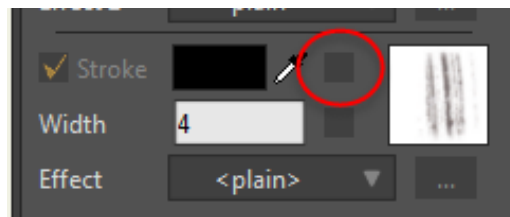
The next time you start Moho, you will find the new Multi-Brush added to the Brush palette. It will appear last in the list. You can further adjust the brush settings as indicated previously in **"Stroke Brush Selector (12)"** on page 273.



Stroke Line Width Field

Stroke Override Checkbox (13, Pro Only)

If checked in advanced view, the color displayed in the stroke color selector will override any other stroke color in the style.



Stroke Override Checkbox

This works slightly different, depending on which mode the window is in:

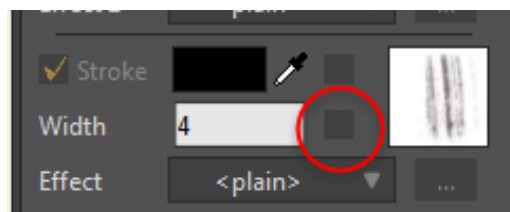
DEFAULTS and **SHAPE**: In these modes the override is only available if a saved style has been applied (see 19). Enabling this will override the applied style stroke color with the current color in the stroke color selector.

STYLE: In this mode the override determines what properties are included in the saved style. There is an override for fill, stroke, and line width (see 14). You can create styles with any combination of these properties.

When a style is applied any overrides checked in that saved style will override those properties in the shape or default.

Stroke Width Override Checkbox (14, Pro Only)

If checked in advanced view, the width displayed in the line width field will override any other line width in the style.



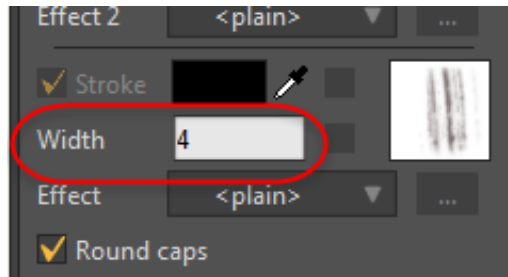
Stroke Width Override Checkbox

This works slightly different, depending on which mode the window is in:

- **DEFAULTS** and **SHAPE**: In these modes the override is only available if a saved style has been applied (see 19). Enabling this will override the applied style line width with the current width in the line width field.
- **STYLE**: In this mode the override determines what properties are included in the saved style. There is an override for fill, stroke, and line width. You can create styles with any combination of these properties.
- When a style is applied any overrides checked in that style will override those properties in the shape or default.

Stroke Line Width Field (15)

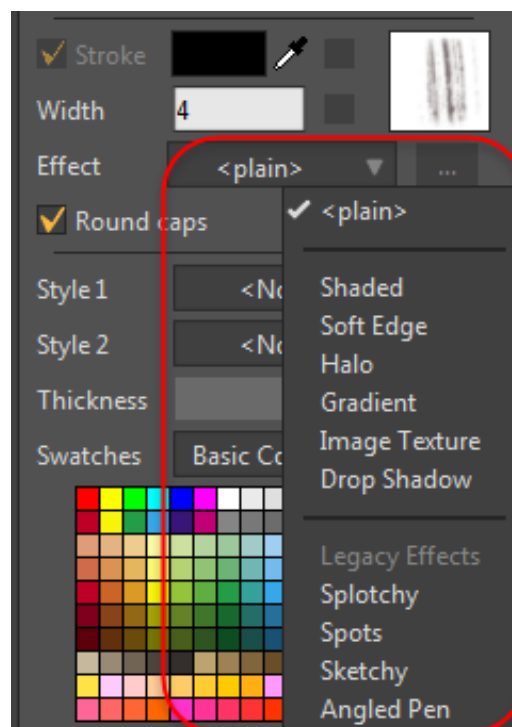
This field allows you to set the stroke line width of the default style, selected shape, or selected style. The minimum line width is .25. After clicking in this field you can either type in or use the mouse wheel to adjust the value.



Stroke Line Width Field

Stroke Effect Drop-down Menu (16)

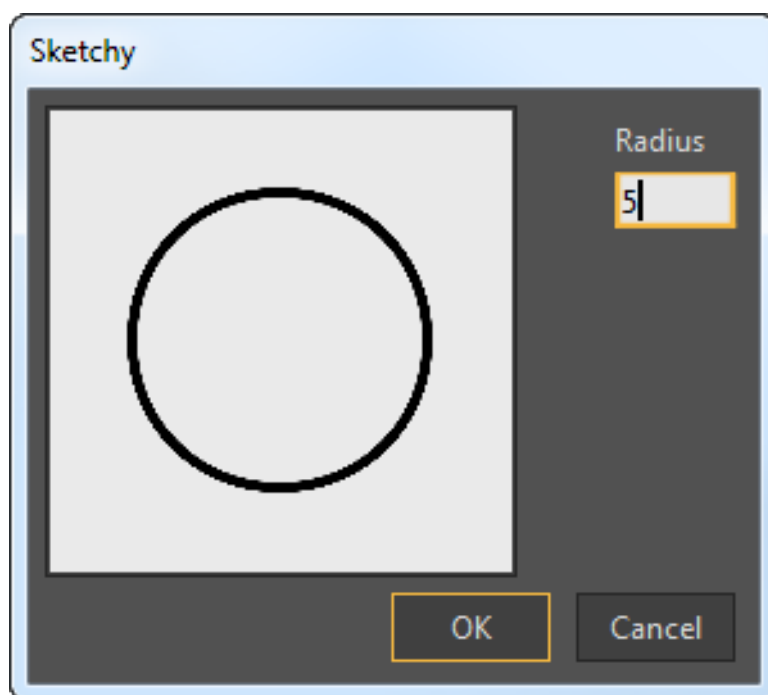
This drop-down menu allows you to select a stroke effect. There are many effects to choose from. The stroke effects are the same as the fill effects described earlier.



Stroke Effect Drop-Down Menu

There are two more stroke Legacy Effects in Moho Pro:

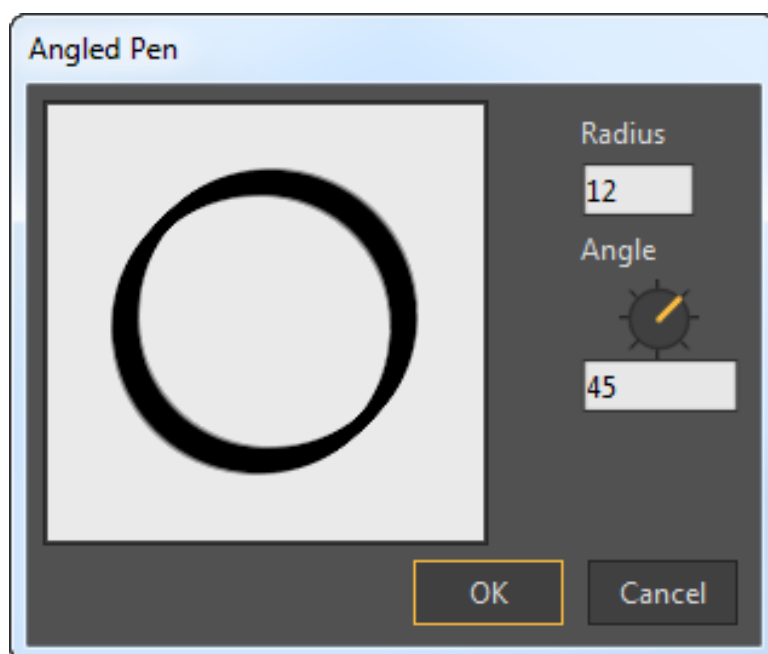
Sketchy



Sketchy Effect Options

- **Radius:** Adjust the radius of the effect.

Angled Pen



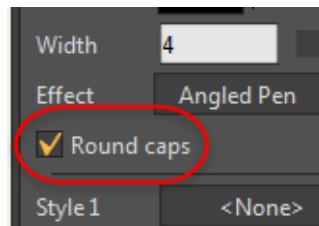
Angled Pen Effect Options

- **Radius:** Adjust the radius of the effect.

- **Angle:** Provides a dial that allows you to change the direction of the angled pen. You can also enter a numerical value. Zero degrees is located at the right of the dial.

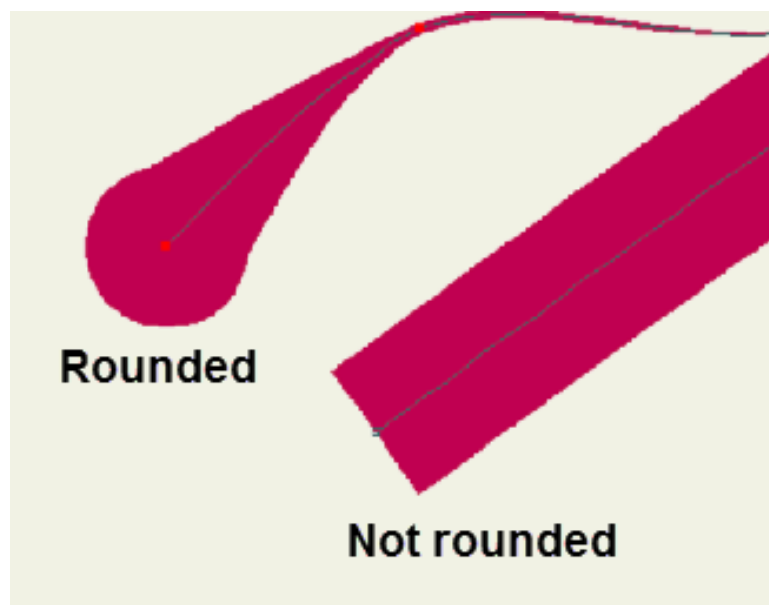
Round End Caps Checkbox (17)

You'll notice the addition of a Round Caps option in the Stroke section of the Advanced Style window. Check this option if you want to use strokes that have rounded ends. Uncheck the option to use flat ends on your strokes (similar to those used in Anime Studio 7 and earlier).



Rounded End Caps Checkbox

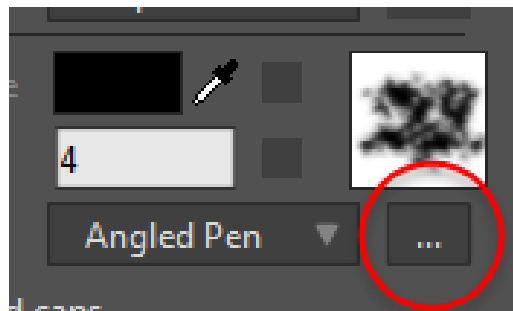
Older files will open with plain end caps to retain their original appearance. New artwork will default to round end caps unless the Round Caps option is unchecked.



Rounded end caps compared to ends that are not rounded.

Stroke Effect Settings Button (18)

This button becomes active when you have an effect selected in the effect drop-down menu next to it. This button allows you to access and edit the effect settings dialog of the selected effect.



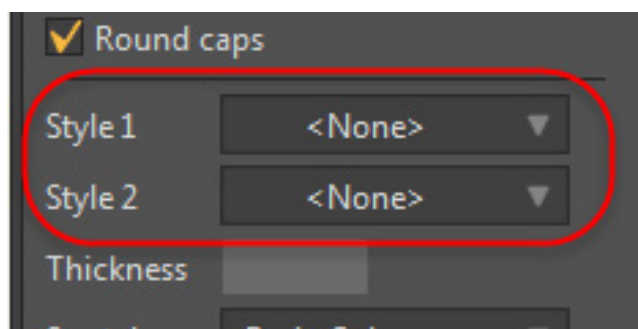
Stroke Effect Settings Button

Applied Styles

Two options appear in the Applied Styles area for Moho Pro only.

Applied Styles Drop-Down Menus (19, Pro Only)

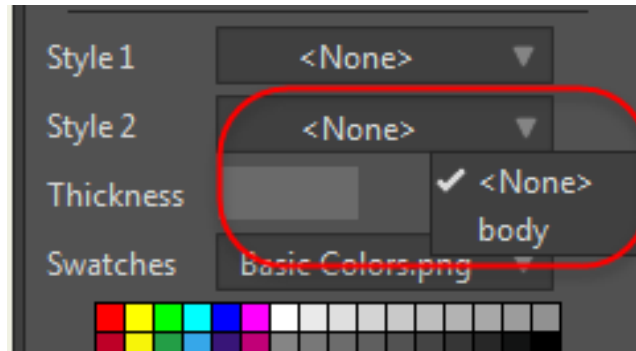
These drop-down menus, which appear in advanced view, allow you to apply two different saved styles.



Applied Styles Drop-Down Menus

A saved style is a set of information used by a shape (color, line width, line brush, effects, etc.), but it doesn't actually appear on its own in your animation. Instead, after creating a style, you can apply that saved style to one or more shapes. For example, you might create a "Skin" style, and apply it to all the body parts of a character. Later, if you want to change the color of the character, just modify the Skin style, and any shapes that use that style will change instantly. Use the Style management drop-down menu to create new styles and to select a style for editing.

You can select any saved style you have created to apply to the default style or the selected shape. Select <None> to clear the applied style.



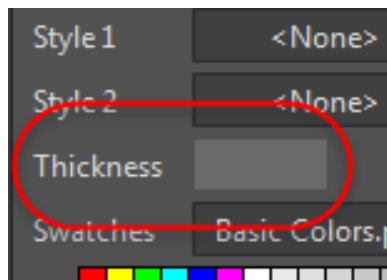
Expanded Menu

You can define global shading, line width, etc. to maintain a consistent look throughout your project.

3D Conversion Thickness Field (20)

This option (20) is only available for the default style or selected shapes on vector layers that are using either the Extrude or Inflate options of the vector layer **Layer Settings > 3D Options tab > 3D Conversion** drop-down. This field displays the 3D thickness of the default style or selected shape. After clicking this field, you can type in or use the mouse wheel to adjust this value.

These swatches appear in the Color Swatch (10) below.

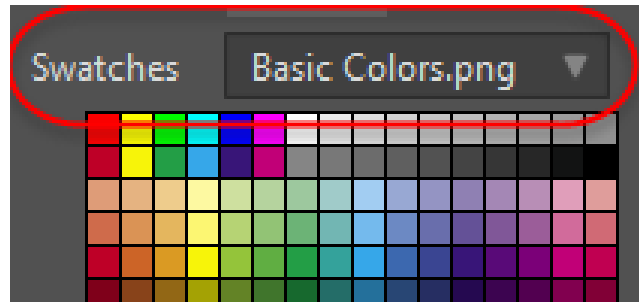


3D Conversion Thickness Field

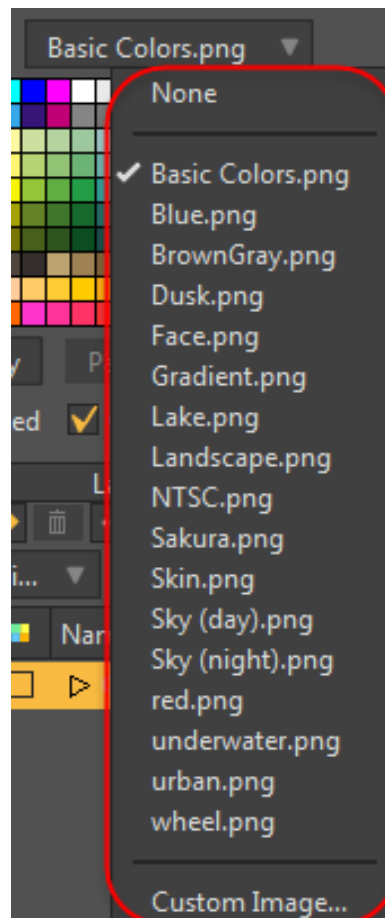
Swatches

Color Swatch Drop-down Menu (21)

This menu allows you to select from a variety of color swatches or select a Custom Image as a swatch.



Swatches menu



Expanded menu

These swatches appear in the Color Swatch (22) below.

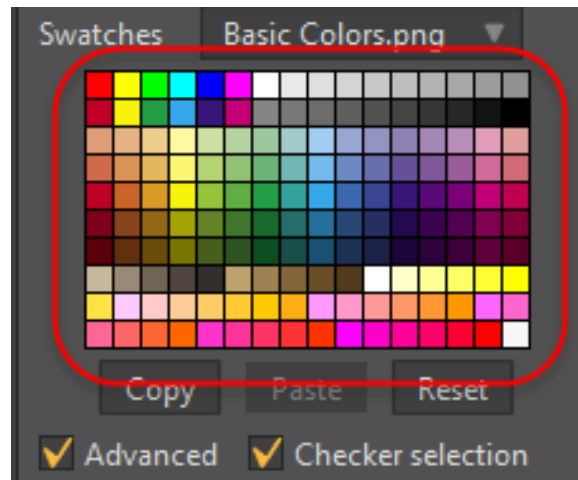
Color Swatch (22)

The swatch you select from the color swatch drop-down menu shows up here as a simple color picker. You can use this as a shortcut for selecting colors for your objects. Just click a color in this palette to assign it as the selected shape's fill color. Right-click a color swatch to assign it as the selected shape's outline color.

Use the following shortcuts for selecting colors from the Color Swatch palette:

- Click a color swatch to assign a fill color.

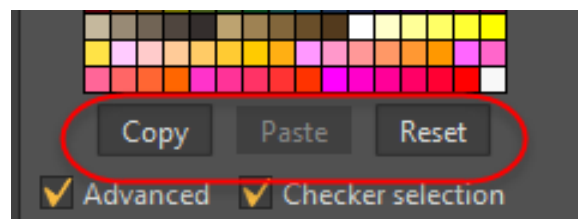
- Ctrl-click or right-click a color swatch to assign a stroke color.
- Alt-click a color swatch to assign a point color (see “Color Points” on page 80 for more information about the Color Points tool).



Color Swatch

Copy, Paste, and Reset Buttons

There are three buttons that we've classified as “other” controls:

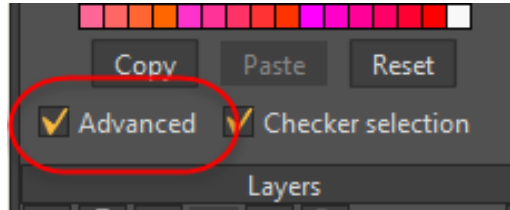


Copy, Paste, and Reset buttons

- Press **Copy** (23) to copy the properties of the selected shape or style.
- Press **Paste** (24) to apply a previously copied set of properties to another shape or style.
- Press **Reset**(25) to switch back to editing the default fill and line properties - if a shape or style is currently selected, it will be de-selected.

Advanced Window Checkbox (26)

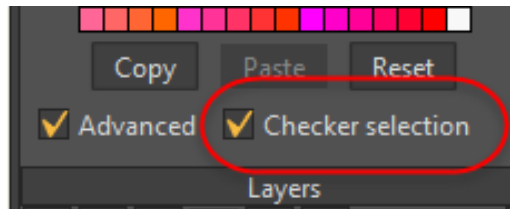
As mentioned at the beginning of this chapter, this checkbox switches the style window between Basic and Advanced views. The basic view minimizes the style window to some of the options most used while animating.



Advanced Window Checkbox

Checker Selection (27, Pro Only)

When the Checker Selection option is unchecked, a bounding box will be shown around the selected shape rather than displaying the object with a checkerboard pattern. This allows you to see the colors and outlines of the selected shape more clearly.

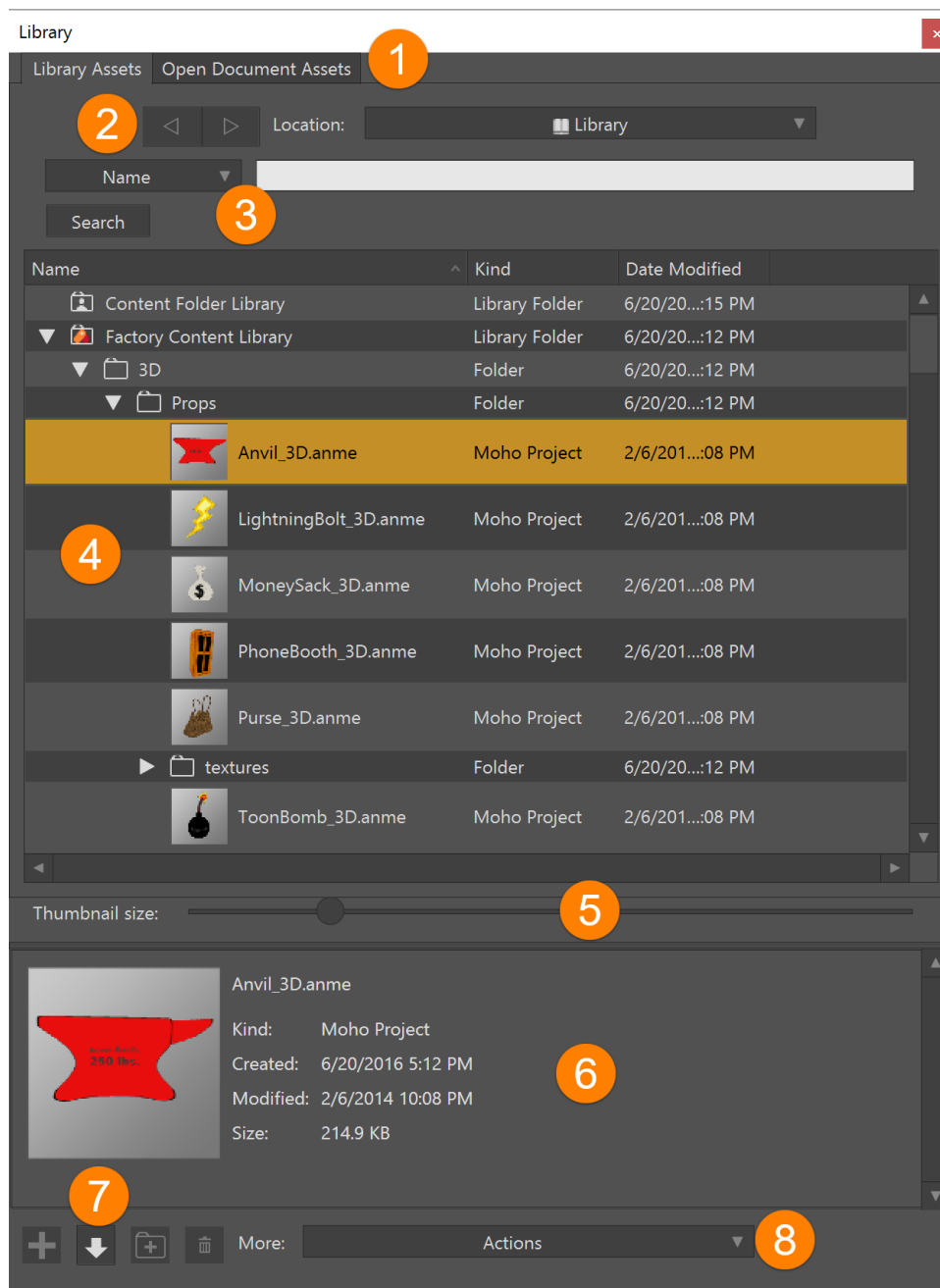


Checker Selection Checkbox

Chapter 14: The Library Window

If the Library Window is not open, select **Window > Library** or use the keyboard shortcut **Command/Ctrl Shift L**.

The Moho Library window provides access to all of the content that ships with Moho such as characters, props, images, audio, etc. The Library tab consists of the following main areas:

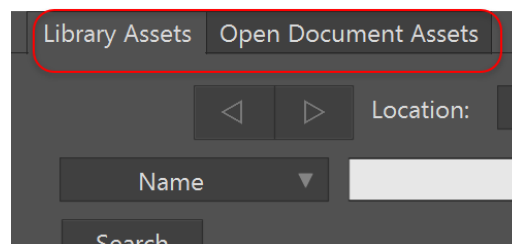


The Moho Library window

1. **Library Tabs:** Allows you to display items in the content library, or items in your current project. For more information see [“Library Tabs” on page 290](#).
2. **Library Folder List:** Displays a list of the top-level library folders. For more information see [“Using the Location Menu \(Pro only\)” on page 291](#).
3. **Library Search:** Allows you to perform library searches based on different criteria. For more information see [“Searching the Library” on page 293](#).
4. **Item List:** Displays subfolders and content thumbnails of the content in your library. For more information see [“Using the Library List” on page 296](#).
5. **Thumbnail Slider:** For more information see [“Using the Library List” on page 296](#).
6. **Details panel:** For more information see [“Details Panel” on page 302](#).
7. **Library icons:** For more information see [“Library Icons” on page 301](#).
8. **Actions selector:** Click the Actions button to choose a command that is applicable to the content that is selected. Commands available here are also available if you right-click a content item to choose a command from the context menu..


Library Tabs

The library consists of two main tabs:




The Moho Library window

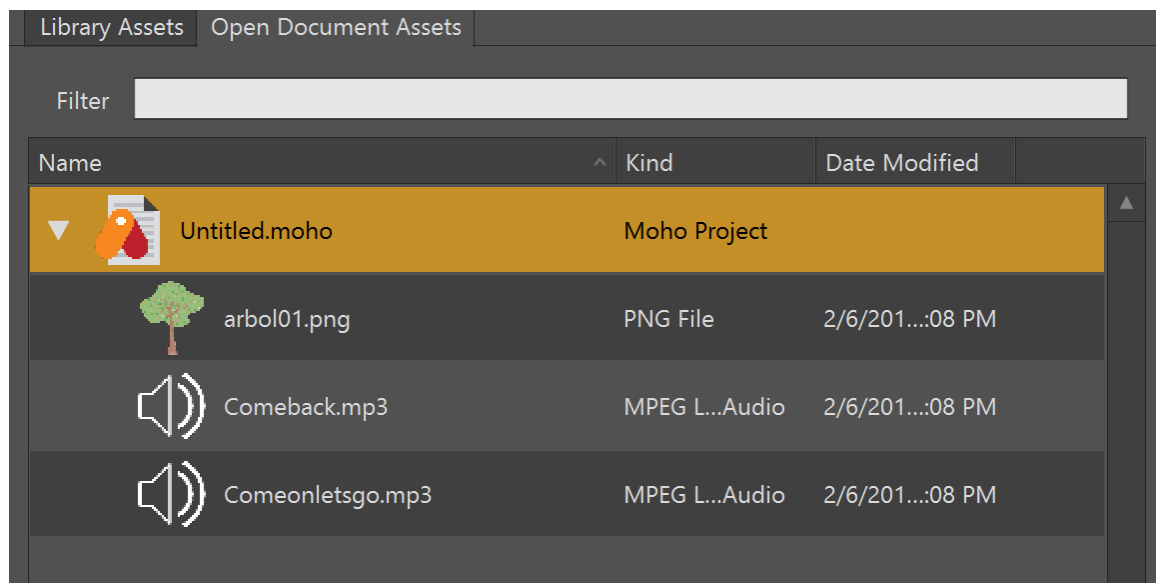
- **Library Assets:** This tab displays several different types of content.
 - Factory content that is furnished with Moho. Factory content is treated as read-only. You can't edit it directly but you can add it to your opened projects as noted later in this chapter.

 *You can disable display of factory content in the library, if desired. Open the Preferences dialog to the General tab, and uncheck the **Include factory content in the Library** option. This option is checked by default.*

- Content that you have saved in your User Content folder.
- Files that exist in external folders that you specify. You add these folders from the Location list, as described in [“Adding Custom Locations \(Pro only\)” on page 292](#).

- **Open Document Assets:** This tab displays assets that appear in documents that you currently have opened in Moho. The assets will appear in this tab automatically as you add images, video, audio, and other external assets to your open documents.

 *The Open Documents tab makes it easy to share media assets between projects. With two or more projects open in Moho, select the project that you want to add content to. Next, go to the Open Document Assets tab and click to highlight the media item that you want to add to the current project. Right-click the item in the library list and choose **Add to the Current Document**.*

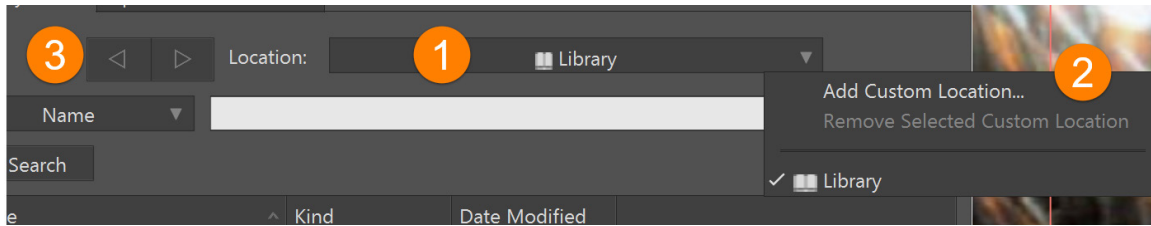


The Open Documents Assets tab lists media files that are used in all open documents.

Using the Location Menu (Pro only)

The Location menu displays the names of the folders that make up your library assets:

- Click the Location list (1) to display a context menu.
- The context menu (2) allows you to add or remove custom folders, or to go back to specific folders that appear in the list.
- Use the **Go Back** and **Go Forward** buttons (3) to navigate through your library history, which keeps track of the folders that you have viewed. Click and hold on these buttons to display a list of folders that you can go to.



The Location List

Adding Custom Locations (Pro only)

You can add your own custom folders on disk to the Library. When you add custom folders they will be added to the Location list in the Library Assets tab, and treated as a Library folder. Library data folders will be created as needed in all levels of the folders that you add. Additional thumbnail and metadata files may also be written.

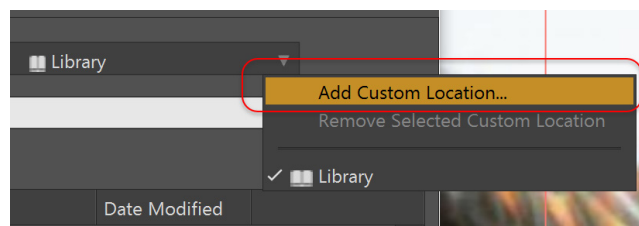
When you add a folder you will be asked to set a unique identifier, or root location, for the path. This identifier will be used to facilitate relative path support.

If another user creates a unique identifier that has the same name as yours, the folders beneath it will be treated as relative paths. While the physical/absolute paths may be different on each machine, the relative paths will be resolved based on the unique path that is the same on both machines. As long as both people place the files in the same location relative to the root location, your libraries will be able to find the same content.

You can rename non-factory items in custom folder by clicking the name of the item.

To add your own folders to the library, follow these steps:

1. Click the Location list to expand the menu, and choose **Add Custom Location**.



Adding a custom location

2. Use the **Browse for Folder** dialog to locate the folder that you want to add to the library.
3. Click **OK**. You will be prompted to enter a unique name that identifies this location. The name will be associated with the folder and will be used for relative path resolution.
4. Click **OK** to assign the name to your library folder. The new Library folder appears in the tree.

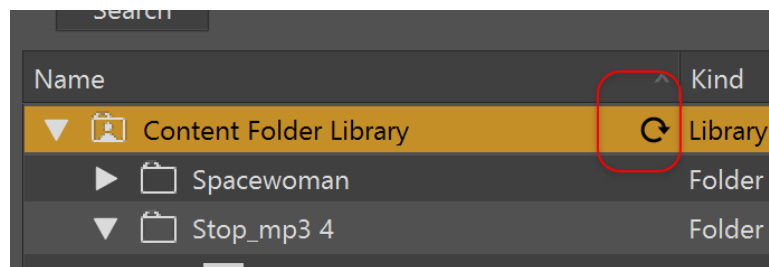
Removing Custom Locations

To remove custom library folders:

1. Select the folder that you want to remove in the Library tree.
2. Click the Location list to expand the menu, and choose Remove Selected Custom Location.
3. Moho will ask you to confirm that you want to remove the custom library folder. Click Remove to complete removal, or Cancel to leave the custom folder in the library.

Searching the Library

In order to perform Library searches, Moho must index your content first. Indexing is performed the first time you open the library, when Moho begins indexing content. Generally, indexing is performed fast, but indexing can take more time if you have a particularly large amount of content. Indexing is also performed when you add new content to the library, or when you click the Refresh icon to manually refresh a folder.



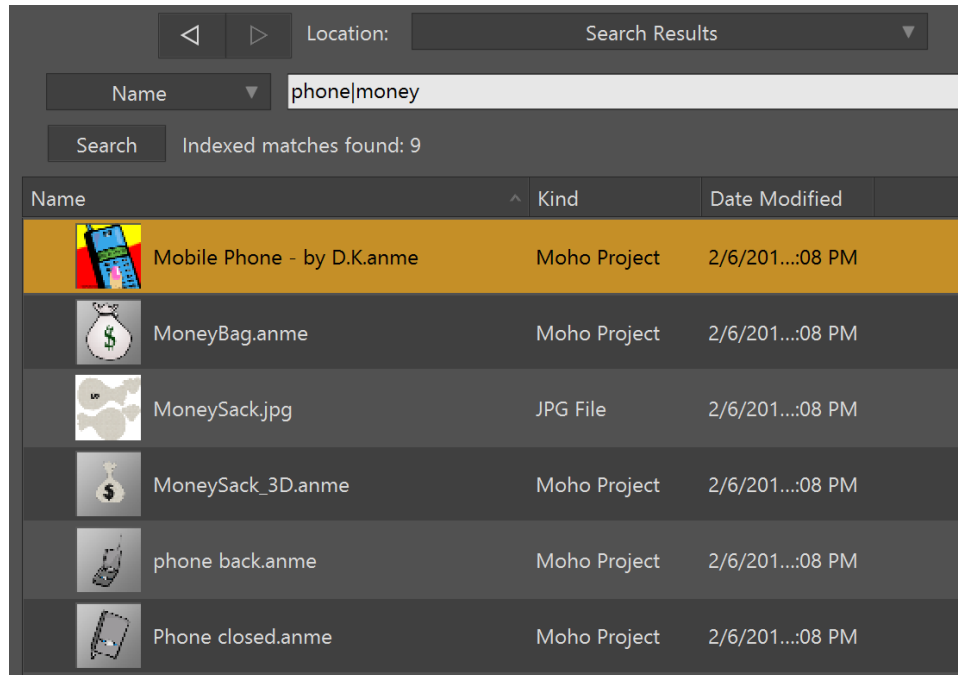
Click the Refresh button to manually refresh the contents of a folder.

The Search section of the library allows you to perform searches on the assets in your library. The search is based on the text that you enter in the search field. Simply enter text and press the Search button to search for content that contains that string.

After the content is indexed, you will be able to perform searches to find specific content. If any item contains the search term value in the search type that you select, results will be returned in the search. Up to 500 items will be returned at a time. If additional results are available, the Search button will say **Continue**, and a **Click to find more matches** message will appear. Each time you click Continue, another 500 results will be returned until no additional results are available.


All search terms must match for an item to be returned, unless you use OR or NOT options:

- **OR:** Use the | operator to perform an OR search. In other words if you enter **phone | money**, the search will return items that contain **phone** OR **money**.

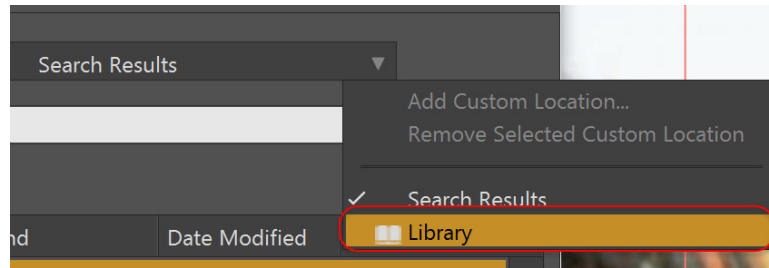


Use the | character as an OR operator for your search.

- **NOT:** If a search term is preceded by a - (minus sign) or a ~ (tilde), the search will only return items that do not contain that search term. NOT operators only apply to a single item.
 - **beach~chair** will be evaluated as a string that must be matched in its entirety.
 - **beach,~chair** will return items that contain the word **beach**, but do not contain the word **chair**.
 - **beach | bum,~chair** will return items that contain either **beach** or **bum**, but do not contain **chair**.

 *When using the OR or NOT operator, spaces will automatically be trimmed out before and after the operator character. In other words, you can enter either **cat|dog** or **cat | dog** and the extra spaces before and after the | in the latter example will be trimmed off before the search is performed.*

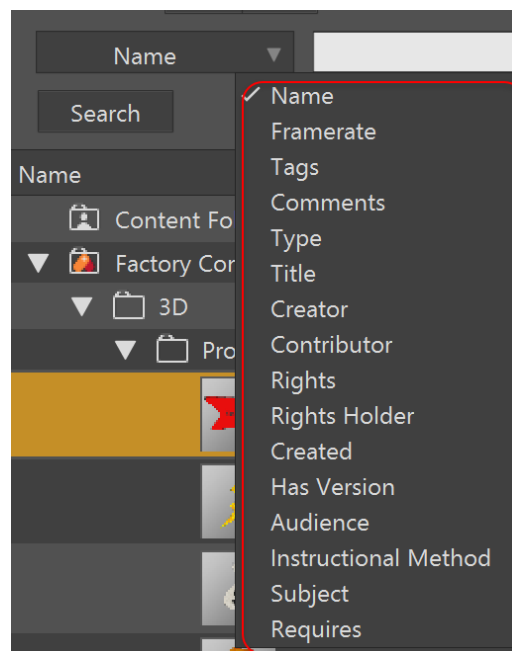
The Location popup will display an item to show **Search Results**. These results will remain in the item list until you navigate to a regular library location. You can use the Location popup window or the Back button to discard the search results and return to the main library window.



Use the Location popup or the Back navigation button to return to the main library window and clear the search results.

Metadata Searches (Pro Only)

In Moho Pro, the type of search that you perform is selected in the popup menu that appears to the left of the search entry field. The Moho library allows you to search for various types of metadata, including: Name, Framerate, Tags, Comments, Type, Title, Creator, Contributor, Rights, Rights Holder, Created, Has Version, Audience, Instructional Method, Subject, and Requires.



Various types of metadata can be searched in Moho Pro.



You can add metadata to any non-factory content that you add to your library in the Details section of the Library palette, See "Details Panel" on page 302 for more information.

- If the search option is set to **Tags**, you can enter multiple tags in a comma-separated list. For example, you can enter **woman,astronaut,space**, and the search will return tag matches that contain **woman**, and matches that contain **astronaut**, and matches that contain **space**.



The Tags search option is the only one that supports a comma-separated list.



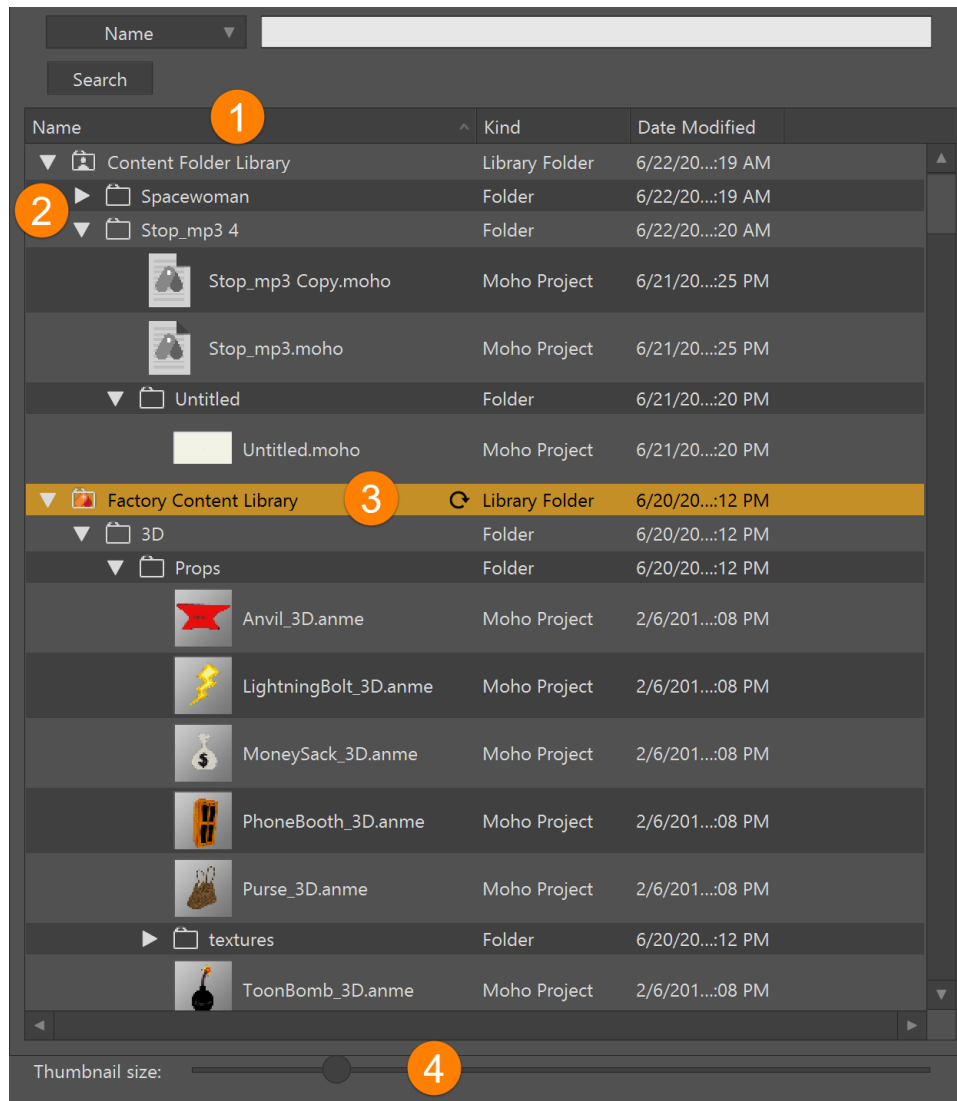
If the metadata itself contains commas, the metadata will be treated as separate search items separated by those commas. Each term must match in order for the search to identify a match.

Maintaining Your Library

Using the Library List

The library list displays the content in your library in a hierarchical manner. Content is organized in folders and subfolders. Each item in the library is displayed in the tree with the name of the content, a thumbnail image, the kind of content, and the date that the content was last modified.

- To display contents in a folder, double-click the folder that you want to view.
- Right-click an item that is displayed in the library to display a contextual menu that pertains to that type of content. These menus are further described in ["Factory Content Options" on page 298](#) and ["Non-Factory Content Options" on page 299](#).
- To delete a non-factory item from the library and move it to the Trash (Mac) or Recycle Bin (Windows), select the item you want to delete and click the Trash icon in the lower left corner of the Library window.

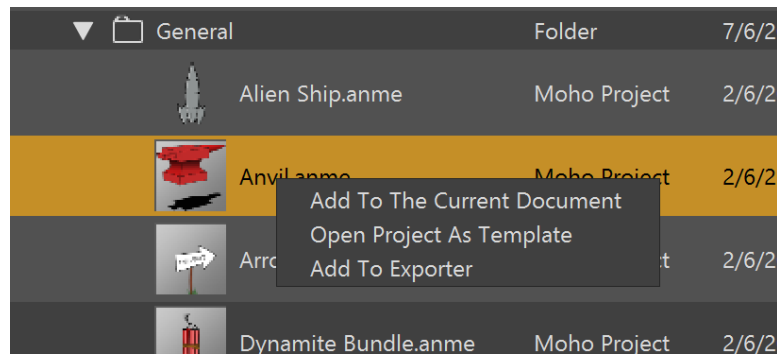


Use the Location popup or the Back navigation button to return to the main library window and clear the search results.

- Click a column header in the tree (1) to sort content by name, kind, or date modified. A small up or down arrow appears at the right side of each column header to indicate whether the column is sorted in forward or reverse order.
- Use the arrows (2) that appear at the left of a folder to display or hide the contents in that folder.
- Double-click a folder to go to that folder in the tree list. The currently selected folder will be highlighted (3).
- The thumbnail slider (4) is always visible. You can increase or decrease the size of the thumbnails as needed to preview items before you add them to your project.

Factory Content Options

Factory content is read-only in the Moho library. When you right-click factory content items, you get a context menu that includes the following options, depending on the type of content that you select. Similar contextual menus appear for items in the search list.



Right-click a content item in the list to display a context menu. (Pro shown)

The following actions apply to factory content items:

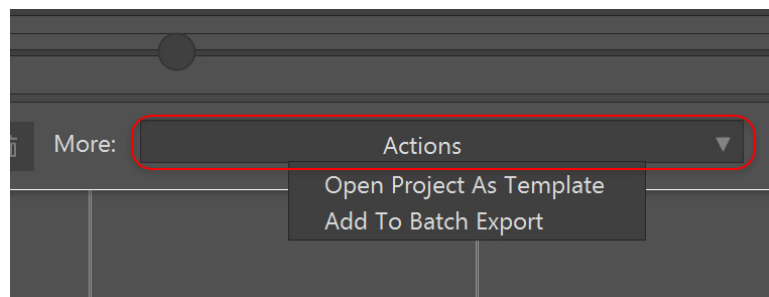
- **Add To The Current Document:** When you select this option, the Insert Option dialog opens so that you can select items from a Moho project. If there are no opened documents this command will be unavailable. This option also appears when you right-click image, video, and audio files.



You can also drag and drop one or more items from the Library into your opened document.

- **Open Project as Template:** Opens the selected Moho project file in a new untitled document window.
- **Add to Exporter** (Pro Only): Opens the Moho Exporter window and adds the selected Moho project to the export list.

Actions also appear in the Actions selector at the bottom of the library palette. Highlight the item that you want to view or use, and click the Actions selector to display available actions for that content item.



Expand the Actions selector at the bottom of the library to choose an action for selected content.

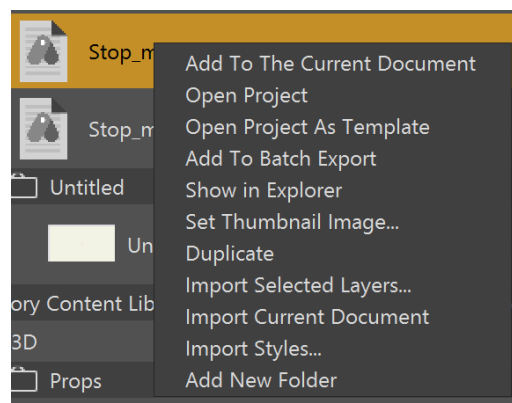
In addition to the context menus described previously, you can double-click content to add it to your project. For example:

- **Moho projects:** Double-click to open the Insert Object dialog, which allows you to check objects in the project file and add them to your project.
- **Moho Styles:** Double-click to add the style(s) to the Styles popup in the Style palette.
- **Image and Movie Files:** Double-click the library item to add the image to your project at the current position in the timeline.
- **Audio files:** Click on the library item to preview the sound. Double-click to add it to your project at the current position in the timeline.

Non-Factory Content Options

Moho provides several other options when you browse non-factory content in the Library. These items allow you to open and locate projects, and import or export content from and to the library.


In addition to the options that are available for factory content (as indicated above), you may see the following additional options when you right-click a non-factory content item, depending on the type of content you choose. These additional options are available for Moho project files that are located in your user or custom content folders:



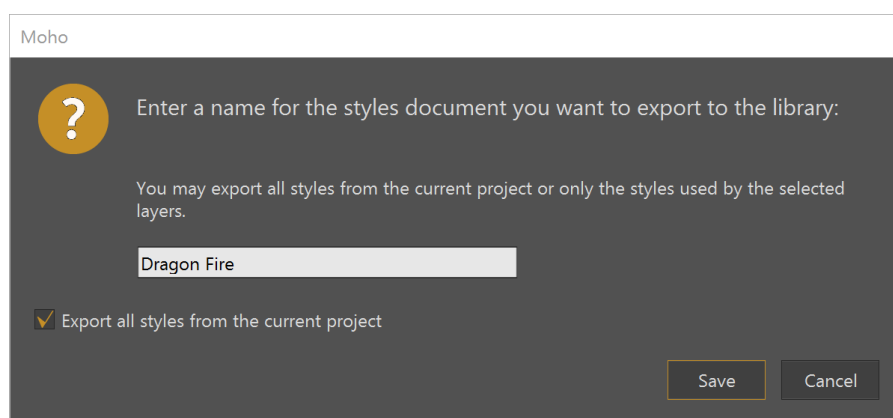
Several additional options appear for non-factory content.

- **Open Project:** Opens the project in a new document window.
- **Show in Explorer/Finder:** Opens Windows Explorer or Mac Finder to the physical location that stores the selected library item.
- **Set Thumbnail Image:** Allows you to choose a thumbnail image for the selected library item. The thumbnail image that you select will be copied into a folder named **_LibraryData**, which will be placed in the same folder that contains the library item. If multiple items are selected, the action will only be applied to the last item selected.
- **Duplicate:** Creates a duplicate copy of the item that you right-click. The duplicate will be named the same as the item that you duplicated, but will initially be appended with the word Copy.

- **Import Selected Layers:** Select one or more layers in your current scene. Then right-click one of the folders in your user or content folder in the Library. Choose **Import Selected Layers** to import the selected layers into the library.

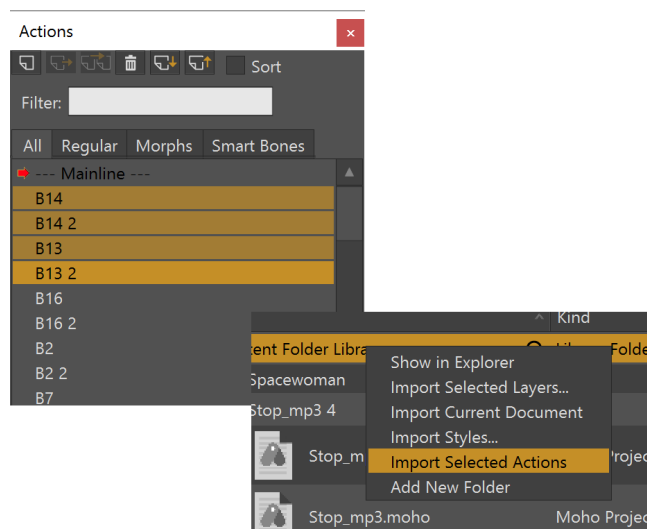
 *When you add layers, documents, styles, or other content to the library, Moho will notice that the contents of the library have changed, and will automatically refresh the folder after a slight delay.*

- **Import Current Document:** Imports a complete Moho document into your user or custom content Library folder. Select a non-factory folder and choose **Import Current Document**. You will not be prompted to select layers in the project file with this option. All media will be gathered with the project during import. You can import complete documents into the library.
- **Import Styles:** If your current document contains styles, you can easily add them to the library. First, select the document that contains the styles you want to import. If you want to import styles from one or more specific layers in that document, select only the layers that contain the styles. Next, go to the Library window and select the user or custom content library folder that you want to save the styles to. Right-click the folder and choose **Import Styles** from the context menu. A dialog prompts you to enter a name for the styles document. By default, all styles from the current project will be imported. To only import styles from selected layers, uncheck the **Export all styles from the current project** option.



You can import all styles from the current document, or styles from selected layers in that document.

- **Import Selected Actions:** If your project contains actions, you can save selected actions from that project into the Library. Open the Actions window and choose the actions that you want to import. Switch to the Library and select the user or custom content folder that you want to save the actions into. Right-click the folder and choose **Import Selected Actions**. The actions will be saved into the selected folder, and will use a **.mohoaction** extension.




Adding selected actions to the library.


- **Add New Folder:** Select this option to add a new folder to your user or custom content library. The new folder will be created as a subfolder to your initial folder selection. A dialog prompts you to enter a name for the new folder. After you enter the name, click **OK** to create the new folder.


Library Icons


Four icons appear in the lower left hand corner of the Library window. These icons allow you to add or remove content from your Content Folder Library, or from custom library folders that you added.

From left to right, these icons are:

-  **Import selected layers from the current document:** After you select layers from the current document, switch to the Library and select the user or custom content folder that you want to save the layers into. Then click the **Import Selected Layers** icon.

 *In Moho Pro, after you add the layers you can add metadata that will help you retrieve them in your library searches, as described in "Details Panel" on page 302.*

 *When you save layers to the Library, media assets that already exist in the library will not be gathered together and saved to the library again. It will also exclude gathering of child folders that reside in shared resource folders.*

-  **Add the selected library item to the current document:** Click to highlight the library item or items that you want to add to your current document. Then click the **Add the Selected Library Item** button to add the items to your current document. The items will be added immediately above the layer that was selected in the Layers Window.

-  **Add new folder:** Allows you to add a new folder to your user or custom content Library. Select the folder beneath which you want to create a subfolder. Then click the **Add new folder** icon.
-  **Move to Recycle Bin/Trash:** After you select one or more items or folders in your user or custom content location, click the Trashcan icon to move the selected items to the Windows Recycle Bin or Mac Trash.

Converting Legacy Documents to the New Format

When you select a legacy Anime Studio document from the Library, you will be given an option to convert it to the new file format. This includes files with the .anme, .ming, and .scattershow extensions.

 *There is no option to convert old .moho documents to the new .moho format, or to convert .anime or .animeproj documents to .moho or .mohoproj.*

Details Panel

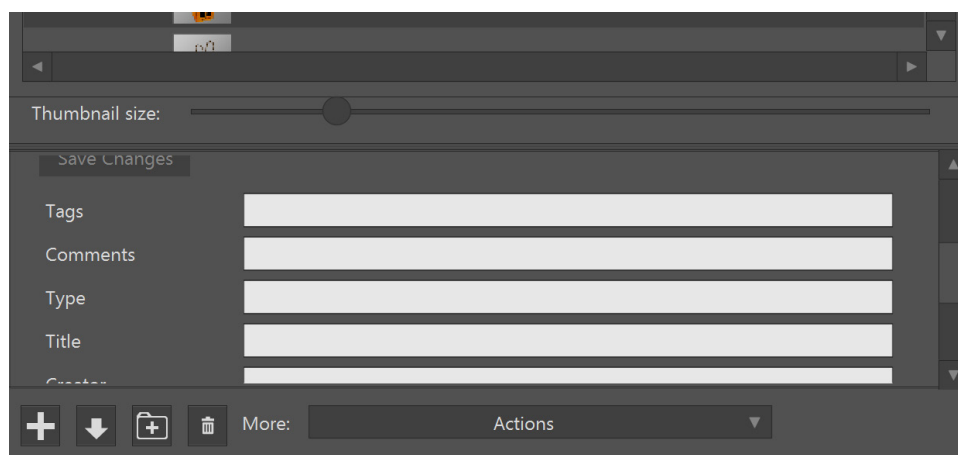
The Details Panel displays a larger thumbnail of the selected item, along with details such as file name, size, kind, creation date, modified date, and file size. Use the scrollbar to display additional information (if available).

Adding Metadata (Pro Only)

You can add metadata information to any non-factory item in your library. When you select an item in the library, you will notice that the bottom portion of the library displays details about the content item. If you use the scrollbar at the right side of the detail panel, you will notice a series of text entry fields where you can add or edit the metadata for the items in your user or custom content folders. These text fields will not be enabled for factory content items.

These fields allow you to add metadata for tags (Pro only), comments (Pro only), type, title, creator, contributor, rights, rights holder, created, has version, audience, instructional method, subject, and requires. You can enter any text that you wish in these fields. The Tags field in Moho Pro is the only field that will allow items that are separated by commas to be treated as individual entries. You can later use the dropdown menu in the Search area of the library to search through the library for content that matches the specific types of metadata that you search for.

When you add metadata to a content item, Moho will save an XMP file and thumbnail image with the library item. The XMP file and thumbnail will automatically be renamed whenever you rename the associated project file. In addition, XMP and thumbnail files will also be duplicated when their associated project file is duplicated.



Use text entry fields in the Details panel to add metadata for your custom content.

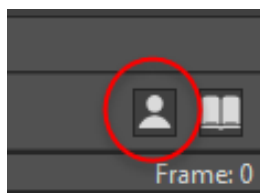
Chapter 15: The Character Wizard

The Character Wizard allows you to quickly and easily create characters that you can animate in Moho. It consists of several different tabs that allow you to specify body proportions, facial features, movement, clothing and other styling features.

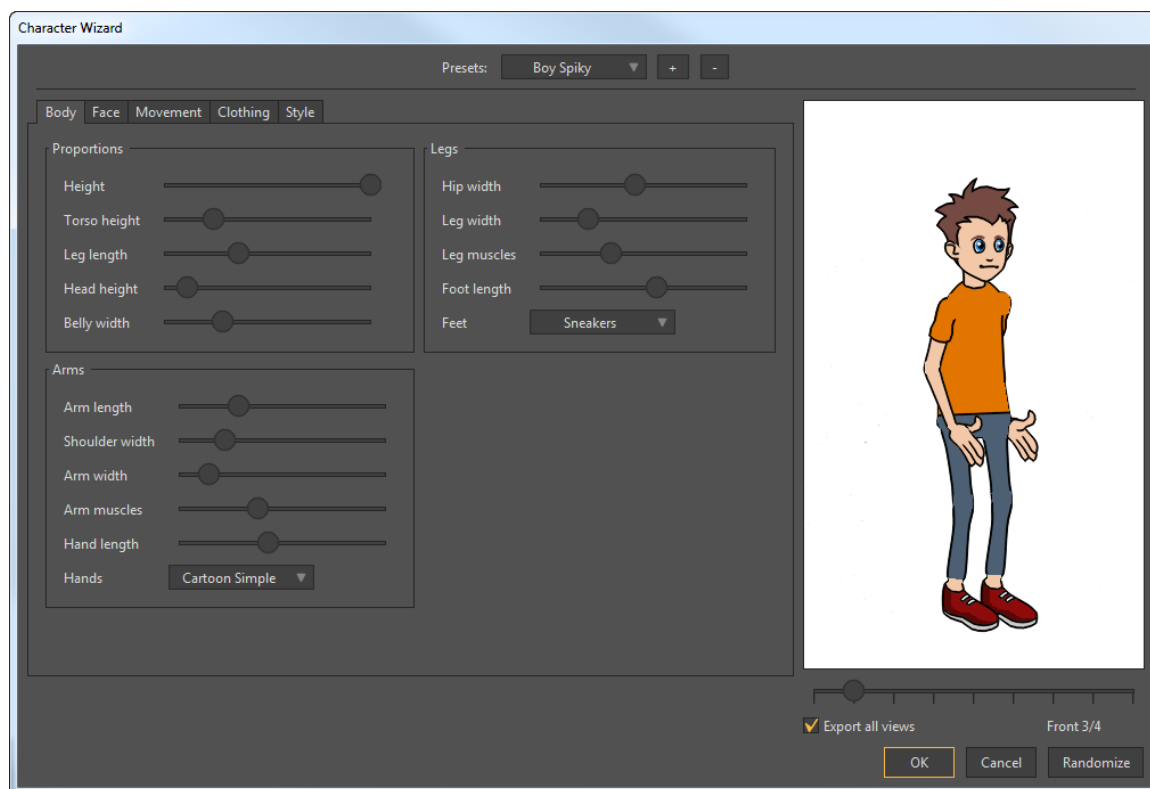
Using the Character Wizard

You can open the Character Wizard by clicking the Character Wizard button that is located in the upper right corner of the Moho interface. It appears just to the left of the Library button.

The Character Wizard consists of a number of different tabs that help you design your own character. There are also a few controls that appear from one tab to the next.



Click the Character Wizard button to open the Character Wizard




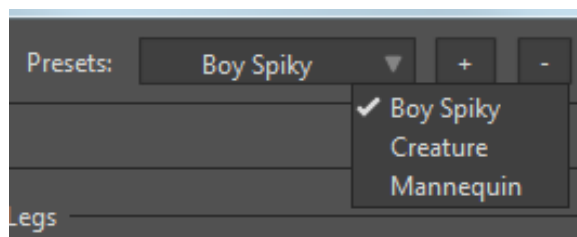
The Character Wizard window

Presets

The Presets drop-Down allows you to choose from a number of different character types: **Boy Spiky**, **Creature**, and **Mannequin**. Each of these different humanoid character types has a different appearance to start with, varying in proportion, body shape, head shape, and so on. Some presets are more “human” while other are more fantasy-like. You can use the other tabs to customize the appearance of the Preset even further.

Use the **+** button beside the Preset drop-Down to create your own preset, or the **-** button to delete a preset that you have previously saved yourself. Built-in presets cannot be deleted.

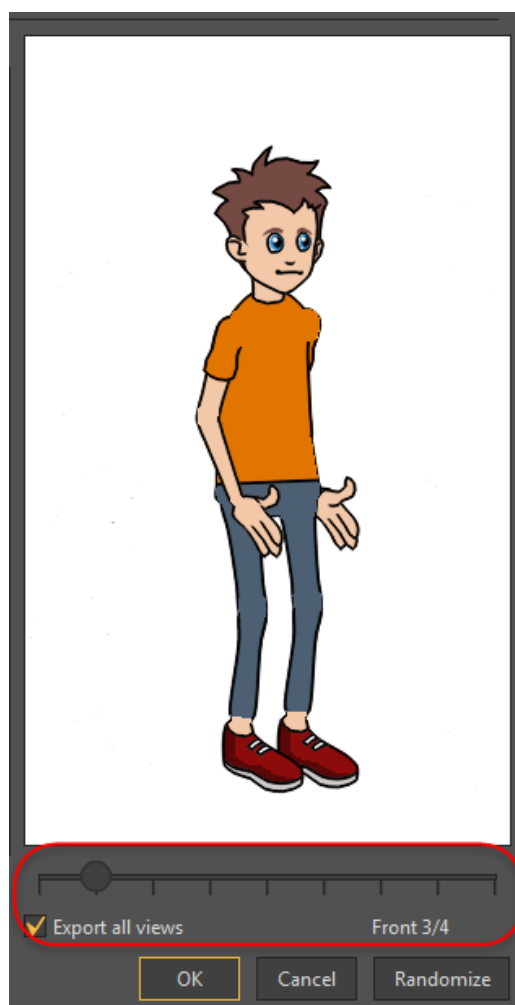
 *The preset will be saved at its current state. If you go back and later change the character's appearance (such as changing features or colors), the saved preset does not automatically update to reflect those changes. You can resave the character under its original name to overwrite the old one, or save a new preset under a different name.*



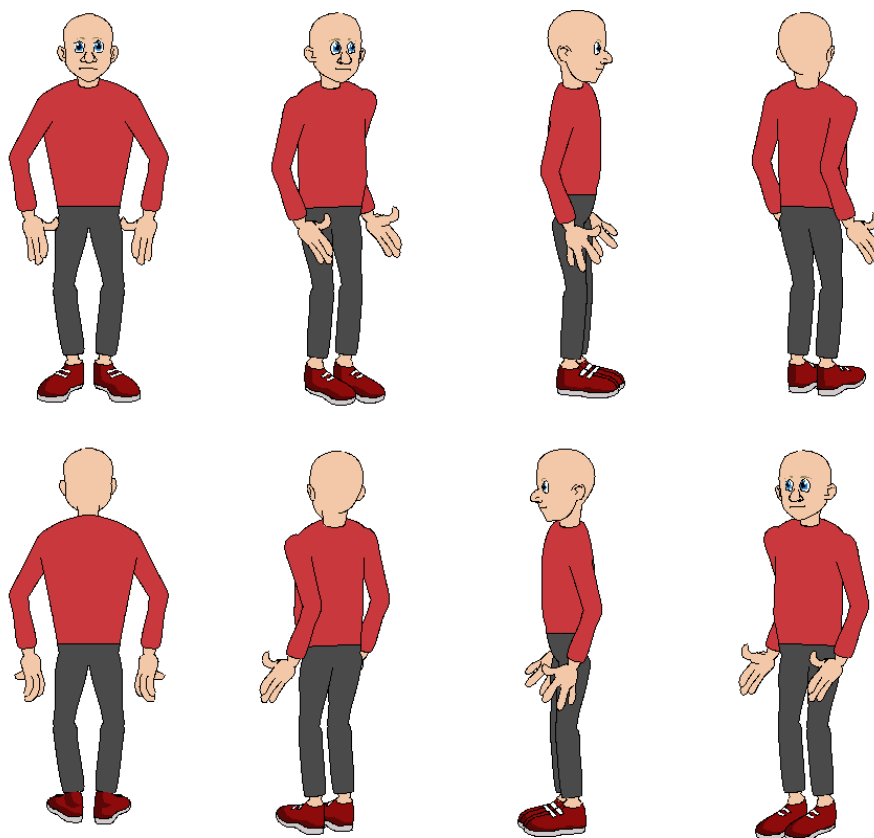
Presets available in the Character Wizard

Changing the Character Views

On the right side of the Character Wizard, you will see a preview of the current character. Beneath the preview is a slider, that allows you to view your character in one of eight angles. Move the slider to the right or left to change the perspective view of the character. The first bar displays the character in its front view. As you move the slider toward the right, the view changes to reflect 1/8 of a circle (as if the character has turned 45 degrees).



Changing character views




Different character views

Exporting Views

After you complete your character in wizard, either with a preset or by customizing in the other tabs (described in the sections that follow) you can click OK to exit the character wizard and view the character in your Moho project.

Before clicking the OK button, you should check the status of the Export All Views option beneath the view slider. With this option checked, five views of the character will be exported to your Moho project (Front, Front 3/4, Back, Back 3/4, and Side). With the option unchecked, only the currently selected view will appear in your project.

 If any of the parts used in the character have pre-animated movement (such as eyes that blink), the movement will also be added to your character. The animation will show on the Movement tab in the Character Wizard, and will be added as Actions in your Moho Pro project.

Randomizing Characters

The lower-right corner of the Character Wizard contains a Randomize button. When you click this button, the Character Wizard combines settings from the different tabs

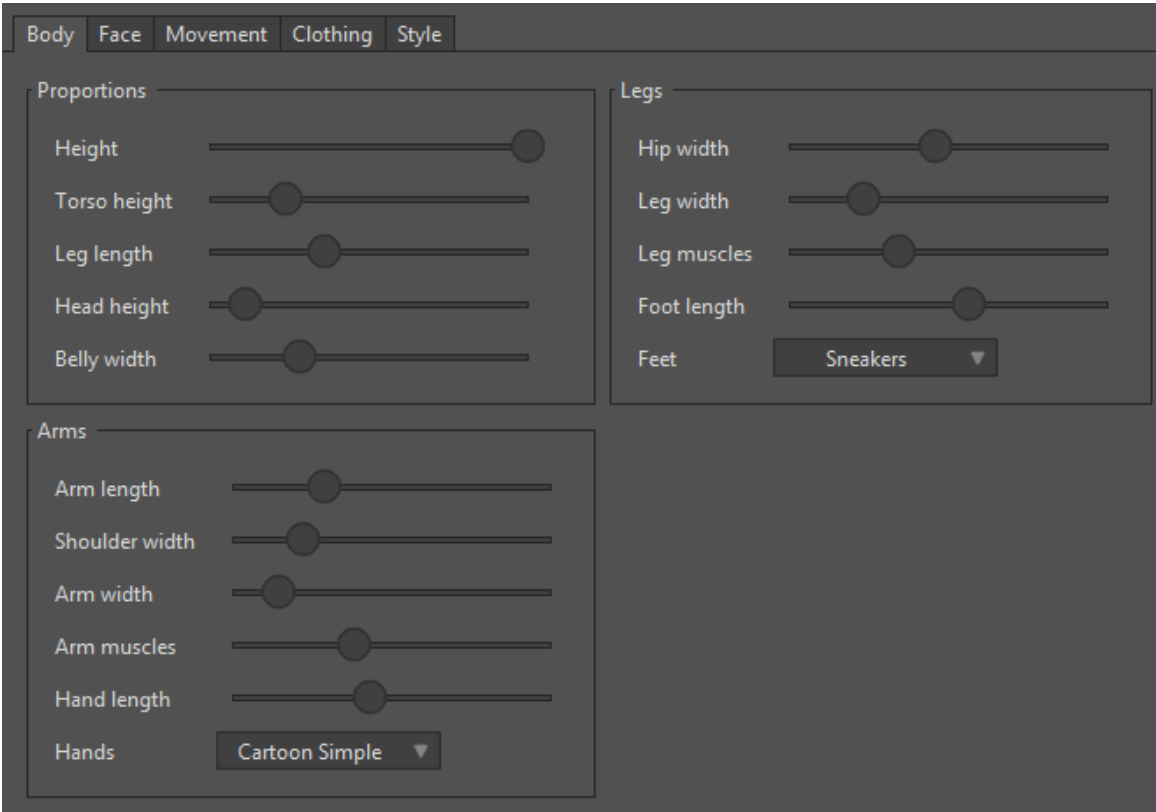
to create a totally unique character. This is a quick and easy way to generate a customized character or preset as a starting point that you can later modify yourself.



Some random characters

Body Tab

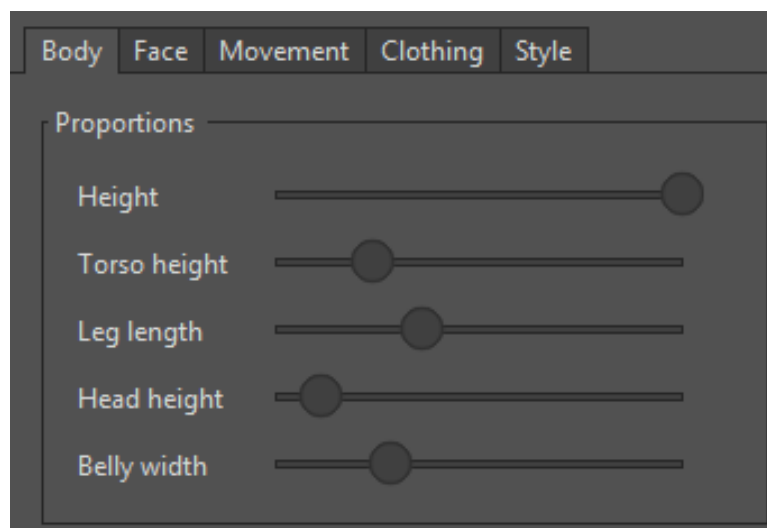
The Body tab allows you to adjust the proportions of the various parts of the character's body. Move the sliders left or right to adjust the proportions as described in the following sections. The preview window will update the character in real time while you make your adjustments.



Character wizard Body tab

Proportions

- **Height:** Move the slider toward the left to make the character shorter, or toward the right to make the character taller.
- **Torso height:** Move the slider toward the left to decrease the height of the area between the shoulders and hip, or toward the right to increase the height of this area.
- **Leg length:** Move the slider toward the left to shorten the legs, or toward the right to lengthen them. The feet will remain stationary on the ground.
- **Head height:** Move the slider toward the left to make the head smaller, or toward the right to make the head larger. The height of the character will remain the same.
- **Belly width:** Move the slider toward the left to decrease the width of the waist, or toward the right to increase it.

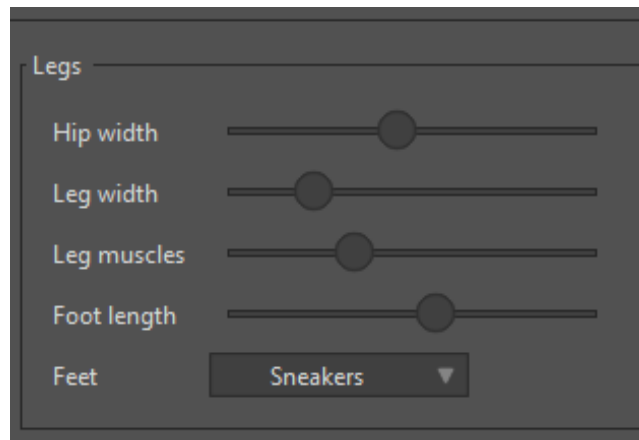


Proportion options

Legs

- **Hip width:** Move the slider toward the left to decrease the width of the hip, bringing the legs closer together. Move the slider toward the right to increase the width of the hip, creating more space between the legs.
- **Leg width:** Move the slider toward the left to make the legs and hip thinner, and toward the right to make the legs and hip wider.
- **Leg muscles:** Move the slider toward the left to make the legs appear less muscular (and more bony). Move the slider toward the right to add more muscle to the legs.
- **Foot length:** Move the slider toward the left to decrease the size of the feet, or toward the right to increase the size of the feet.

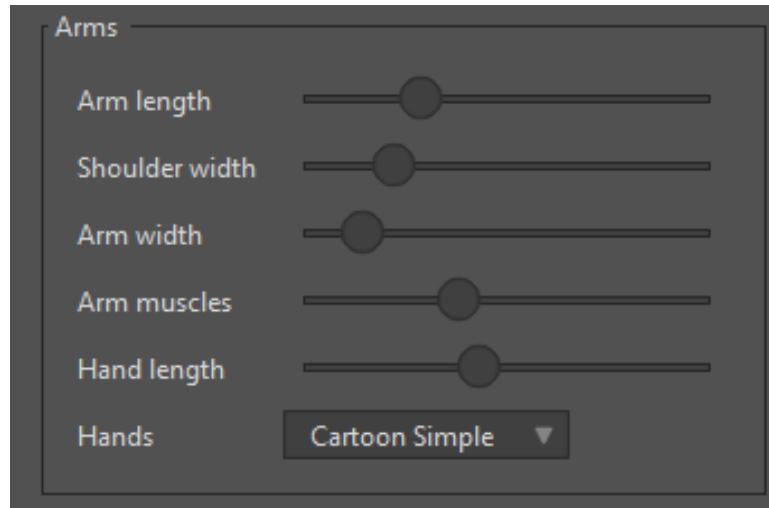
- **Feet:** Use the Feet drop-Down menu to select the appearance of the feet. Choose **Generic** to create a simple representation of a bare foot with no toes. Other choices include **Anime Boy Sneakers**, **Bare** (with toes), **Bowling Shoes**, **Female Sandals**, **Male Sandals**, **Reference**, and **Simple**.



Leg options

Arms

- **Arm length:** Move the slider toward the left to shorten the arms from the shoulder, and toward the right to lengthen them.
- **Shoulder width:** Move the slider toward the left to decrease the width of the shoulder (bringing the arms closer toward the body), or toward the right to increase the width of the shoulder (moving the arms away from the body).
- **Arm width:** Move the slider toward the left to decrease the size of the arms (making them thinner), or toward the right to increase the size of the arms (making them fatter).
- **Arm muscles:** Move the slider toward the left to make the arms less muscular and bony, or toward the right to make them more muscular.
- **Hand length:** Move the slider toward the left to decrease the size of the hands, and toward the right to increase the size of the hands.
- **Hands:** Use the Hands drop-Down menu to select a style of hands for the character. Choose **Generic** to create generic hands that have no fingers. Other choices include **Anime Boy Mittens**, **Female Red Nails**, **Long Fingers**, **Simple**, **Square**, and **Toon**.

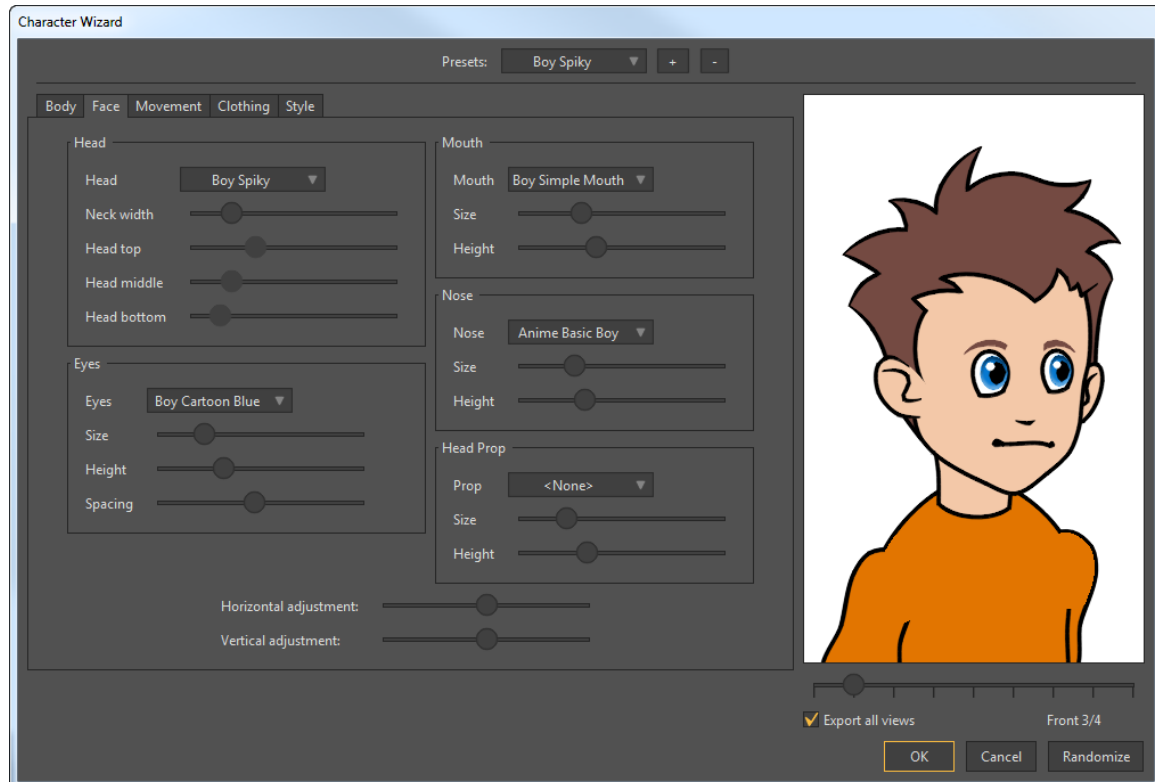


Arm options

Face Tab

The Face Tab of the Character Wizard allows you to select and adjust the facial features, including the head, eyes, mouth, and nose. Included at the bottom of the various categories are the following sliders:

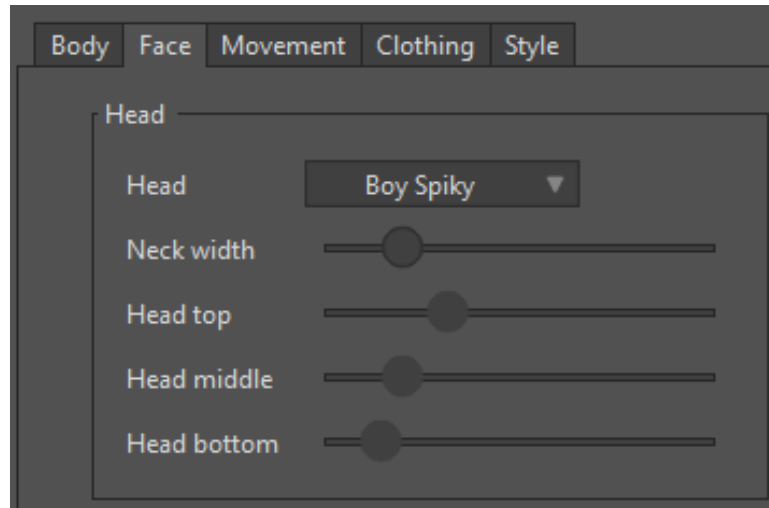
- **Horizontal adjustment:** Move the slider left or right to position the facial features, if necessary after you adjust the head proportions. For example, you can move the eyes, nose, and mouth closer to the face if they appear to be detached from the face. The adjustment slider will be disabled in the Front and Back views where it does not apply.
- **Vertical adjustment:** Move the slider left or right to adjust the height of the facial features, if necessary after you adjust the head proportions. For example, in some cases, the profile of the lips will not match up with the line of the mouth and this control can match it more closely.



Character wizard Face tab (Moho Pro shown)

Head

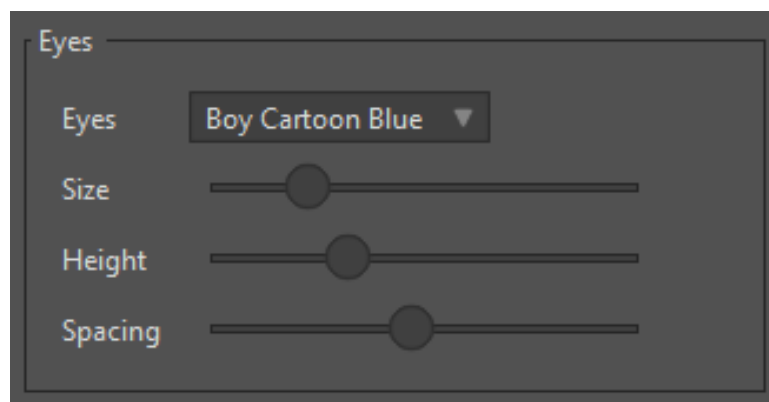
- **Head selector:** Click the Head drop-Down list to choose from a number of preset character heads. Styles range from human to fantasy and more. Some characters have hair or hats, while others are bald.
- **Neck width:** When you are working with a head where the size of the neck can be adjusted, this dial allows you to increase or decrease the width of the neck. The option will be disabled when the character does not have a resizeable neck.
- **Head top:** (enabled for Generic head only) Move the slider toward the left to decrease the width of the crown, or toward the right to increase the width.
- **Head middle:** (enabled for Generic head only) Move the slider toward the left to decrease the width of the middle head, or toward the right to increase the width.
- **Head bottom:** (enabled for Generic head only) Move the slider toward the left to decrease the width of the lower head, or toward the right to increase the width.



Head options

Eyes

- **Eye selector:** Use the Eyes drop-Down list to select one of several different eye shapes.
- **Size:** Move the slider toward the left to decrease the size of the eyes, or toward the right to increase the size of the eyes. The size will increase or decrease from the center point of each eye.
- **Height:** Move the slider toward the left to lower the eyes, or toward the right to raise the eyes.
- **Spacing:** Move the slider toward the left to bring the eyes closer, or toward the right to move the eyes farther apart.

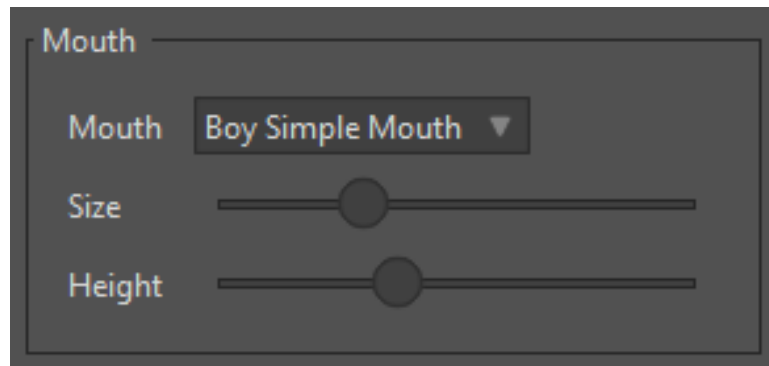


Eyes options

Mouth

- **Mouth selector:** Use the Mouth drop-Down list to select one of several different mouth shapes.

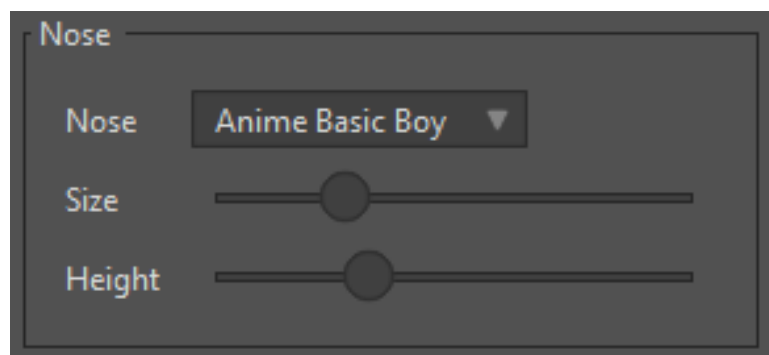
- **Size:** Move the slider toward the left to decrease the size of the mouth, or toward the right to increase the size of the mouth.
- **Height:** Move the slider toward the left to lower the mouth, or toward the right to raise the mouth.



Mouth options

Nose

- **Nose selector:** Use the Nose drop-Down list to select one of several different nose shapes.
- **Size:** Move the slider toward the left to decrease the size of the nose, or toward the right to increase the size of the nose.
- **Height:** Move the slider toward the left to lower the nose, or toward the right to raise the nose.



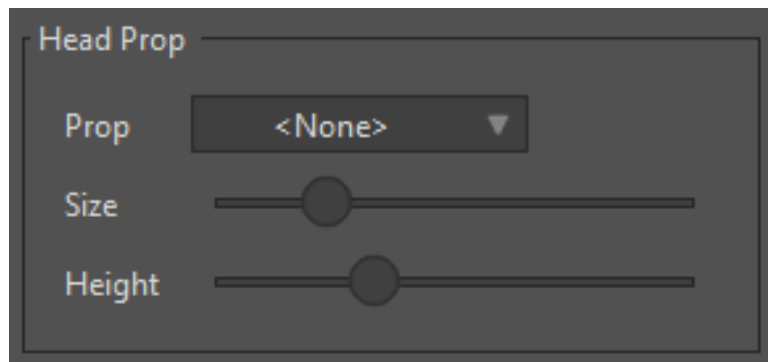
Nose options

Head Prop

Head props are only enabled when the Creature is selected as a character preset.

- **Prop:** Use the Prop drop-Down list to select one of several different head props, such as hats, beards, curls, and other facial and head features.
- **Size:** Move the slider toward the left to decrease the size of the head prop, or toward the right to increase its size.

- **Height:** Move the slider toward the left to lower the head prop, or toward the right to raise it.





Head Prop options

Movement Tab

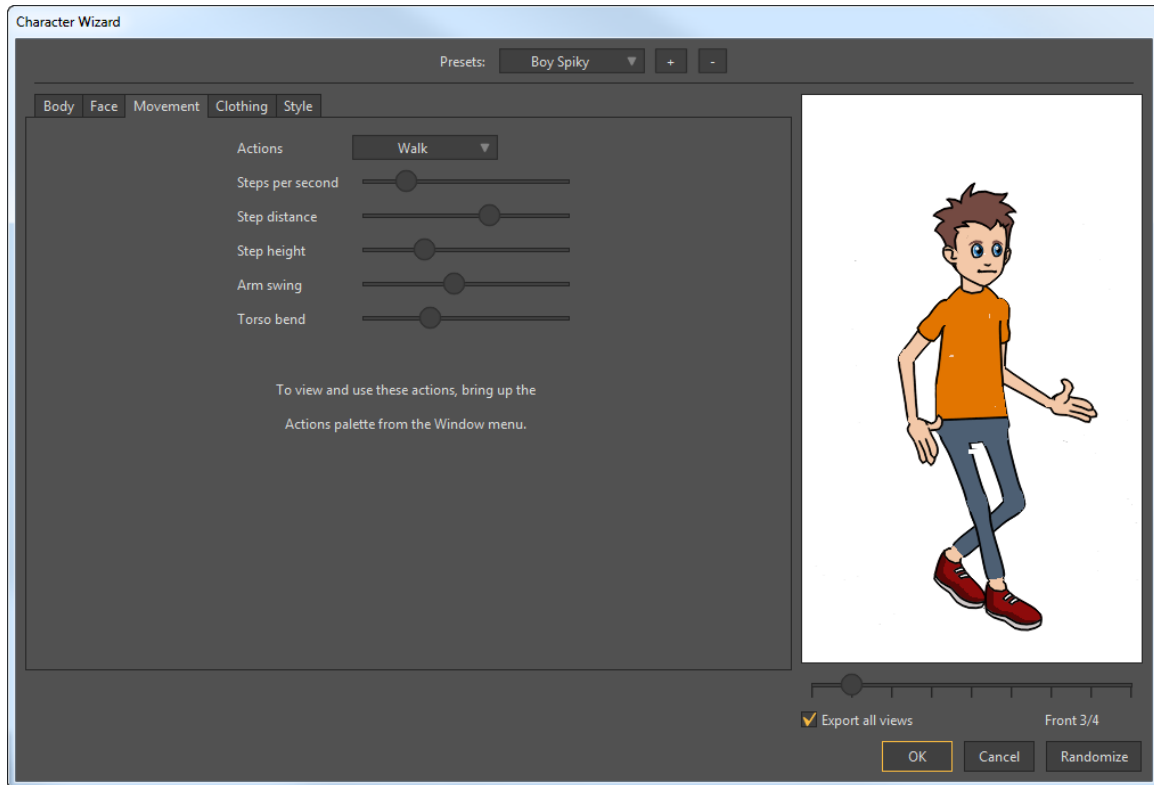
The Movement tab in the Character Wizard allows you to generate a walk cycle for your character, very quickly and easily, through the use of sliders. As you design the walk cycle, it will be applied to all of the character views (front, back, sides, and quarter-views).

In Moho Pro, the character is not automatically animated by default. When you add a character to the scene, the actions will also appear in the Actions palette so that you can manually add actions in the timeline where you want them to occur. For example, you can apply a walk at frame 1, and then add a jump action at frame 100 and a wave action at frame 120.

 When you export a single view of your character, it will appear as a bone group inside your Moho scene. When multiple views of the character are exported to your Moho Pro scene, the character will appear as a Switch Layer. Beneath that switch layer, you will see a bone group for each of the character views (front, back, and so on).

 You will not initially see the actions appear in the Moho Pro timeline because the bone groups and layers are contained within a switch layer. The actions that you use in your animation will be applied to the currently selected view (active switch layer) of the character. To view the actions in the timeline, select one of the bone groups beneath the main switch layer.

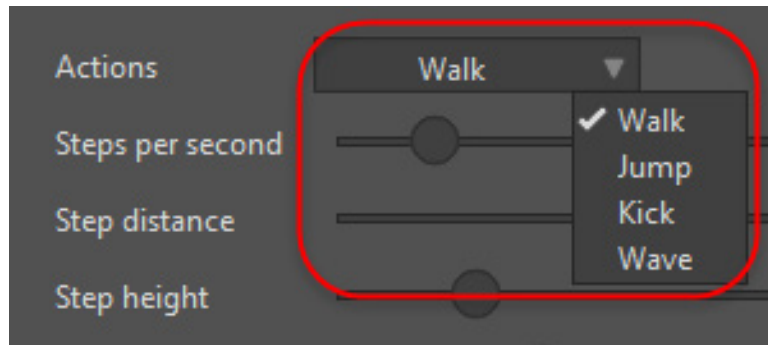
The Walk cycle is a computer generated action. The others (Jump, Kick, and Wave) are custom actions that were created in Moho Pro. These actions can be applied to any character.



Character wizard Movement tab (Moho Pro shown)

The following options appear:

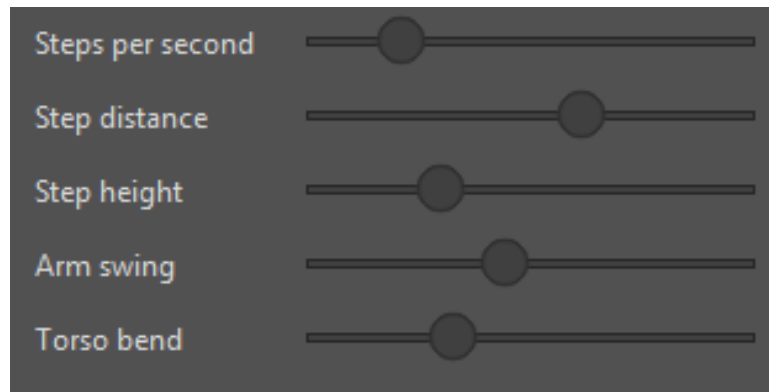
- **Actions (Pro Only):** Use the Actions drop-Down list to select the type of action that you want to use or preview.



Actions options

- **Insert Walk Action (Debut Only):** When you check this option, your character will be exported with movements. If you later decide that you aren't happy with the movement, you will need to delete the keyframes associated with it. With the option unchecked, keyframes for movement will not be exported.
- **Steps per second:** Move the slider toward the left to make your character walk more slowly, and toward the right to make it walk faster.
- **Step distance:** Move the slider toward the left to make your character take shorter steps, and toward the right to make your character take longer steps.

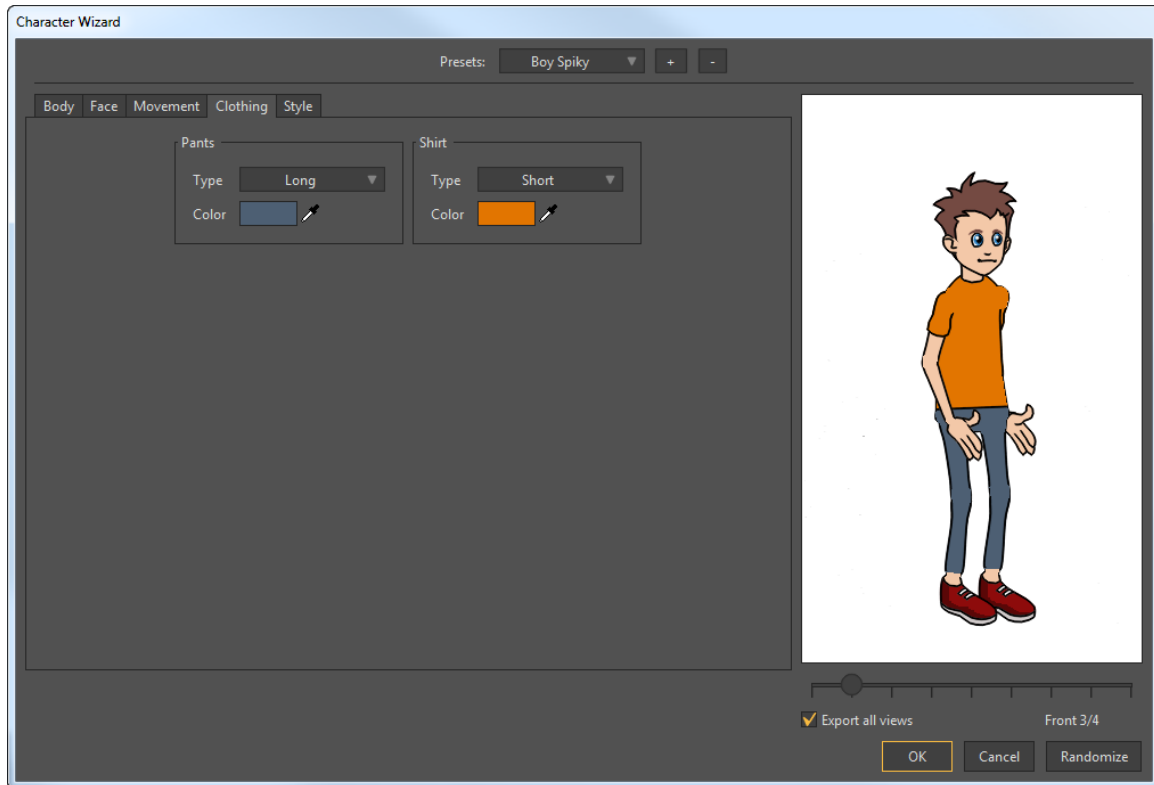
- **Step height:** Move the slider toward the left to keep the steps closer to the ground (less knee bend); and toward the right to raise the feet more from the ground (more knee bend).
- **Arm swing:** Move the slider toward the left to decrease the arm swing (making it stiffer), and toward the right to increase the arm swing (making it looser).
- **Torso bend:** Move the slider toward the left to add less bend to the torso (making the posture straighter). Move the slider toward the right to add more bend (adding more bounce to the walk).



Other settings options

Clothing Tab

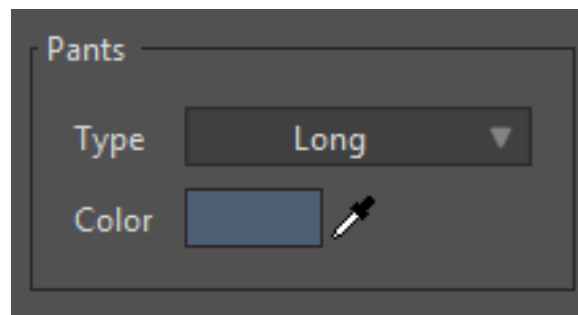
The Clothing Tab allows you to change the style and colors of the pants and shirt that the character wears. There are two sections available in this tab.



Character wizard Clothing tab

Pants

- **Type selector:** Choose whether you want your character to wear short or long pants.
- **Color:** Click the color chip to open the color palette, where you can select a new color for the pants.

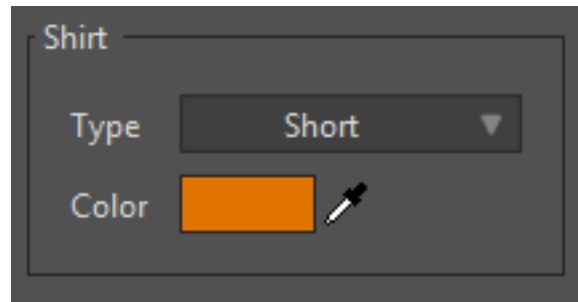


Other settings options

Shirt

- **Type selector:** Choose whether you want your character to wear a short-sleeved shirt or a long-sleeved shirt.

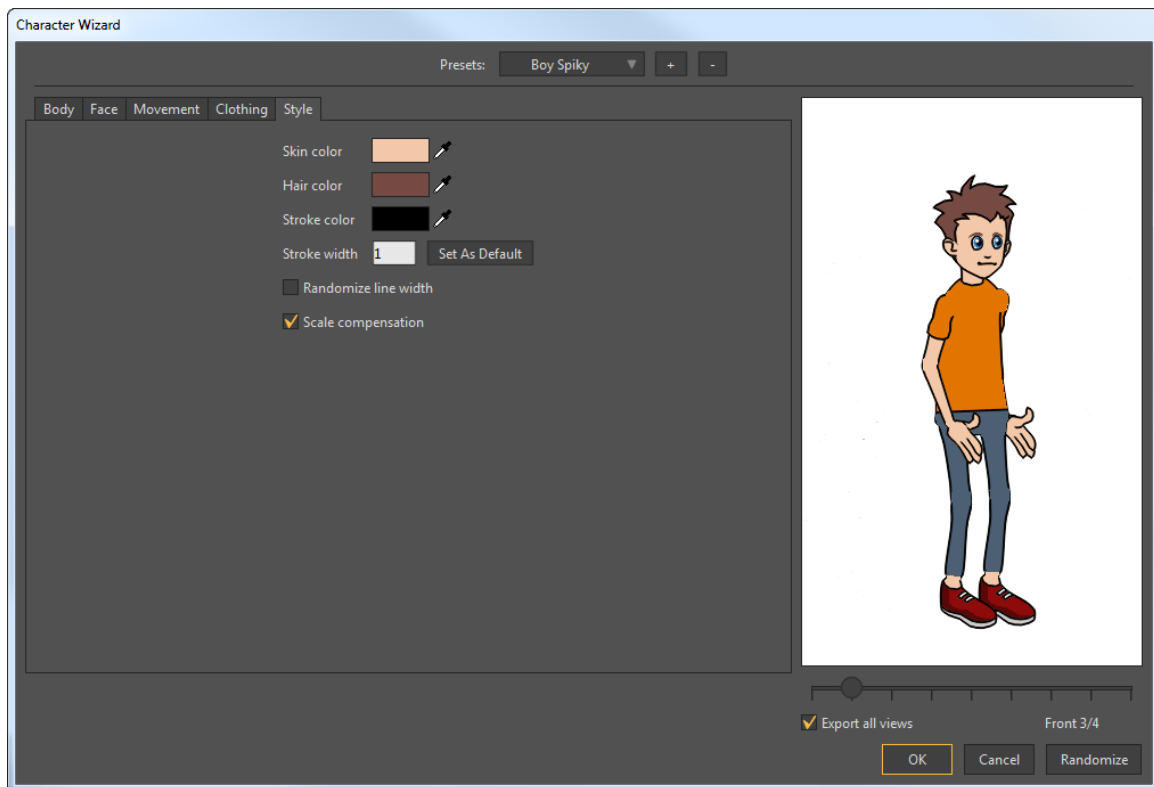
- **Color:** Click the color ship to open the color palette, where you can select a new color for the shirt.



Other settings options

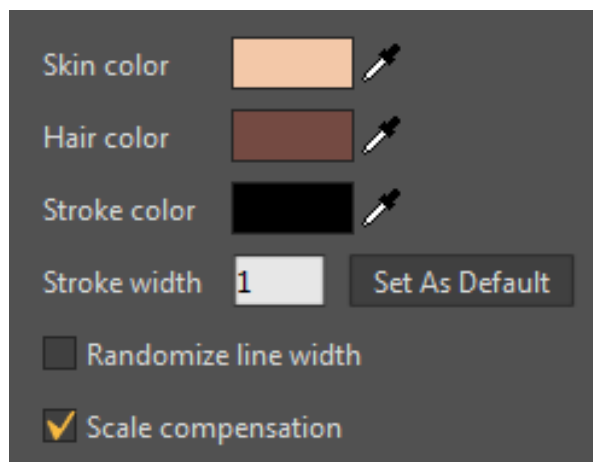
Style Tab

The Style tab allows you to change the skin color, hair color, and stroke color and width for your character.




Character wizard Style tab

The settings you select here are as follows:




Other settings options

- **Skin color:** Click the color chip to open the color palette, where you can select a new color for the skin.

 When you create body parts for the character wizard in Moho Pro, special colors **MUST** be used for the skin and hair. Use Yellow (R 255, G 255, B 0) for any body part that you want to identify as skin color, and Cyan (R 0, G 255, B 255) for any part that you want to identify as hair. Any parts that use these colors will inherit the skin or hair colors that you identify in the Character wizard.

- **Hair color:** Click the color chip to open the color palette, and select a new color for the hair.
- **Stroke color:** Click the color ship to open the color palette, and select a new color for the character outlines.
- **Stroke width:** Sets the stroke width size to use as the default.

 If you have a mouse with a scroll wheel, you can increase or decrease this value while watching the character update in the preview window


- **Set as default:** Click this button after you change the value in the Stroke Width field.
- **Randomize line width:** With this setting on, the line width will vary slightly across the character. With the setting off, the line width will be uniform.
- **Scale compensation:** When checked, the stroke width will be proportionally adjusted as the character is resized. If you make the character smaller, the strokes will get narrower. If you make the character larger, the strokes will get wider. When unchecked, the stroke width will remain the same when you increase or decrease its size, and changes to stroke width will need to be made manually.

Designing a Character and Walk Cycle

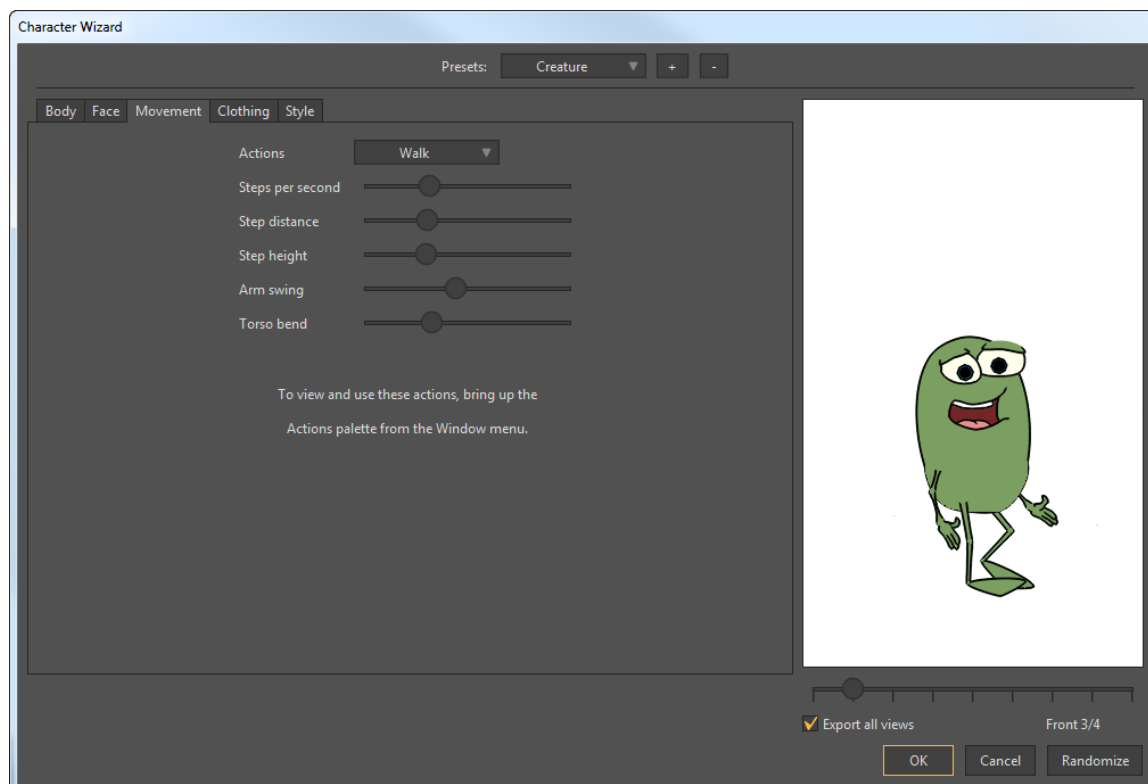
The Walk cycle is a computer generated action. The others (Jump, Kick, and Wave) are custom actions that were created in Moho Pro. These actions can be applied to any character.

To create a walk for your character, follow these steps:

1. Click the Character Wizard button in the upper-right corner of the Moho interface to open the Character Wizard.
2. Design your character using the Body, Face, Clothing, and Style tabs as outlined in the previous sections. Use the view slider beneath the preview window to view your character from all directions as you design it.

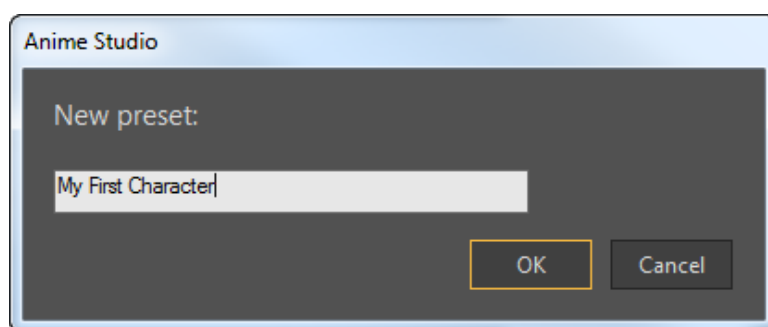
 *Pay attention to the adjustments you make in height and placement of the facial features. Use the Horizontal and Vertical adjustment sliders to position the eyes, nose, and mouth in the side and quarter-view, and then verify that the changes are acceptable for each of those views. In other words, if you use the slider to adjust the position of the nose and mouth in the side view, also look at how the changes affect the placement of the facial features in the Front 3/4 and Back 3/4 views.*

3. After you design your character, click the Movement tab.



Character wizard Movement tab

4. (Moho Pro only) From the Actions drop-down menu, choose Walk (it should be selected by default).
5. Adjust the **Steps per second**, **Step distance**, **Step height**, **Arm swing**, and **Torso bend** sliders until you are happy with the walk.
6. The preview window shows a preview of the walk cycle as it is applied to your character. You can view the walk from several angles by moving the slider right below the preview window. Examine your character from all directions and make tweaks as necessary before you export it to your Moho project. You will export your character in the next tutorial.
7. Click the + button at the top of the Character Wizard window. Name your character **My First Character** and click OK to save the preset. Now you will be able to reuse that character preset in any of your projects.



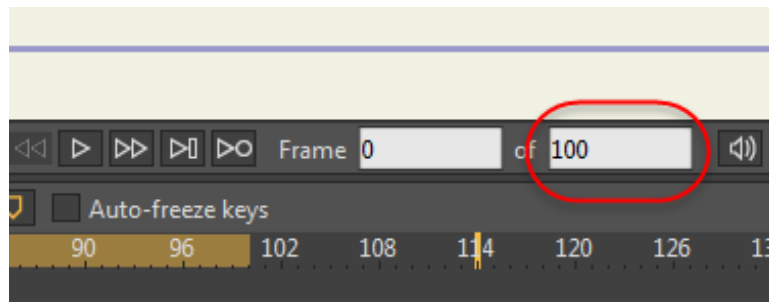
Saving a preset character

8. Click **OK** to exit the Character Wizard. You will notice that the character appears in your scene when you do so. The next two tutorials will explain different ways that you can export and use the character in your projects.

Making Your Character Walk

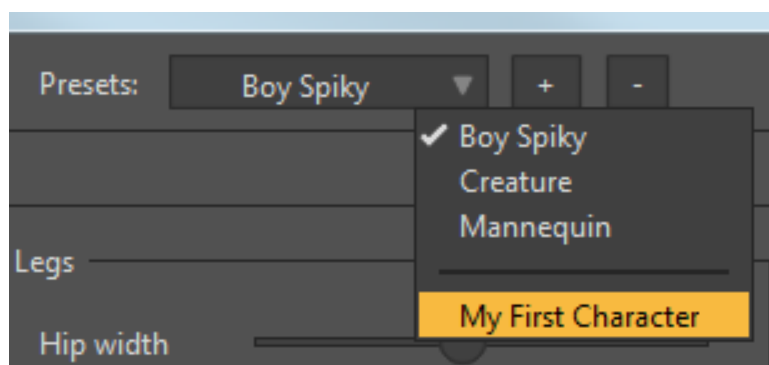
In the previous project you designed a character and a walk, and saved the preset. When you exited the Character Wizard, you noticed that the character that you worked on appeared in the project window. However, because you saved the character, you can easily reuse it at any time in any project you start. We will begin this tutorial with a new project, and you'll reuse the character preset that you designed in the previous exercise. In this tutorial, you will export only one view of the character: the Side view.

1. Start a new empty project in Moho.
2. Optionally, you can shorten the length of the animation from its default of 240 frames. To do so, enter 100 in the end frame field in the timeline.




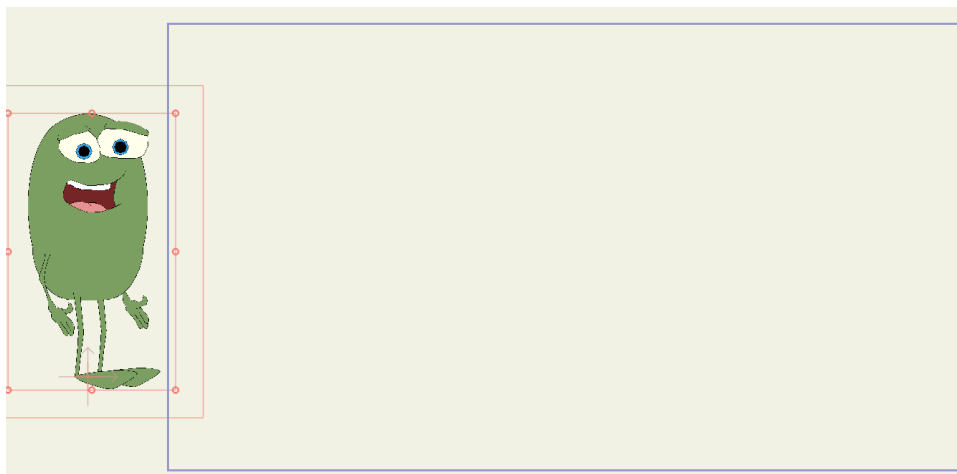
Decrease the length of the animation to 100 frames.

3. Click the Character Wizard to open the Character Wizard.
4. From the Presets menu at the top of the screen, select the **My First Character** preset that you created in the previous exercise. Your custom character appears in the preview area.



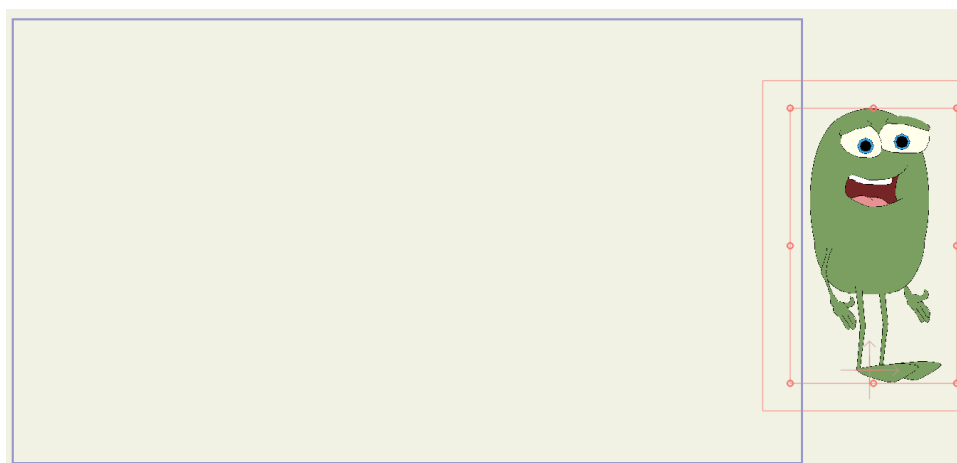
Choosing a preset character

5. Move the View slider so that you see your character in the side view.
6. Uncheck the **Export All Views** option beneath the preview window. This will export only the current view, which is now set to the **Side** view.
7. Click OK to exit the Character Wizard. Your character now appears in the scene. Press the Play button and you will see the character walking in the center of the scene. Press the Stop button after you view the animation.
8.  Click the **Rewind** button to move the timeline back to Frame 0. Then use the **Transform Layer** tool to move your character off the screen to the left.



At frame 0, move the character to the left of the screen.

9. Advance the timeline to frame 96, and move the character off to the other side.



At frame 96, move the character to the right of the screen.

10. Press the **Play** button to view your character as it walks across the screen.


Rotating Your Character 360 Degrees

In this exercise you'll make your character spin around in a full 360 degree circle.


It's fairly easy to do, if you follow these steps:

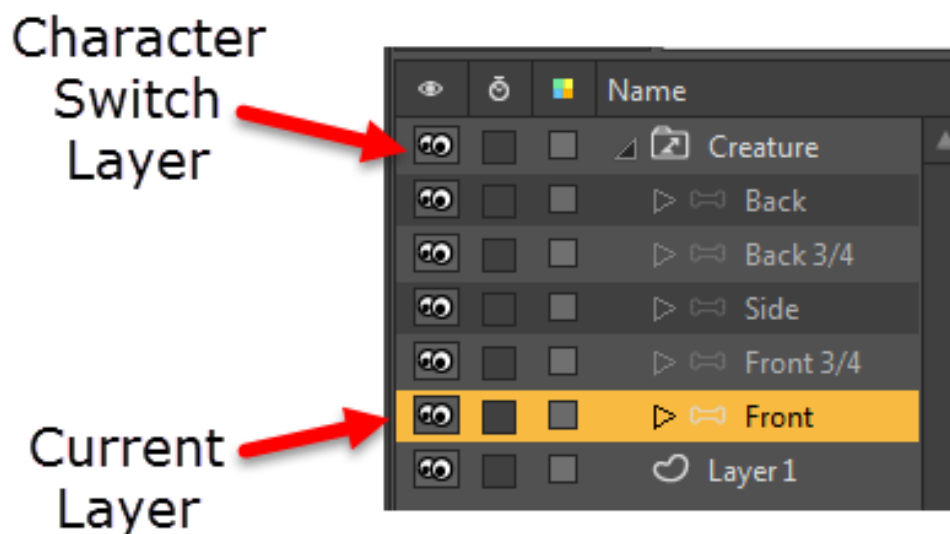
1. Start a new empty project in Moho.
2. Click the Character Wizard to open the Character Wizard.
3. From the Presets menu at the top of the screen, select the **My First Character** preset that you created in the previous exercise. Your custom character appears in the preview area.

4. Select the **Front** view before you export the character. This is the view that will be visible when you initially import the character into your scene.
5. Make sure that the **Export All Views** option beneath the preview window is checked. This step will be necessary, because you will be working with all of the exported views in this project.
6. Click **OK** to exit the **Character Wizard**. The character appears in your project.
7. The top layer of the character is a Switch layer, and the various character views appear as bone groups beneath it. With the character's switch layer selected (the topmost layer), use the **Transform Layer** tool to resize your character as needed.

 As a general rule, you will want to select the Switch Layer (the top layer) when you translate, scale, or rotate your character. This applies the changes to all views of your character. If you want your character to face a different direction at a specific point in the timeline, you simply move to a later frame, and make the appropriate switch layer active. This will be demonstrated in the next few steps. For more information about switch layers, see "Switch Layer" on page 144.

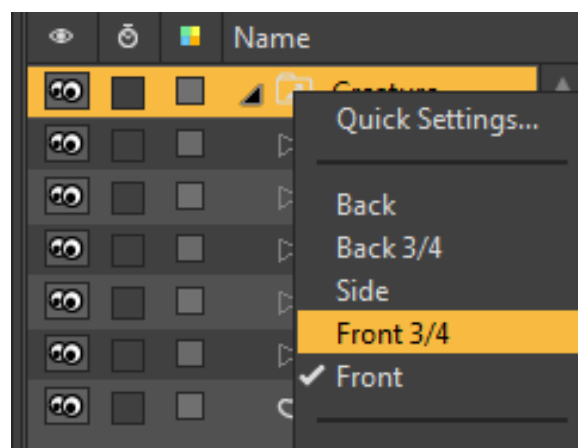
8. If you are not already at Frame 0 in the timeline, use the **Rewind** button to return there. Your character should be facing toward the front.
9. Now, advance the timeline to Frame 6. Expand the character's switch layer so that you see the various views, as shown in the following figure. The view that has the filled-in bone is the layer that is currently in view.

 When you export multiple views of the character, you will see the character appear as a Switch Layer. Each of the different views of the character then appear as individual bone groups beneath that layer, as shown in the following figure. The view that is currently visible is the layer that you had selected at the time you exported the character (in this case, the Front view).



The different views of the character appear as bone groups within the switch layer. The layer that shows a highlighted bone is the switch layer that is currently visible for the character.

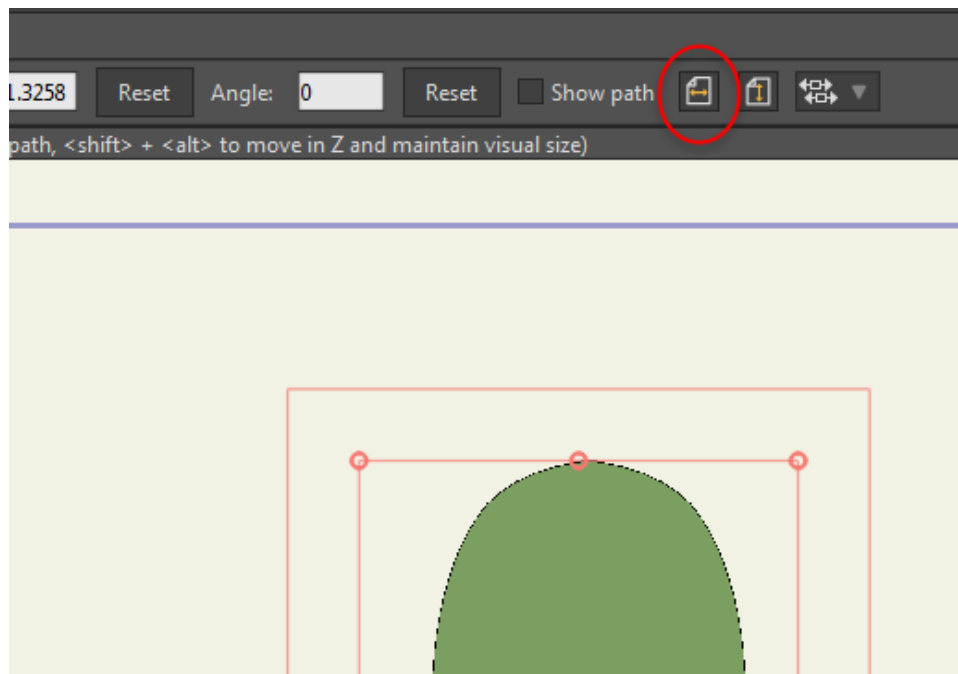
10. At Frame 6, right-click in the Switch layer (shown as Man in the above figure), and select the **Front 3/4** view. Your character should rotate to that view and a keyframe will appear at Frame 6.



At Frame 6, right-click the Switch layer (shown here as Man) and select the Front 3/4 view.

11. Now move to Frame 12 (the next keyframe), and right-click to select the **Side** view in the Layers Window. Your character will rotate to face the side.
12. At Frame 18, switch to the **Back 3/4** view.
13. At Frame 24, switch to the **Back** view. At this point, your character has turned one-half of the circle.
14. Now select the **Transform Layer** tool. You won't actually use this tool, but you will use the **Flip Horizontal** button later in this tutorial.

15. Advance to Frame 30. In the Layers Window, right-click the switch layer, and choose the Back 3/4 view.
16. Next, to make your character continue to spin in the same direction (rather than return in the same direction from which it came), you'll need to click the **Flip Layer Horizontally** button in the **Transform Layer** tool option bar, as shown below.



At Frame 30, select the Back 3/4 view and then flip it horizontally.

17. Complete the remaining three frames as follows:
 - Frame 36: Right-click the switch layer to choose the **Side** view.
 - Frame 42: Right-click the switch layer to choose the **Front ¾** view.
 - Frame 48: Right-click the switch layer to choose the **Front** view.
18. Save the project if you like, and then play back the animation. You should see your character spin around in a circle.

Designing Your Own Actions (Pro Only)

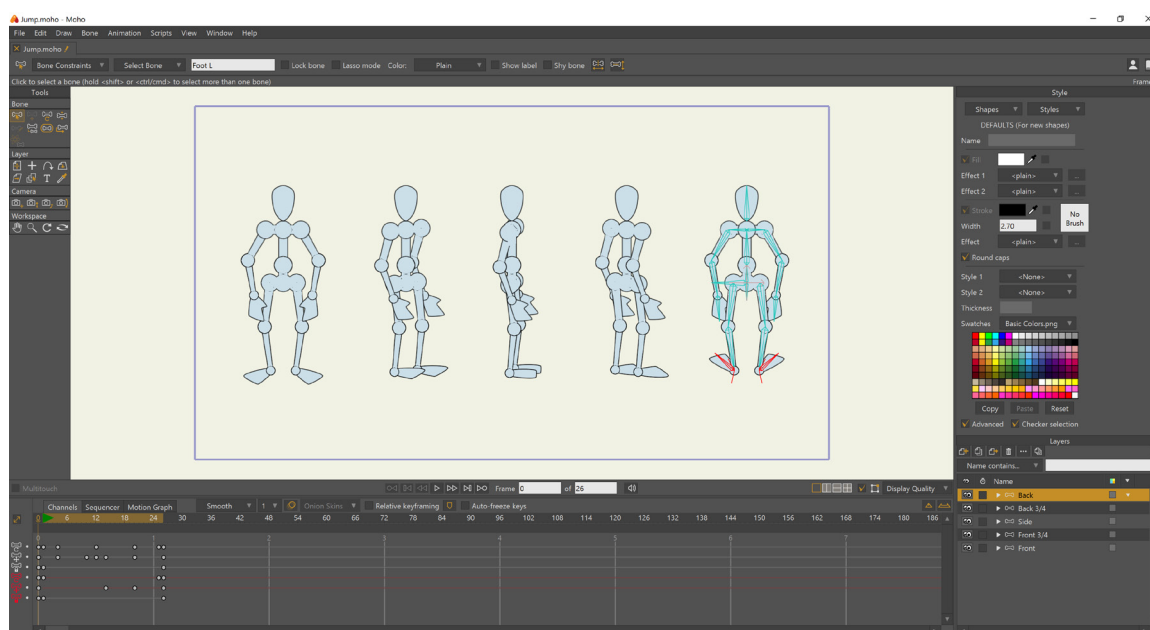
Advanced Moho users may be interested in creating their own actions for the Character Wizard. The actions that you create will appear in the Actions selection menu that appears at the top of the Character Wizard Movement tab.

The steps to create your own custom actions are briefly as follows:

1. Use Windows Explorer (Windows) or Finder (Mac) to locate your Moho installation folder.
2. Navigate from your installation folder to the **Resources > Support > Common > Character Wizard > Actions** folder. You will see three ANME files within that folder: **Jump**, **Kick**, and **Wave**. These are the three files that are associated with the actions that appear in the Actions selection menu.

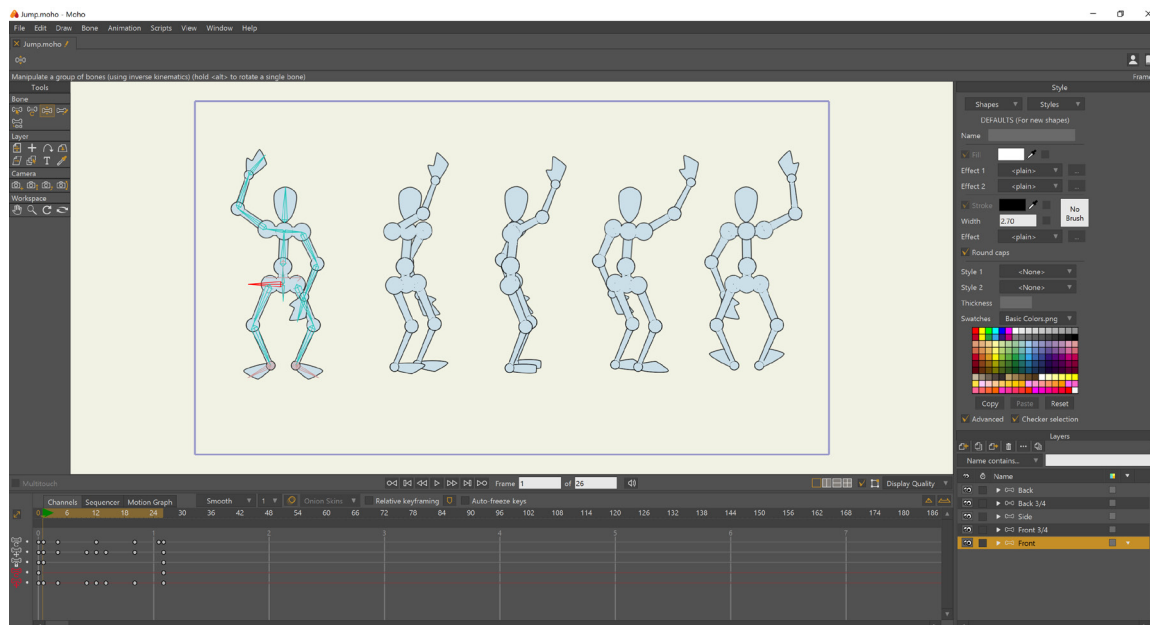
 If you are prompted to convert the document to the new document format, choose OK to continue.

- Open one of these projects, and save it into the Character Wizard folder that resides in your custom Moho Content folder (see [“Creating a Content Folder” on page 16](#)). Name the file according to the action that you want to create (twist, dance, Jumping Jack, etc). This step is important ... if you save the file under its original name and location you will overwrite the original action that is furnished with Moho.
- The project will consist of five different bone layers that animate a mannequin figure: **Back**, **Back 3/4**, **Side**, **Front 3/4**, and **Front**. If you play the animation you will notice that all of the views are animated in unison.



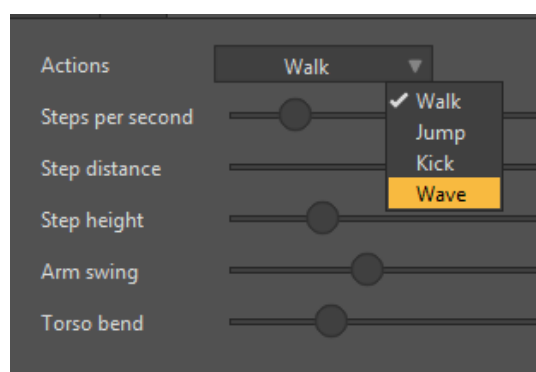
Five bone layers display a mannequin in different views.

- Choose the **Animation > Clear Animation > From Document** command to remove all of the keyframes in the timeline. They will be removed from all bone groups in the document.
- Use the **Manipulate Bone** tool to modify the movement of each view so that you again create five different views of the character that move in unison. Make sure you make your changes on frames 1 or higher (do not make changes on Frame 0).
- Make sure that you adjust the length of your animation so that the movement is seamless when it is played in a loop. Add or remove frames as necessary to create a smooth-flowing animation where you cannot tell where the loop starts or ends.



Edit each view for your figure so that the character moves in the same manner for each view.









8. After all five views of your character have been animated, save the modified file. You should now see your new action appear in the **Actions** menu in the Character Wizard Movement tab.



Your new action will appear in the Actions menu in the Character Wizard movement tab.

Creating Content for the Character Wizard (Pro Only)

Your Moho application installation folder includes the Character Wizard subfolder as mentioned previously in [“Designing Your Own Actions \(Pro Only\)”](#) on page 327. In addition to the Actions folder previously discussed, the [Resources > Support > Common > Character Wizard](#) folder contains other subfolders that store the ANME files for the Character Wizard content that you select in the Body and Face tabs.

Name	Date modified	Type
 Actions	5/23/2016 6:32 AM	File folder
 Eyes	5/23/2016 6:32 AM	File folder
 Feet	5/23/2016 6:32 AM	File folder
 Hands	5/23/2016 6:32 AM	File folder
 Head Props	5/23/2016 6:32 AM	File folder
 Heads	5/23/2016 6:32 AM	File folder
 Mouths	5/23/2016 6:32 AM	File folder
 Noses	5/23/2016 6:32 AM	File folder

Character Wizard content folders.


The additional subfolders are as follows. Examine the files for some ideas on how you can create your own content:

- **Eyes:** Contains the Eyes content that you select from the Eyes section of the Face tab.
- **Feet:** Contains the Feet content that you select from the Legs section of the Body tab.
- **Hands:** Contains the Hands content that you select from the Arms section of the Body tab.



*Eyes, Feet, and Hands come in pairs ... you have a right eye and a left eye, a right foot and a left foot, and a right hand and a left hand. When you create content for paired body parts, precede the topmost layer (switch layer, bone group, or image) with a name that starts with **Right** or **Left**, where **Right** corresponds to the right part, and **Left** corresponds to the left part. For example, if you create a set of animated eyes for the front view, place the character's right eye in a switch layer named **Right Front**, and the character's left eye in a switch layer named **Left Front**. Names are case-sensitive and should be initial-capped. Open one of the files in the Eyes, Feet, or Hands folders and examine the layers within them to view the naming conventions used.*

- **Head Props:** Contains the Prop content that you select from the Head Prop section of the Face tab.
- **Heads:** Contains the Head content that you select from the Head section of the Face tab.
- **Mouths:** Contains the Mouth content that you select from the Mouth section of the Face tab.
- **Noses:** Contains the Nose content that you select from the Nose section of the Face tab.

 *Heads, Head Props, Mouths, and Noses don't come in pairs, so you won't need to add the **Right** or **Left** prefix as you do with paired body parts. When you create switch layers for a "single" body part, name the switch layer according to the view that you are creating. For example, if you create a head for the Front 3/4 view, place the head in a switch layer named **Front 3/4**. Names are case-sensitive and should be initial-capped.*

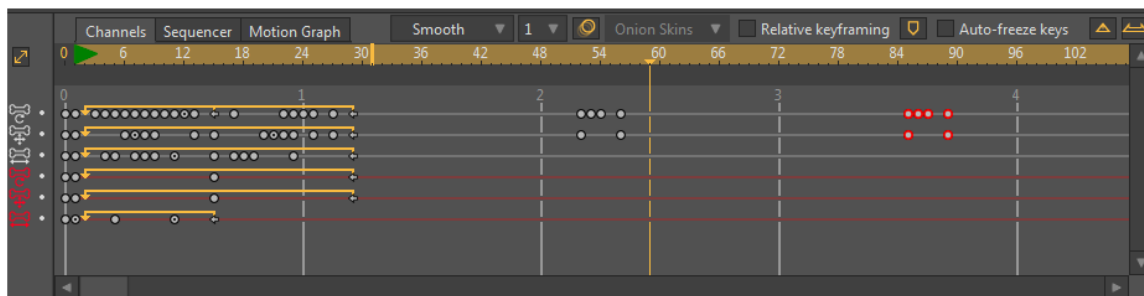
Here are some additional notes and tips about creating content for use in the Character Wizard. Again, we recommend that you study the various ANME files in the Character Wizard subfolders to learn more about how these features work.

Pay attention to the point of origin for the layer that you are working on. The point of origin is important for the main folder (the topmost layer for the part - whether it be a switch group, a bone layer, or an image). For example, if there are multiple eyes contained in a switch layer to make an animated eye, you only need to set the point of origin on the switch layer, instead of on each individual eye layer within that switch layer. If you only have one layer for a body part, set the point of origin on that one layer.

- The points of origin for eyes, mouth, and nose should generally be set at the center. On the other hand, if you are creating something like a broken nose, the point of origin might look better being a little bit off center. For moving parts (like hands, feet, and head) you should set the point of origin at the point of rotation.
- Parts can be resized, but only to a limited degree. In order to work well within the "normal range", parts should be designed to the size of the blue output rectangle. This rule can be broken ... for example, if you intentionally want small, beady eyes you can make them much smaller.
- Examine the heads that are included within the Heads folder. Some heads have hair that fall in front of facial features (for an example, see the Spike head, and turn visibility on and off for the various layers to examine how they work).
- Hair color is controlled within the Style tab of the Character Wizard. When designing your character, assign the color R 0, G 255, B 255 to the objects that you are using for hair (or eyebrows, moustaches, and beards). The Character Wizard will replace this "special" color with the hair color that you choose in the Style tab.
- Skin color is also controlled within the Style tab of the Character Wizard. When designing your character, assign the color R 255, G 255, B 0 to any parts that you want to replace with the Skin color selected in the Style tab.
- Stroke color is also controlled within the Style tab of the Character Wizard. Any strokes in your Character Wizard content file that are pure black (R 0, G 0, B 0) will be replaced with the Stroke color that is specified in the Style tab.

Chapter 16: The Timeline Window

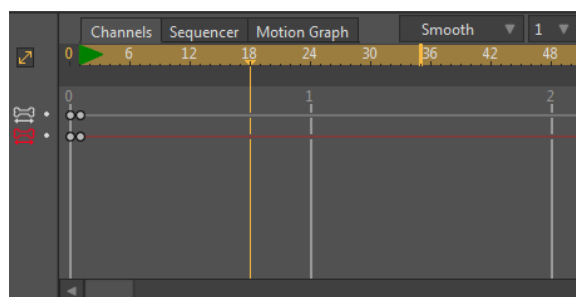
The Timeline window is used when animating in Moho to control the current time, and to control objects' keyframes.



The Moho timeline (Moho Pro shown)

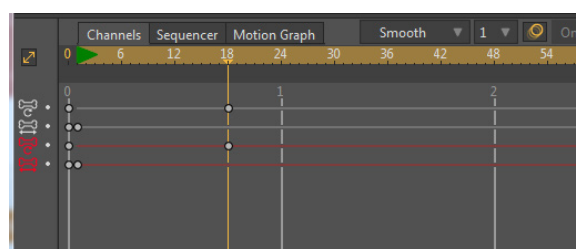
The Timeline window only displays information about the currently active layer in the project. When you switch to a new layer, the timeline panel will update its display to show the new layer's keyframes.

Changes are not displayed in the timeline until you actually create a keyframe change in a channel. For example, you won't see a change in the Bone channel until you actually move a bone.



Animation channels are not displayed in the timeline until you add them to your project

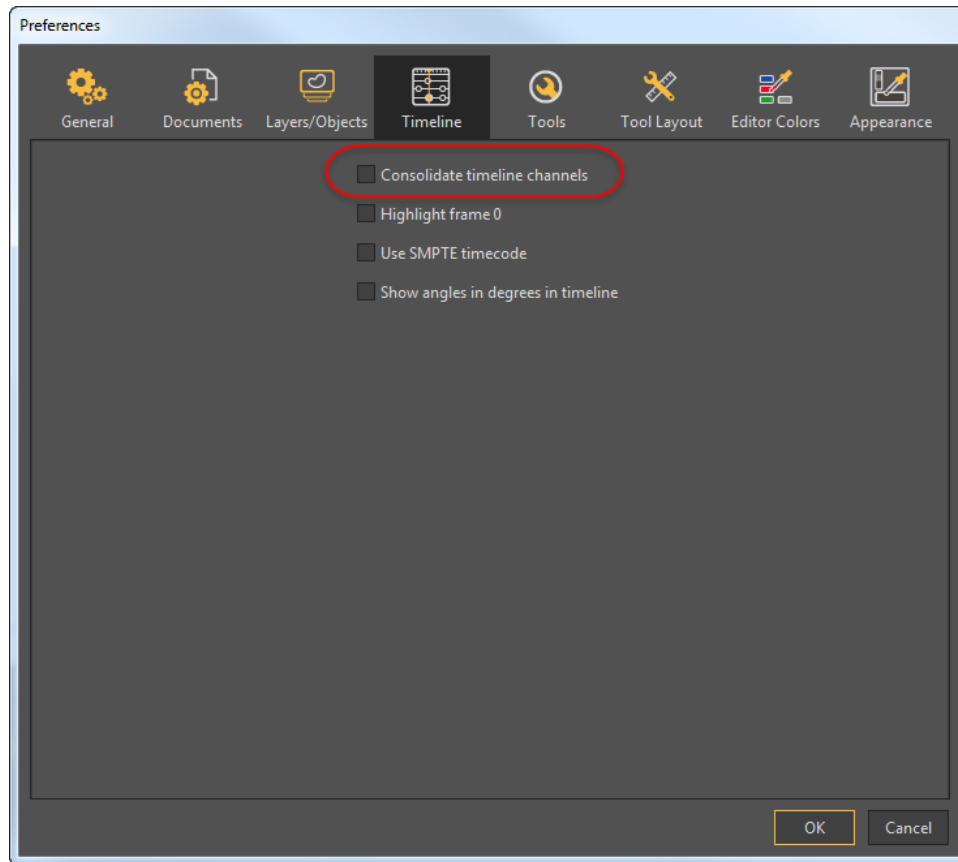
If you then rotate the layer, you'll see the Rotation channel added to the timeline, along with its keyframe.



A rotation channel added to the timeline

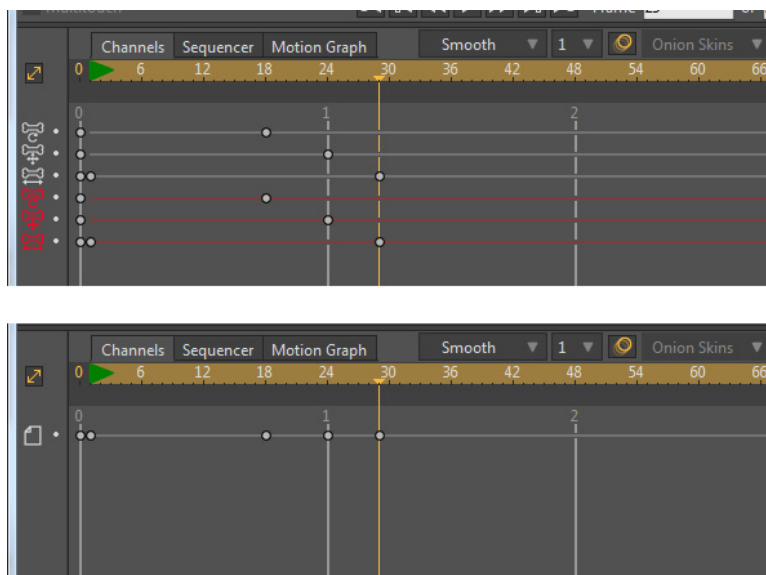
Consolidating Timeline Channels

There is a Preferences option that allows you to consolidate timeline channels. This option is off by default in Moho Pro, and on by default in Moho Debut.




Uncheck the Consolidate Timeline Channels option before you delete keyframes

This option combines all changes on a single layer into one line in the timeline. The following image shows an example of a layer that has several channel changes (top), and what the layer looks like if the Consolidate Timeline Channels option is active (bottom).

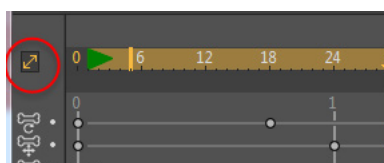


A timeline that is not consolidated (top), and a consolidated timeline (bottom)

 The consolidated timeline view displays a keyframe when there is a change in any of the consolidated layers. If you delete a keyframe, you may not be sure which type of keyframe you are deleting, or whether or not there are multiple keyframes being deleted at that point. Be sure to uncheck the Consolidate Timeline Channels option in the Preferences dialog before you remove any keyframes from your timeline.

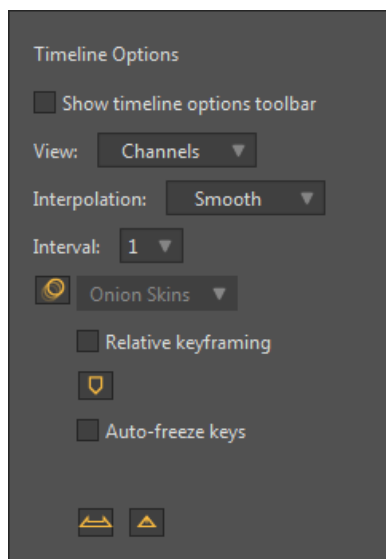
Condensing and Expanding the Timeline

A condense/expand timeline options widget appears in the upper left of the Timeline window. Click the button to access the dialog.



Click the Timeline Options widget to condense or expand the Timeline Options.

Timeline options appear at the top of the timeline. These options can be hidden or shown with a controller that appears next to the ruler. If the options are hidden when you click the widget, a dialog displays the applicable options, along with options to show specific items in the timeline.



Timeline display options.

- **Show timeline options toolbar:** Check **Show timeline options toolbar** to unhide the Timeline Options banner in the timeline.
- **View:** Allows you to choose between Channels view, Sequencer View, and Motion Graph view. Motion Graph view is available in Pro only.
- **Auto-freeze keys:** Enables or disables the Auto-Freeze Keyframes feature, described in [“Auto-Freeze Keyframes” on page 472](#).
- **Zoom In:** Zooms in so that you can view less frames in the timeline.
- **Zoom Out:** Zooms out so that you can view more frames in the timeline.

The following additional options are available in Moho Pro:

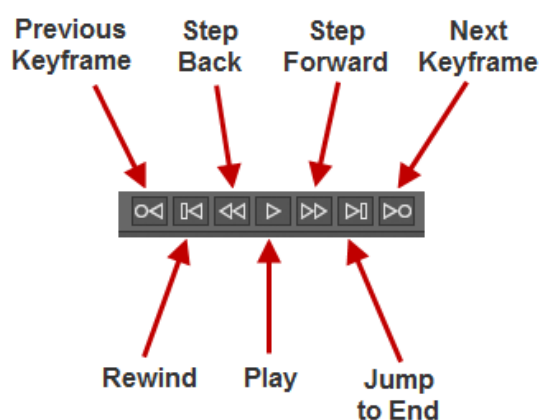
- **Interpolation:** Allows you to choose a default interpolation method. For more information, see [“Choosing an Interpolation Method” on page 338](#).
- **Interval:** Allows you to choose an animation interval. See [“Choosing an Animation Interval \(Pro Only\)” on page 344](#).
- **Onion Skins:** Enables or disables onion skinning. See [“Onion Skins \(Pro Only\)” on page 345](#).
- **Relative Keyframing:** Relative frames are enabled by default. When this option is checked, you will be able to scrub through the timeline, and the onion skin markers will move with the current frame, keeping the same relative distance to each other. When unchecked, the onion skin frames will remain stationary as you scrub through the timeline.
- **Add Marker:** Adds a timeline marker at the current frame.

Controlling Time

The top of the Timeline window has controls for setting the current time. Whenever you modify an object in Moho, the modification is recorded at the current time. The process of modifying an object, changing the time, and modifying it again is how an animation is created in Moho.

Time in Moho is expressed in terms of “frames”, where there are x number of frames in a second. By default, a new Moho project has 24 frames per second, although this value can be adjusted in the Project Settings dialog.

The first set of controls for adjusting time is a set of VCR-like playback buttons. (These are actually at the bottom of the main window, not in the Timeline window itself.) From left to right these buttons are: rewind, step back, stop, play, step forward, and jump to end.



Playback controls

Rewind sets the current frame to 0, while jump to end sets the current frame to the last one in the animation (the length of the animation is defined by the shaded area in the time ruler). The step forward and back buttons advance and back up by one frame. The play button plays back the animation in the main editing area, repeating playback in a loop. Finally, the stop button stops playback.

At the top-left of the Timeline window is a text control that indicates the current frame number. You can change the current frame by typing in a new value here and pressing enter.

Directly below the frame field is a sort of ruler that measures time. This time ruler has small tick marks, one per frame, and has labeled frame numbers at intervals along its length. The time ruler also displays the current frame with a red triangular marker above the current frame's tick mark. The time ruler is used both as an indicator of the current time, as well as a control to adjust it. By clicking (or clicking and dragging) anywhere on the time ruler, you can change the current frame.

A certain range of frames in the time ruler are shaded with a darker color. This shaded region indicates the length of your animation. When you play back your animation in Moho or export it as a movie file, this shaded region is the part that will play back. You can change the start and end frames of your animation in the Project Settings dialog, or you can **Alt**-click in the time ruler to set a new start and/or

end time. **Alt**-Click with the left mouse button to set the start of your animation, and **Alt**-click with the right mouse button to set the end.

Navigating the Timeline with the Mouse

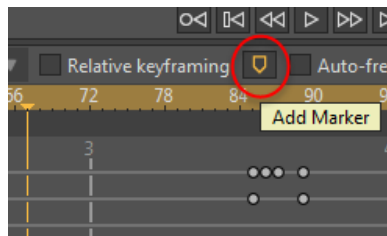
To navigate through the timeline with your mouse, you can use the following:

- Use the mouse scrollwheel to move the sequencer vertically (up and down through the layers).
- Press the Alt key while you use the scrollwheel to move the playhead right and left through time.
- Right-click and drag to pan left or right through the timeline.
- Use the mouse wheel in Graph mode to zoom in and out of the timeline.

Using Timeline Markers (Pro Only)

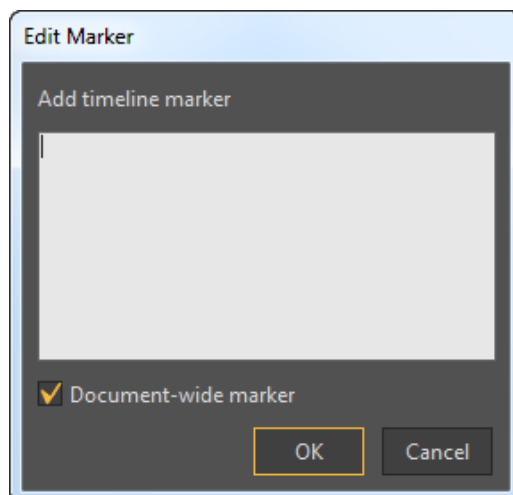
Moho provides an option to add timeline markers that help you identify where specific events take place in your project. The Marker dialog allows you to enter a string of text that identifies the marker. They can be added for an entire document, or per layer.

- To add a timeline marker, go to the frame at which you want the marker to start. Click the **Add Marker** button in the timeline.



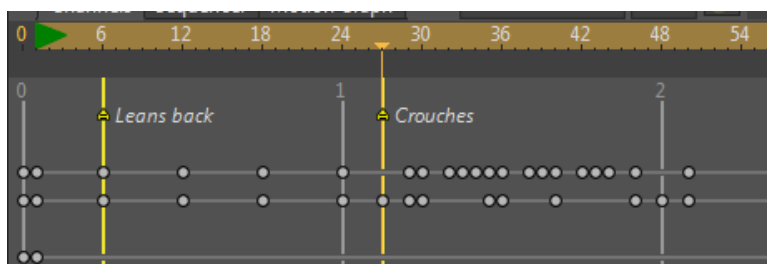
Add Marker button (circled)

- When the Edit Marker dialog opens, enter a name for the marker. Check the Document-wide marker option if you want the marker to apply to the entire document, or leave the option unchecked to add the marker to the currently selected layer.



Edit Marker dialog

- After you create the marker, a marker appears in the timeline. If the text for the marker is longer than can be displayed on the timeline, you can hover the marker to display all the text. Double-click the marker indicator to edit the settings for that marker.



Edit Marker dialog

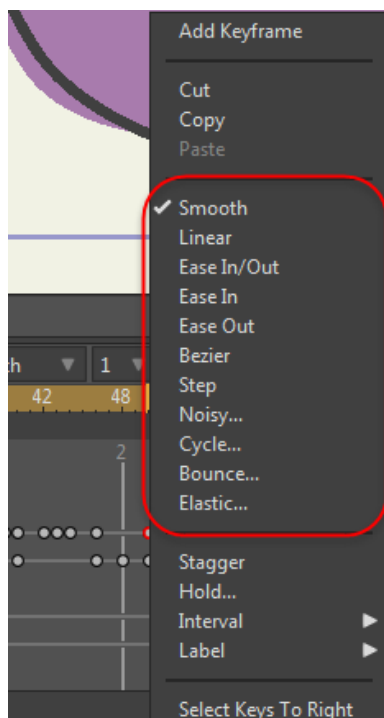
 Timeline marker regions are based on the keyframe's hold values.

 You can manipulate markers just like any other keyframe type.

Choosing an Interpolation Method

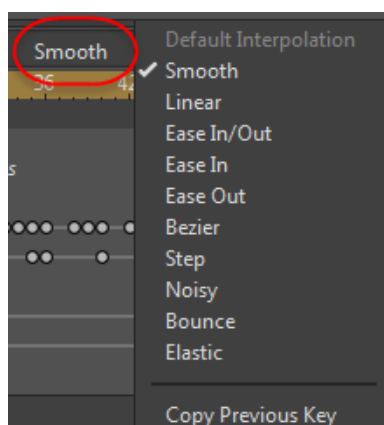
You can choose a keyframe interpolation method in one of two ways:

- **To change the interpolation method for existing keyframes:** Select one or more keyframes. Then right-click a selected keyframe to open the Keyframe menu. Select one of the available interpolation methods from the menu.



Choosing an interpolation method for existing keyframes (Moho Pro shown)

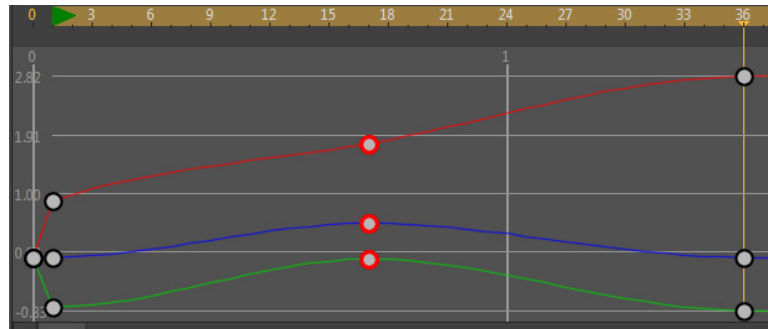
- **To change the interpolation method used for keyframes that you will add to the timeline (Pro only):** Immediately to the right of the Motion Graph tab you will see a popup menu that allows you to choose a default interpolation method. The method that you choose here will be applied to any new keyframes that you create. Moho will provide a real-time preview of the changes as they are applied.



Choosing a default Interpolation Method

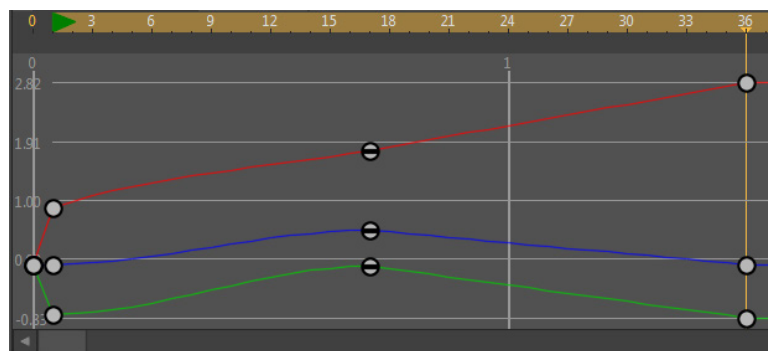
The interpolation methods are as follows:

- **Default Interpolation (Pro only):** Uses the interpolation method that is set by the Interpolation popup.
- **Smooth:** Takes into account neighboring keyframes, creating a smooth transition from one keyframe to the next.



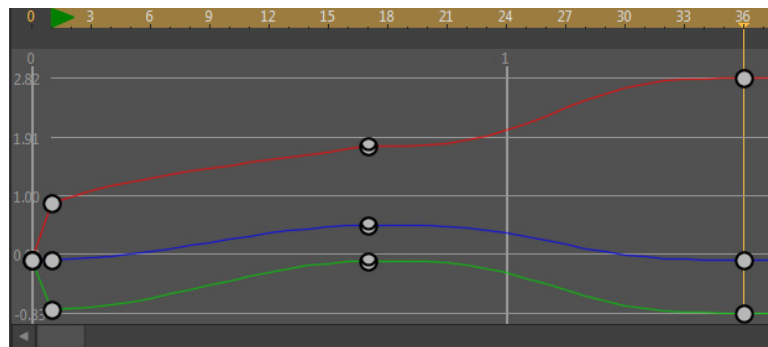
Smooth interpolation

- **Linear:** Moves an object in a straight line, with no acceleration or deceleration from one keyframe to the next.



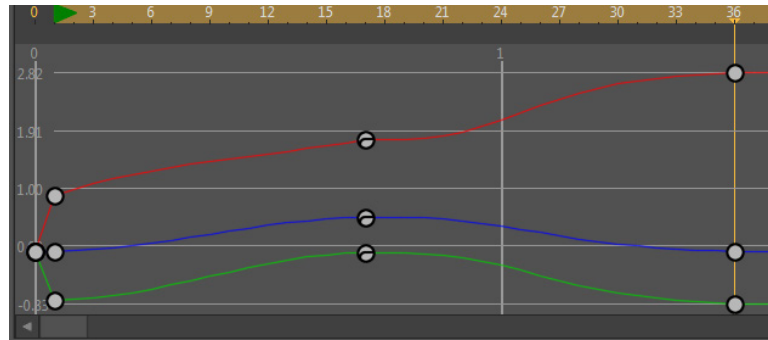
Linear interpolation

- **Ease In/Out:** Creates a smooth transition at the beginning and the end.



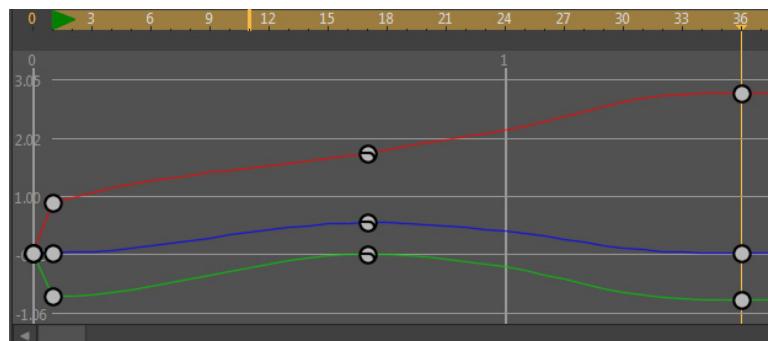
Ease In/Out interpolation

- **Ease In:** Creates a smooth transition at the beginning.



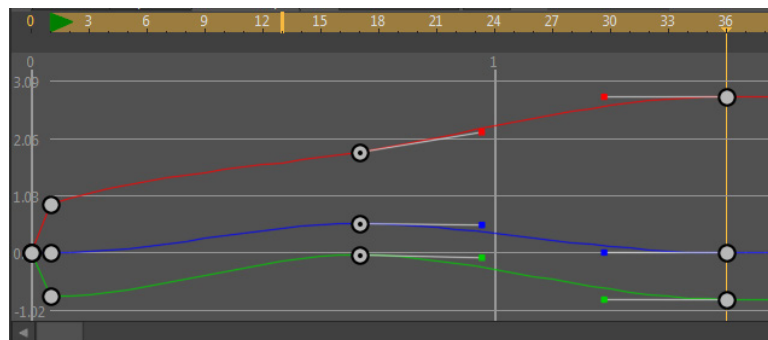
Ease In interpolation

- **Ease Out:** Creates a smooth transition at the end.



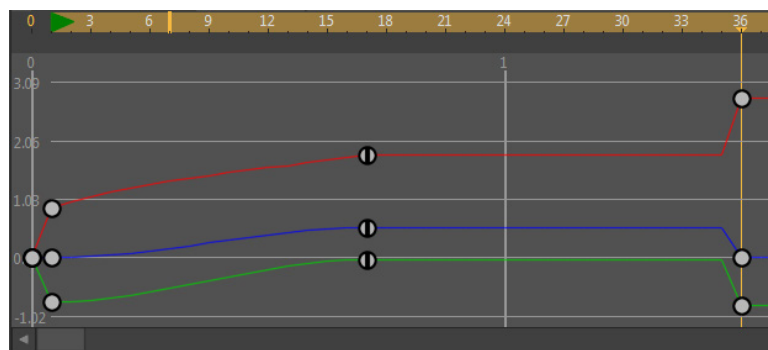
Ease Out interpolation

- **Bezier (Pro only):** Allows you to use Bezier handles to shape an animation curve. Bezier handles in the timeline graph mode are colored Red, Green, and Blue to match colors for X, Y, and Z keyframes.



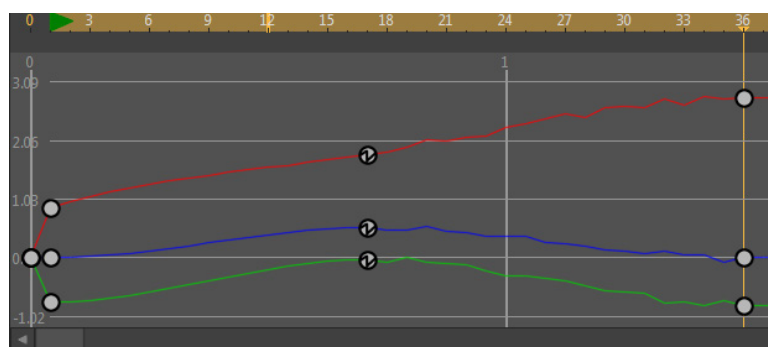
Bezier interpolation

- **Step:** Holds an object, unmoving, at the previous keyframe's position until the next keyframe is reached. Then it suddenly jumps (or steps) to the new position.



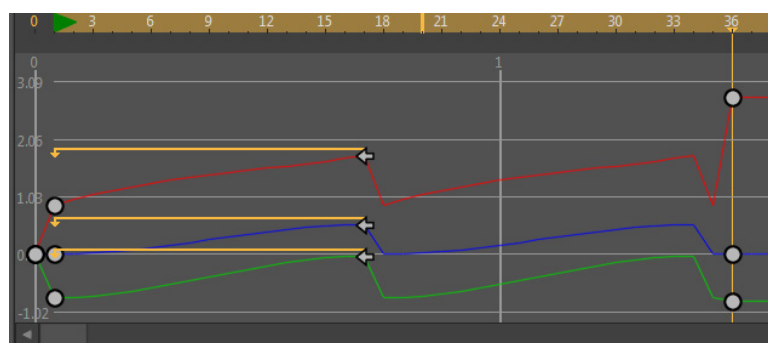
Step interpolation

- **Noisy:** Can be used to simulate a handheld camera, but it can be used to interpolate any value. It adds jitter to the interpolation process so that the object appears wobbly from one keyframe to the next.



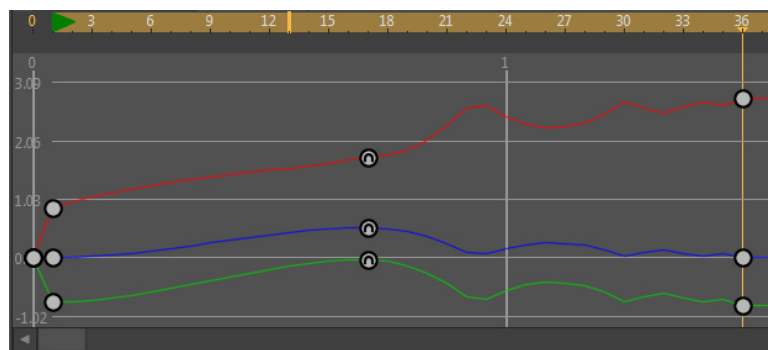
Noisy interpolation

- **Cycle:** Cycles back to a specific frame number (absolute cycling), or back by a specified number of frames (relative cycling).



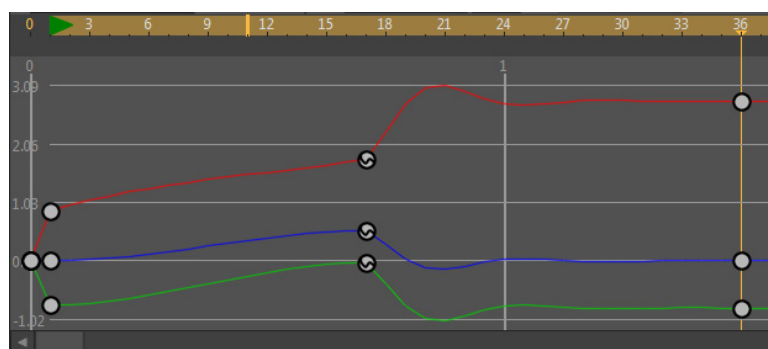
Cycle interpolation

- **Bounce (Pro only):** Creates a bounce between the start and end points. Settings include the number of bounces, and the height scale. A setting of 4 for a bounce count and a scale of .75 would result in an object that bounces four times, and each bounce would reach 75 percent of its previous height.



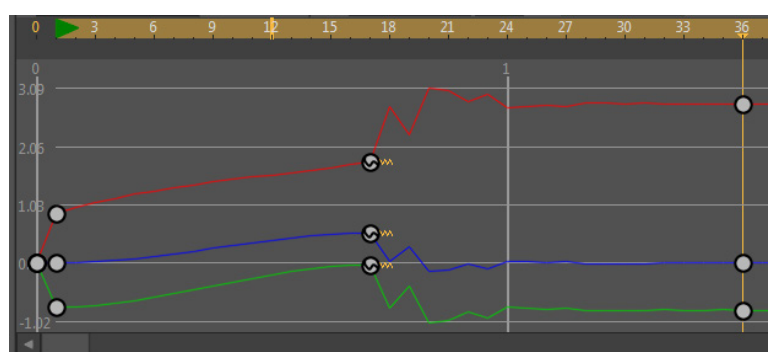
Bounce interpolation

- **Elastic (Pro only):** Similar to bounce, above, except that the effect overshoots the ending value and then curves back again until it settles down on the ending value. You have control over the scale of the bounces, and can also allow the elastic effect to happen in reverse.



Elastic interpolation

- **Stagger (Pro only):** Creates a stairstepping effect between keyframes, and gives the illusion of an object that is staggering against weight.



Stagger interpolation

- **Copy Previous Key (Pro only):** Uses the setting of the previous key as the new default interpolation method for the current channel.

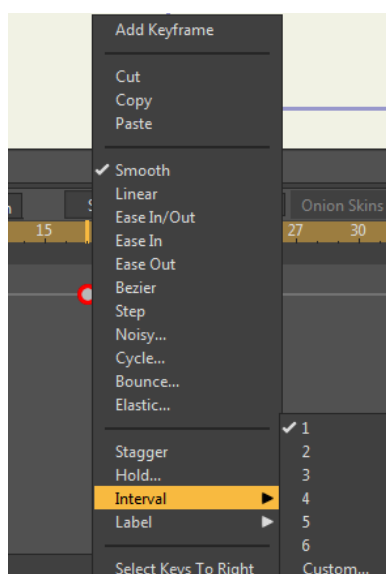
Choosing an Animation Interval (Pro Only)

By default, interpolation is calculated for each frame (an animation interval of 1). There might be cases when you want your animation to be calculated less frequently. The greater the animation interval, the less smooth your animation will be.

The Animation Interval popup menu will allow you to select an animation interval between 1 and 6 frames. You can find this popup menu in the Timeline, between the Interpolation and Onionskins popup menus.

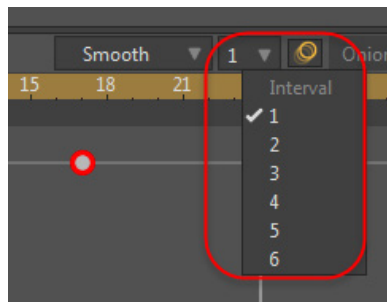
The interpolation level is normally 1, which means that a change is interpolated for each frame. When you choose an animation interval other than one, a change will not occur until after that number of frames is reached. For example, an interpolation level of 3 would cause the selected layer to change at every third frame. This can create motion that looks more staggered, without having to add a lot of keyframes to accomplish the same effect.

- **To change the animation interval for existing keyframes:** Select one or more keyframes. Then right-click a selected keyframe to open the Keyframe menu. Expand the Interval command to select an animation interval between 1 and 6.



Choosing an Animation Interval for selected keyframe(s)

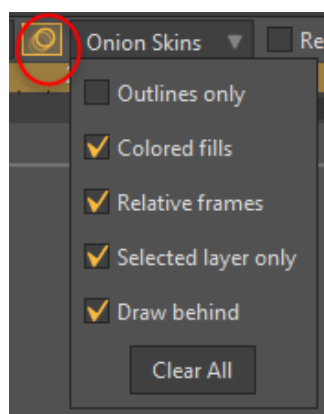
- **To change the default animation interval:** Use the Animation Interval popup that appears in the Timeline window. Click the Animation Interval button to select a default animation interval between 1 and 6. This default animation interval will be applied to any new keyframes that you add, until you change the default setting.



Choosing a default Animation Interval

Onion Skins (Pro Only)

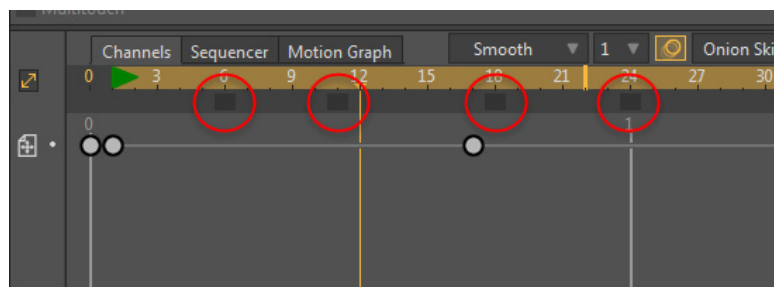
Next, just below the time ruler, is the onionskin controller. Expand the Onionskins menu to enable this feature and set additional options.




Onion Skin Options

The Onionskin options are as follows:

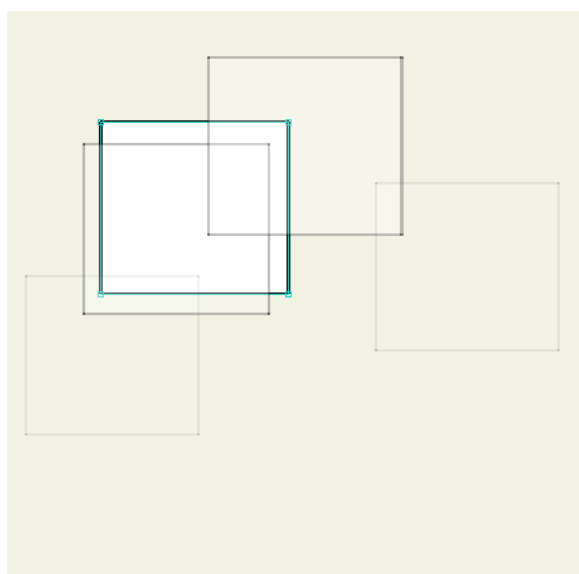
- **Enable onion skins:** Onion skins are disabled by default. Click the Onion Skins button to turn on the display of onion skins. This allows you to set onion skin markers in the timeline. You can also toggle onion skins on/off with the **View > Enable/Disable Onion Skins** command. You will be unable to add onion skin markers unless this option is turned on. You'll notice has marks that line up with the frames in the time ruler. By clicking one of these tick marks, you can turn on an "onionskin" frame. Moho can display up to 8 onionskin frames.
 - To add an onionskin marker, click in the tickmarks, beneath the frame number at which you want to add an onionskin.
 - To remove an onionskin marker, click the marker that you want to remove.



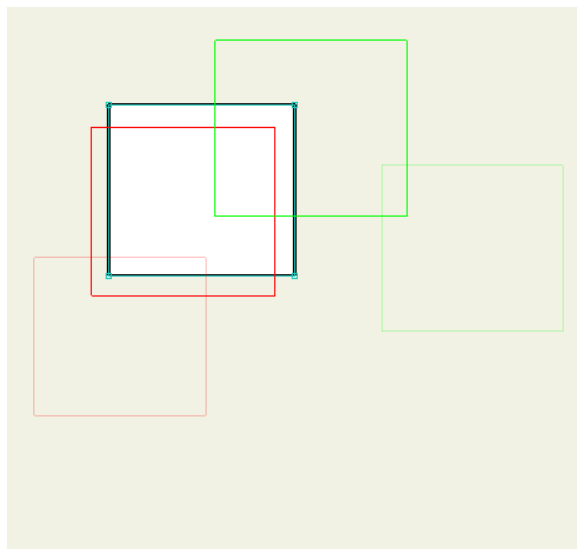
Onion skin markers placed in the timeline.

 If you uncheck this option after you set onionskin markers, it will remove the existing markers completely and the onionskin bar will be inactive. To remove existing markers but keep the bar active, use the **Clear All** button, described below.

- **Outlines only:** Outlines are turned off by default. With this option unchecked, onion skin frames will be displayed at various levels of opacity. Frames that are farther away from the current frame will be more transparent, and frames that are closer will be less transparent. With this option checked, the onion skin frames will be displayed only in outline form. Onionskins before the current frame will be colored red in varying transparencies. Onionskins after the current frame will be displayed green in varying transparencies.



With Outlines Only unchecked, onionskins are shown as partially transparent versions of the layer.



With outlines only checked, onionskins are shown as red and green outlines of varying transparency.

- **Relative frames:** Relative frames are enabled by default. When this option is checked, you will be able to scrub through the timeline, and the onion skin markers will move with the current frame, keeping the same relative distance to each other. When unchecked, the onion skin frames will remain stationary as you scrub through the timeline.
- **Selected layer only:** This option is enabled by default. When checked, this option will only display the onionskins for the currently active layer. When unchecked, onionskins will be displayed for all layers in the scene.
- **Draw Behind:** This option is enabled by default.
- **Clear All:** Click this button to remove all existing onion skin markers. The onion skin bar will remain active so that you can add new onion skin markers.

Playing a Partial Segment

Sometimes, you may want to play back just a short segment of the timeline, instead of your entire animation. For example, you may be working on one small move, and you want to play it back over and over while you make small changes to see when you've got it just right.

To set a limited segment of the timeline for playback, hold down the **Ctrl** key (Windows) or **Cmd** key (Mac) while you click in the time ruler. Click with the left mouse button to set the beginning of the segment, and click with the right mouse button to set the endpoint. To remove the limited playback segment, **Ctrl**-click on the segment endpoints to remove them from the timeline.


Animation Channels

Most of the timeline panel is taken up with animation channels, drawn as horizontal bars below the time ruler. Each animation channel displays a certain type of motion

or effect that can take place in a Moho animation. These animation channels only appear in the timeline if you have keyframes associated with that particular animation channel.

Different types of layers have different animation channels available. For example, vector layers are the only ones with a point animation channel, and bone layers are the only ones with bone animation channels. At the left end of each animation channel is a small icon that indicates what type of channel it is.
























Shown below are the icons for the various types of animation channels. Note that the red-colored channel icons represent animation for the currently selected object. (If you're ever unsure about which channel an channel icon refers to, just hold your mouse over it momentarily for a tooltip reminder.)

 To help reduce visual clutter, not all animation channels have to be displayed at once in the timeline. For example, you won't often have to refer to the Layer Shading channel in the timeline. Hidden channels are still doing their work behind the scenes, they just aren't displayed in the timeline. See "Hiding and Showing Timeline Channels (Pro Only)" on page 351 for more information.










Marker Channels (Pro Only)

	Document Markers
	Layer Markers






Vector Channels

	Point Motion		Selected Point Motion
	Point Curvature		Selected Point Curvature
	Fill Color		Selected Fill Color
	Shape Effect Transforms		Selected Shape Effect Transform
	Shape Effect		Selected Shape Effects
	Shape Thickness		Selected Shape Thickness
	Line Color		Selected Line Color
	Line Width		Selected Line Width
	Curve Exposure		Selected Curve Exposure
	Point Color		Selected Point Color
	Point Color Strength		Selected Point Color Strength
	Shape Order		













Layer Transform Channels


	Layer Translation
	Layer Scale
	Layer Z Rotation
	Layer Y Rotation
	Layer X Rotation
	Layer Horizontal Flip
	Layer Vertical Flip
	Layer Shear
	Path Following

Physics Channels





	Enable Physics
	Physics Nudge
	Physics Motor Speed
	Physics Force Field
	Selected Physics

Layer Effect Channels





















	Layer Visibility
	Layer Blur
	Layer Opacity
	Auto Shading
	Threshold
	Layer Noise
	Layer Pixelation
	Layer Shadow
	Layer Shading
	Layer Motion Blur
	Perspective Shadow
	Outline

	Layer Color
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Camera Channels

	Camera Tracking
	Camera Zoom
	Camera Roll
	Camera Pan/Tilt

Bone Channels


	Bone Angle *		Selected Bone Angle
	Bone Translation *		Selected Bone Translation
	Bone Scale *		Selected Bone Scale
	Bone End Flip		Selected Bone End Flip
	Bone Side Flip		Selected Bone Side Flip
	Bone Lock		Selected Bone Lock
	Bone Target		Selected Bone Target
	Bone Parent		Selected Bone Parent
	Bone Dynamics		Selected Bone Dynamics
	Bone Motor Speed		Selected Bone Motor Speed

* Angle, Translation, and Scale channels are also displayed in the timeline for colored bones (appropriately colored Coral, Cadet Blue, Turquoise, Pink, Tan, Purple, Blue, .Green, Yellow, Orange, and Red.


Group Channels

	Layer Ordering
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Switch-Only Channels

	Switch Layer
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Particle-Only Channels

	Particles On/Off
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Physics Channels (Pro Only)

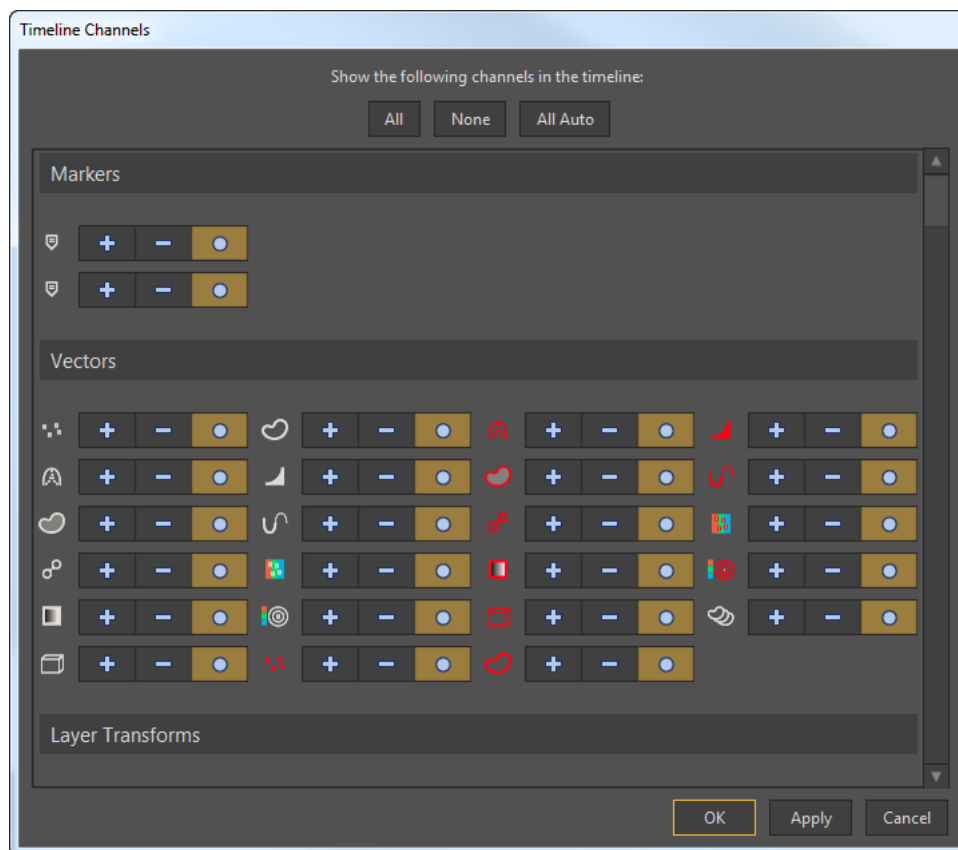
	Enable Physics
	Physics Nudge
	Physics Motor Speed
	Physics Force Field

Other Channels

	Audio Jump		
	Audio Level		
	Media Jump		
	Mute		
	No Mute		
	Off		
	On		
	Poser		Selected Poser
	Tracking Point		Selected Tracking Point

Hiding and Showing Timeline Channels (Pro Only)

The **View > Timeline Channels** command opens the Timeline Channels dialog, which allows you to configure the channels that appear in the timeline.



Timeline channels dialog

The top of the Timeline Channels dialog shows three buttons:

- **All:** Click the **All** button to set all channels to display in the timeline. The channels will appear in the timeline whether or not they are used in the project.
- **None:** Click the **None** button to set all channels off in the timeline. Channels that are set to off will not appear in the timeline, even if they are used in the project.
- **All Auto:** Click the **All Auto** button to set all channels to Auto. This mode will cause a timeline channel to appear in the timeline only if it is used in the project, and is the default selection when you first open the Timeline Channels dialog.
- You can also select individual channels to on, off, or auto by clicking the appropriate icon next to the channel that you want to set.
- After you set your timeline channel display options, click **OK** to exit the dialog. You can also click **Apply** to assign those that are already configured and remain in the dialog to make additional changes. Click **Cancel** to exit the dialog without saving changes.

Working with Keyframes

Keyframes are displayed along the length of an animation channel. A keyframe represents a point in time at which you, the animator, made a modification to an

object. For example, if you set the current time to frame 24, then scale the layer, a keyframe will appear in the layer scale channel at frame 24.

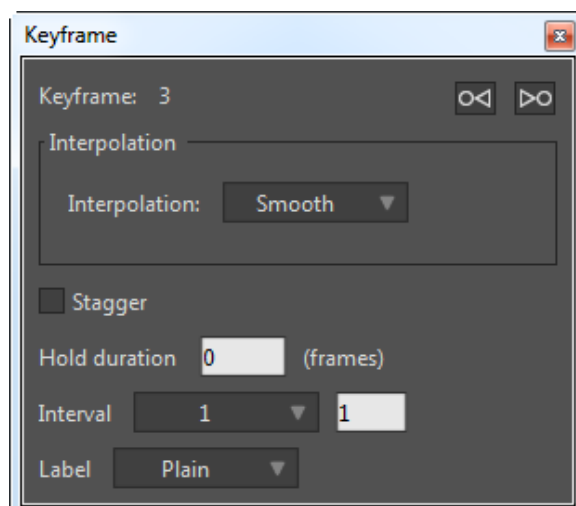
Keyframes appear as small markers on the channels. At points in time that lie in between keyframes, Moho automatically calculates how to move an object from one keyframe position to the next.

Keyframes are not just static elements displayed in the animation channels. They can be moved, deleted, and copied. Moho remembers what key frames are selected when you change layers, delete keys, move keys, and so on.

Editing Keyframe Settings

The **Window > Keyframe** command opens the Keyframe window so that you can manage settings for the keyframes in your project.

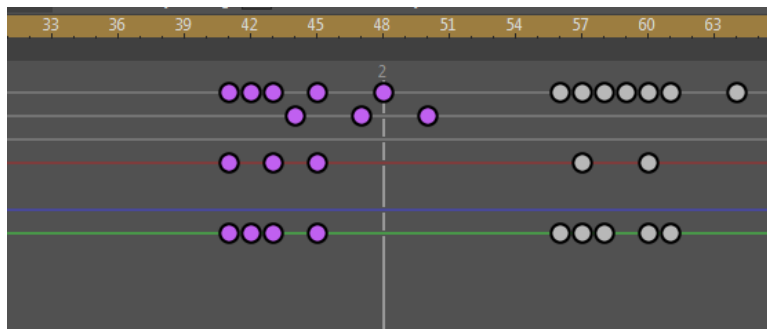
1. Select the keyframes that you want to modify.
2. Choose **Window > Keyframe** or use the shortcut **Ctrl/Command+Alt E** to open the Keyframe dialog.



Keyframe dialog

3. Modify the following settings as applicable. Settings are applied live as you modify them:
 - **Keyframe:** Displays the frame number at which your keyframe selection begins. The plus sign indicates that the selection extends beyond the designated frame number.
 - **Interpolation:** Use the Interpolation menu to select the desired interpolation method for the keyframe selection. These methods are described in [“Choosing an Interpolation Method” on page 338](#).
 - **Stagger:** Check this option to apply a “stairstep” effect to the selected interpolation method.
 - **Hold Duration:** Enter the number of frames desired for the hold duration (the number of frames you want to hold the objects in their current position) and press Enter to apply the setting. For additional information, see [“Hold Durations” on page 357](#).

- **Interval:** By default, interpolation is calculated at every frame. Increasing the setting creates an animation that is less smooth.
- **Label:** Use the Label dropdown to choose a color that later helps you identify keyframes that share common settings.



Keyframes with a color label applied.

Adding Keyframes

Keyframes are added automatically when you make a change (such as position, rotation, scale, etc) on any object in your project.

Use the **Animation > Add Keyframe** command to add a new keyframe to any animation that already has keyframes.

You can also add a keyframe to the current frame at any time by double-clicking the timeline in any animation channel. This also works in graph mode in Pro only.

Copying and Pasting Keyframes


Another way of creating keyframes is to copy an object's position from another point in time. Keyframes can also be copied from one layer to another, or from one document to another.

To copy keyframes:

1. Select the keyframes you want to copy.
2. Press **CMD/Ctrl C** to copy the keyframes to the clipboard.
3. Select the layer or document to which you want to paste the keyframes.
4. Set the current frame to when you want the copied keyframe to appear (using the time ruler or the step forward/back buttons).
5. Press **CMD/Ctrl V** to place a copy of the keyframes at the current time. When you paste keyframes, they become the new selection so that you can move, scale, or finetune them.



*You can also right-click on selected keyframes in the timeline, and choose **Cut**, **Copy**, or **Paste** from the context menu.*

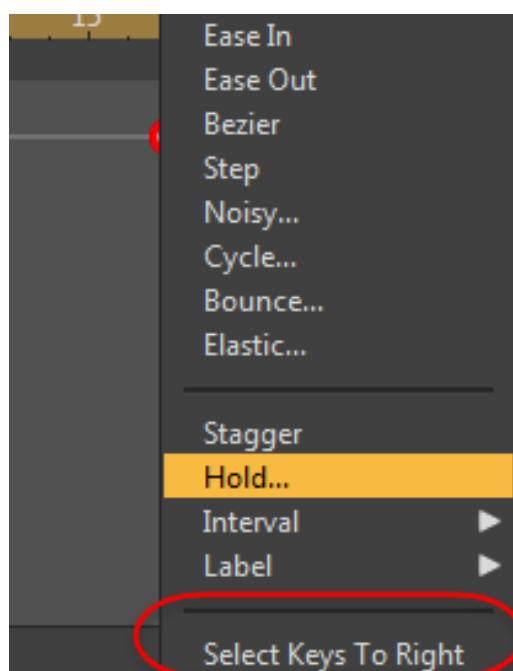
 You can also use the **Edit > Paste Relative** command to paste keyframes and continue animation relative to the current position in the timeline. See “Paste Relative” on page 428 for more information.

Selecting Keyframes

To modify a keyframe, first it must be selected. This is accomplished simply by clicking a keyframe in the timeline panel. A selected keyframe shows up in a highlighted color.

Multiple keyframes may be selected by holding the shift key while clicking on keyframes. Alternatively, you can click and drag a rectangular selection box around the group of keyframes you want selected.

In Moho Pro, you can also right-click a keyframe and then use the **Select Keys to Right** command in the context menu to select all keyframes that appear in time after the currently selected keyframe. This helps when you need to add space in the middle of a long animation, because you won't have to scroll through to the end of the animation while selecting keyframes manually.



Keyframe context menu (Moho Pro shown)

Deleting Keyframes

To delete selected keyframe(s), press the **Delete** key. Deleting a keyframe removes motion from an object.

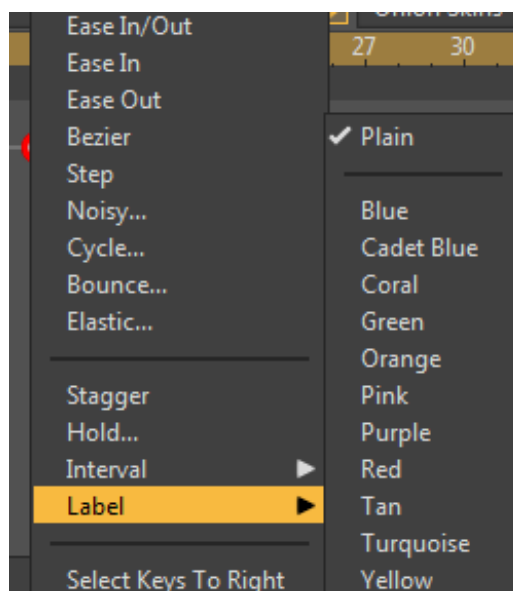
Moving Keyframes

Keyframes can also be moved by dragging them forward and back in time. If you want some motion to take less time, drag its keyframe to the left. To take more time, drag it to the right. You can also move selected keyframes beyond other keyframes.

Coloring Keyframes

You can use color to label the keyframes in your timeline in ways that are meaningful to you. For example, you can assign one color to keyframes that pertain to a particular character in your scene, and another color for another character. This helps you visually keep track of the movements associated with a particular object or group of objects.

To add color to keyframes, select the keyframes that you want to assign color to. Then right-click to display the Keyframe context menu, and choose **Label >** followed by your color choice (**Blue, Cadet Blue, Coral, Green, Orange, Pink, Purple, Red, Tan, Turquoise, or Yellow**).



Assigning a color label to keyframes

Editing Multiple Keyframes

If you have a number of keyframes that you want to edit, you can now select multiple keyframes and edit them at the same time. For example, if you want to move an object to a different part of the screen but want to keep the animation of that object the same, you can select all the keyframes and translate them all at the same time. Select all the keyframes for that object and use the mouse to move the object to the new location. Then release the mouse button to complete the movement.

This works for both layer movement and point movement. For example, let's say that you have a circle that squashes and stretches, but you want to turn it into a petal shape. You can select all of the keyframes and then reshape the object on the first

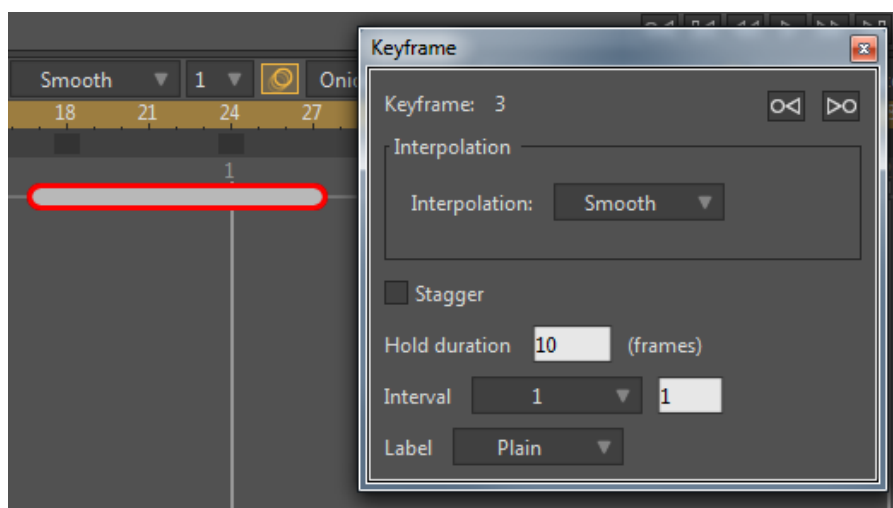
keyframe as needed. Then the reshaping will be applied to all of the keyframes that follow.

Hold Durations

There are times when you need to hold an object in the same position for a while, before the animation starts. In cases like this, you can add a hold duration that keeps the object in place for a set number of frames. Place a keyframe in the first frame where you want the object to stay still, and then add a hold duration for the number of additional frames where you want the object to pause.

To directly modify the hold duration for a selected keyframe, hold down the **ALT/OPTION** key while dragging the keyframe in the timeline. A red pill shape will appear in the frames where the keyframe is held in its set position.

You can also right-click the keyframe in the timeline to display the keyframe context menu, and then enter a hold duration (in frames) in the Hold Duration dialog.



Hold durations shown in the timeline.



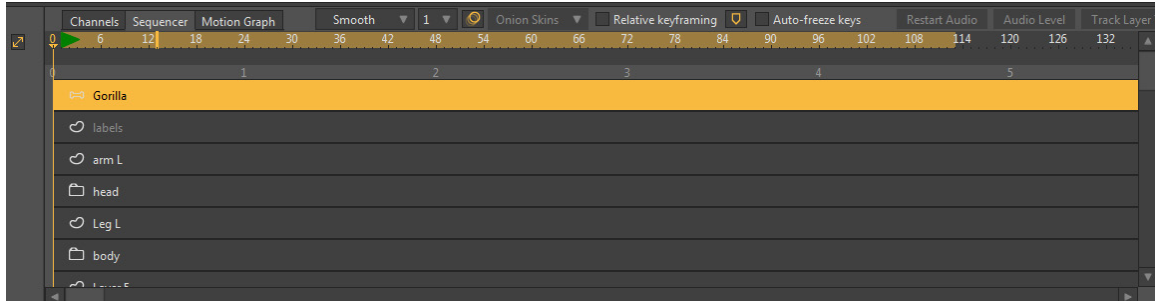
Pill shapes are used to represent switch keys, layer ordering keys, and keyframes that have hold durations.

Keyframe Transitions

As mentioned before, Moho automatically calculates what happens in between keyframes. However, you do have some control over this. By default, Moho will compute a smooth transition from one keyframe to the next - most of the time, this is probably what you want. However, you can change the transition type by right-clicking a keyframe and choosing a new method from the popup menu that appears. The transition methods are: smooth (the default), ease in/out (also a smooth motion, but the object starts off moving kind of slowly and slows down again as it approaches the next keyframe), linear (motion is straight from one keyframe to the next, leading to a somewhat mechanical look to the motion), step (there is no transition at all - the object just jumps from one keyframe to the next), noisy (the object moves in a slightly wobbly motion), and cycle (the value from this keyframe to the next will be taken from some earlier section of the timeline).


Sequencer

The sequencer provides another view of the timeline. It displays each layer as a block of time. Keyframe changes are not displayed in the sequencer, but you can create keyframe changes in this view.

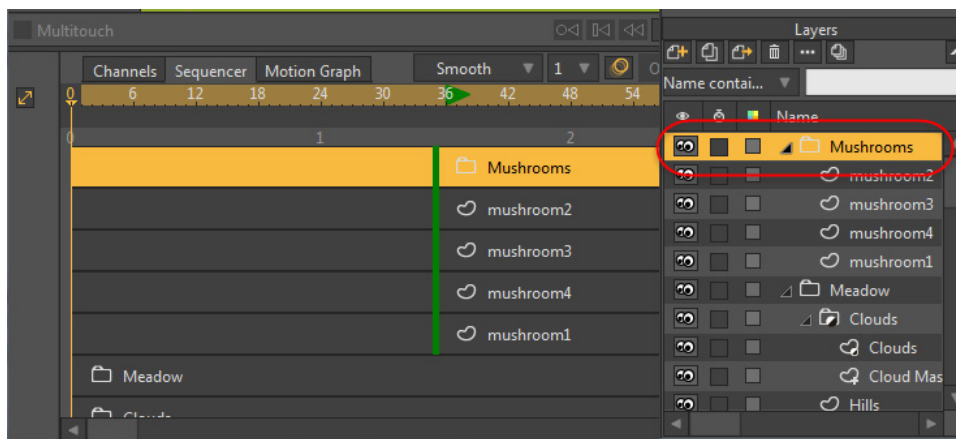


The Sequencer

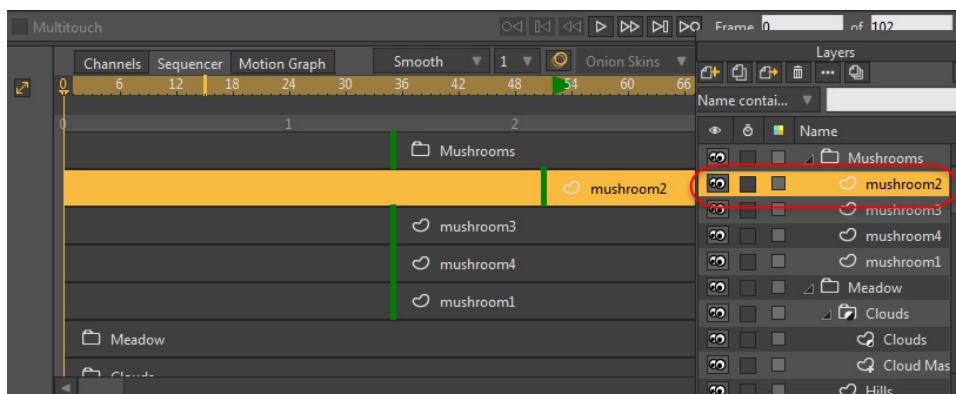
The Sequencer allows you to easily move a layer forward or backward in time. Move the clip toward the left to have it start sooner, or toward the right to have it start later. The green arrow in the time ruler, located at the top of the Sequencer timeline, indicates the frame at which the currently selected clip will start.

 You can also reposition your clips in the Channels timeline view. Select the channel you want to move, then right-click in the Time Ruler to drag the green arrow to the right or left. You'll notice the keyframes and arrow relocate with the mouse.

For example, you can reposition a layer from frame 1 to frame 38, causing the animation in that layer to start at a later time. To move a layer and its sublayers, click the topmost layer and move all of them at the same time. To move a sublayer, click the desired sublayer to move it on its own.

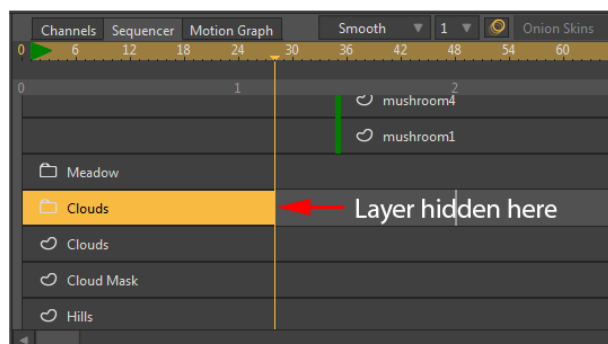
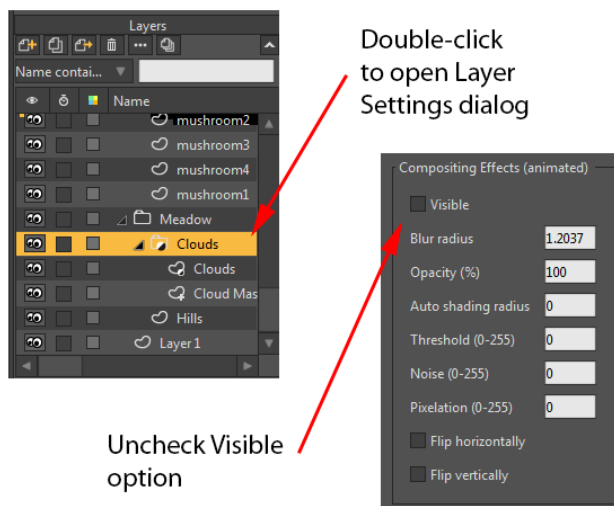


Select a layer to move it and its sublayers



You can also move a sublayer by itself

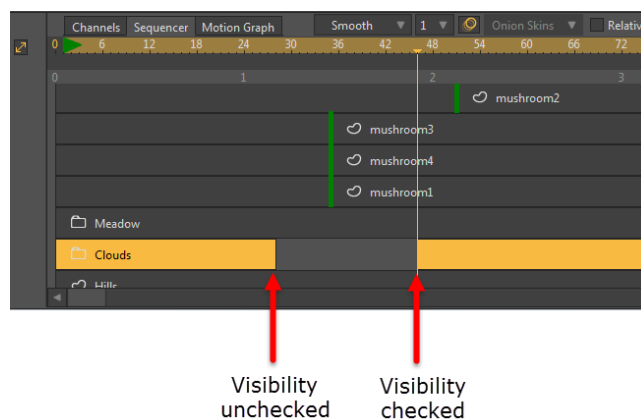
You can also use the sequencer to show or hide a layer at any time during the movie. Advance to the frame where you want the layer to become invisible. Open the Layer Settings dialog for the layer that you want to hide, uncheck the Visible checkbox, and close the Layer Settings dialog. The contents in the layer will disappear in the project window, and the track in the sequencer will appear as though it ends at the point where it was hidden.



Check or uncheck the Visible setting in the Layer Settings dialog to show or hide a layer

To make the layer reappear later in the timeline, repeat the process. Select the layer you want to unhide, open the Layer Settings dialog, and check the Visible

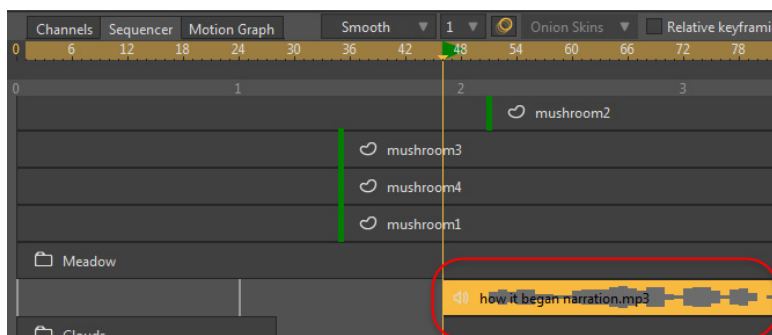
checkbox. After you close the Layer Settings dialog the layer will reappear in the sequencer.



The sequencer shows a break where the layer is hidden

If you import an audio file, it has a fixed duration in the sequencer. You can see where the sound effect will happen. Say you want a pop to happen when your character disappears from the scene. You can place the pop in the right place.

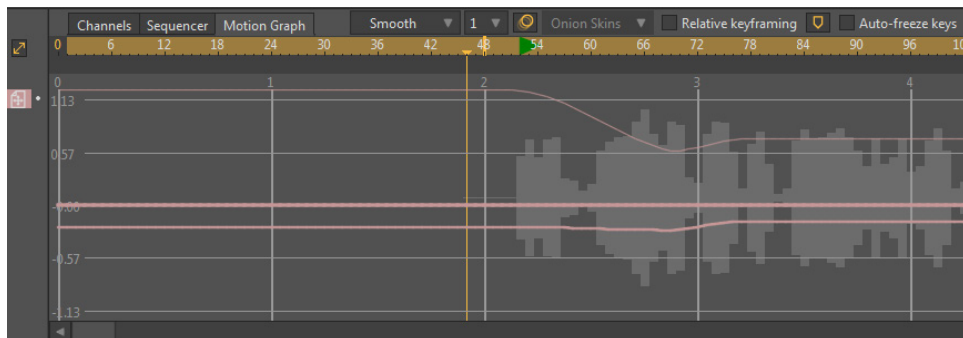
It works the same way if you import a video layer. For example, if you want an explosion to happen just before the pop, you can import a video layer and place it just before the sound effect.



You can precisely place audio and video files in Sequencer view

Motion Graph (Pro Only)

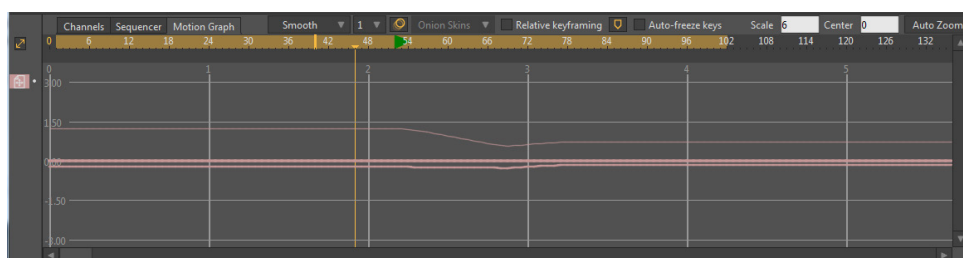
In the Motion Graph in the Timeline window, you can enable Moho's graph mode. In graph mode, the animation channels of the current layer are displayed graphically, rather than just as points along a line. In the example below you can see what graph mode looks like:



The Timeline window in graph mode

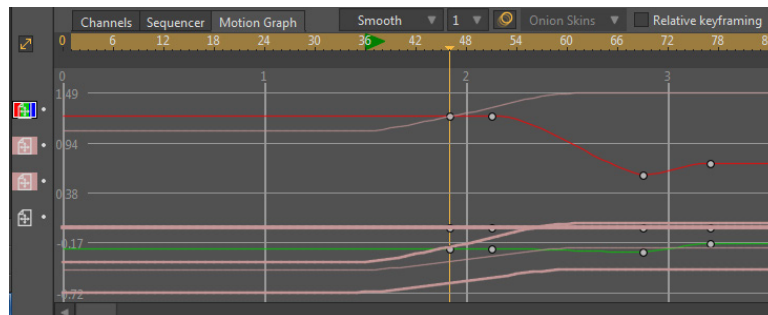
The main body of the timeline is now a graph, showing the value of the animation channels as curves:

- The horizontal dimension represents time in frames (just as in the regular timeline mode). To move forward or backward in time, you can scrub the playhead left or right.
- Depending on the values in your animation channels, the curves on the graph may be too large to view, or too small to work with easily. You can change the vertical scale of the graph in the following ways:
 - Scroll the mousewheel to increase or decrease the vertical scale.
 - Set the vertical scale numerically in the **Scale** text field in the Graph Mode popup.
 - Press the Page Up/Page Down keys to zoom in and out vertically. If you hold the **Shift** key while pressing Page Up/Page Down, you can move the graph up and down.
 - Press the End key, to automatically scale the graph to accommodate the currently active channel.



Use the scrollwheel on your mouse to increase the vertical range of the animation curves.

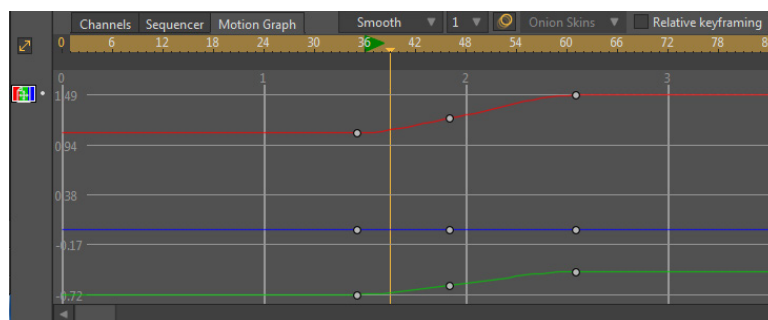
If all animation channels were displayed at once, the graph would become too cluttered to be useful, so it's up to you which channels to display at any given time. To turn the display of a channel on and off, click its icon on the left side of the timeline. Channels that are turned on become highlighted in the color of their respective curves in the graph - in the following example, three channels are turned on. Double-click again to display further information for a channel: Move (red), Scale (blue), and Rotate (green).



Channels can be shown or hidden in the timeline.

In graph mode, you can still add keyframes (use the popup menu through the right mouse button), delete keyframes, and move keyframes back and forth. In addition, you can move keyframes vertically - that is, change the value of keyframes.

Something that will become apparent in graph mode is that some channels have more than one value for every keyframe. For example, the Layer Translation channel has separate values for X, Y, and Z translation. These values will appear as separate colors in the graph: Red for X, Green for Y, and Blue for Z.



Different colors are used for X (Red), Y (Green) and Z (Blue) layer translations.

Another thing you may notice when using animation cycling: A channel that cycles will have a repeating curve, without more keyframes after the one that cycles.

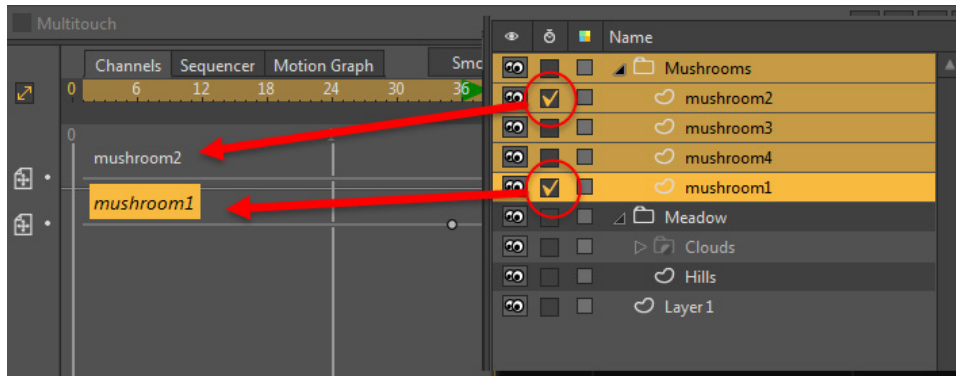
For a hands-on example of using the timeline in graph mode, see **“Tutorial 5.4: Animation Curves (Pro Only)” on page 188 in your Moho Tutorial Manual.**

Displaying Multiple Layers in the Timeline

If you select multiple layers in the Layers Window, they will all appear in the timeline.

- The layer name will appear in the timeline. Click the layer name to select that layer in the timeline. The name of the selected layer will highlight and appear in italicized text.
- In Moho Pro, the Layers Window contains Timeline Visibility controls that allow you to select which layers you want to display in the timeline. You can enable or disable this column using the Quick Settings dialog, discussed in [“Using Layer Quick Settings” on page 179.](#)

- If the layer has a color assigned to it in the Layers Window, the layer color will be reflected in the timeline.
- You can select keyframes from multiple layers, and delete, copy or paste them at the same time.



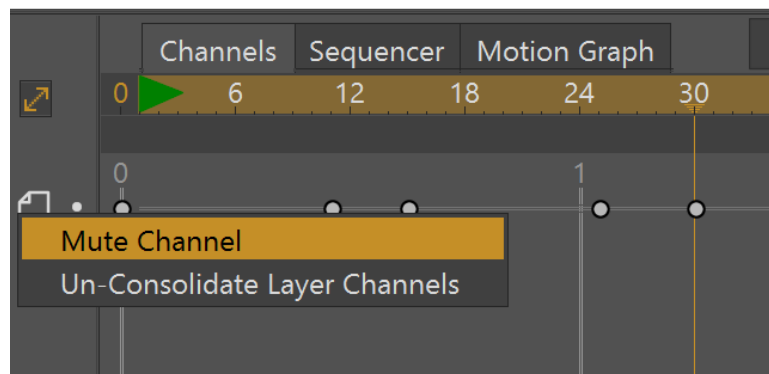
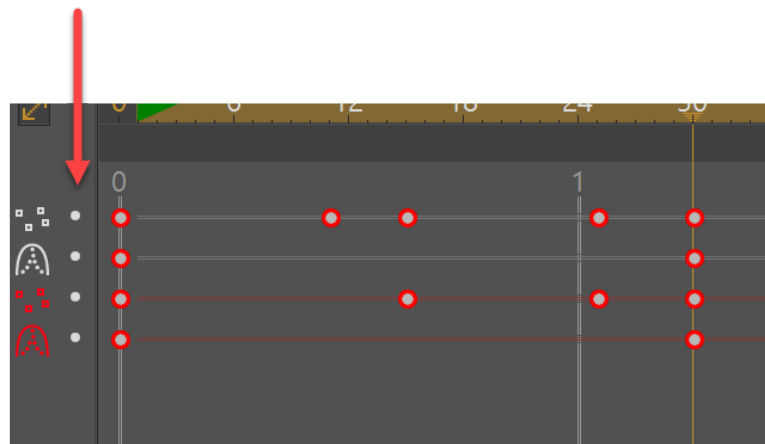
Timeline Visibility of two layers is set in the Layers Window. The current layer is highlighted in the timeline.

Muting Animation Channels (Pro only)

If you are working on a scene or character that has a lot of layer movement or camera movement, you can “mute” other animation channels so that you can concentrate on the character. This will temporarily disable any keyframes in the muted channel. After you finish your changes, you can click the Mute button again to toggle the channel back on.

To mute a channel, click the small dot that appears to the right of the channel icon that you want to mute. You can also right-click the channel icon and choose Mute Channel from the context menu.

Mute buttons



Muting animation channels.

Chapter 17: Other Windows

Audio Recording

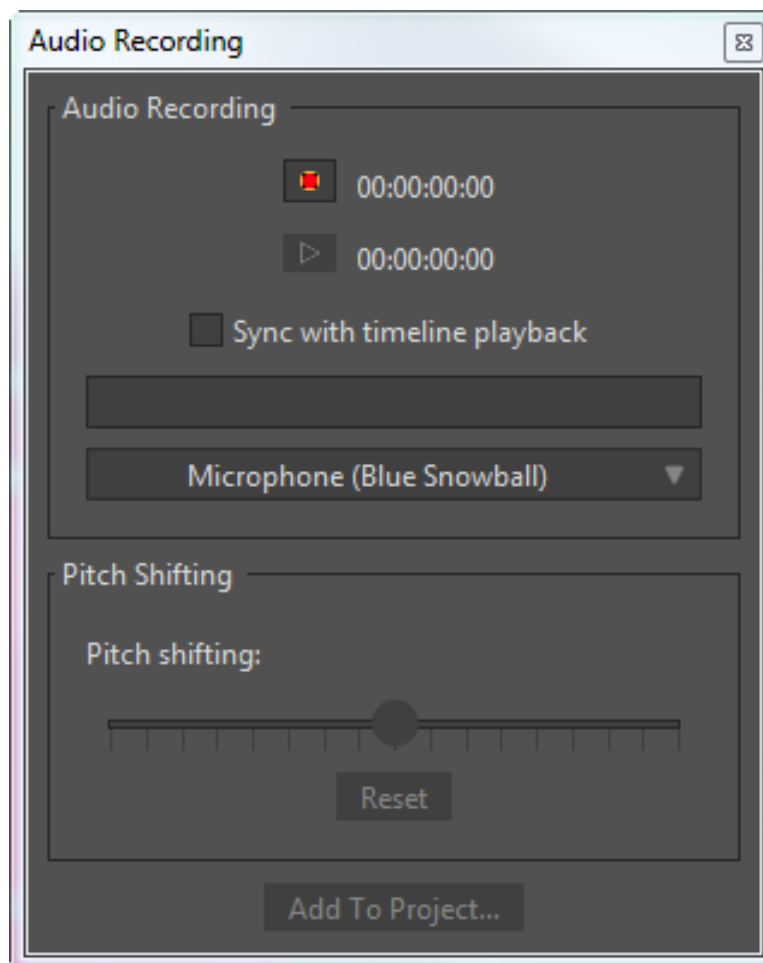
Moho allows you to record audio tracks within the application. Select **Window > Audio Recording** to open the Audio Recording palette. You will see the following controls and settings:

- **Record Button:** Press the Record button to start a recording. After you have recorded the content you want to record (speech, sound effects, etc.), press the same button to stop the recording.



You can start a recording at any selected frame in the timeline. Simply select the frame at which you want the recording to begin, and start your recording at that frame.

- **Play Button:** After the recording is complete, press the Play button to hear the recording.
- **Sync with Timeline Playback:** If this box is checked, the timeline will play back while you record the audio (and when you play back the audio). This lets you record in sync with the visuals if you choose to do so.
- **Microphone Drop-Down List:** Selects the microphone that you want to use for audio recording.
- **Pitch Shifting:** Use the Pitch Shifting slider to raise or lower the pitch of the recording. Move the slider toward the left to lower the pitch, or toward the right to raise the pitch. The Reset button returns the recording to its original pitch.
- **Add to Project:** Once you are satisfied with the recording, click this button to save the recording as a WAV file. The WAV file also appears in the Layers Window as a new audio layer, and in the timeline of your current project.

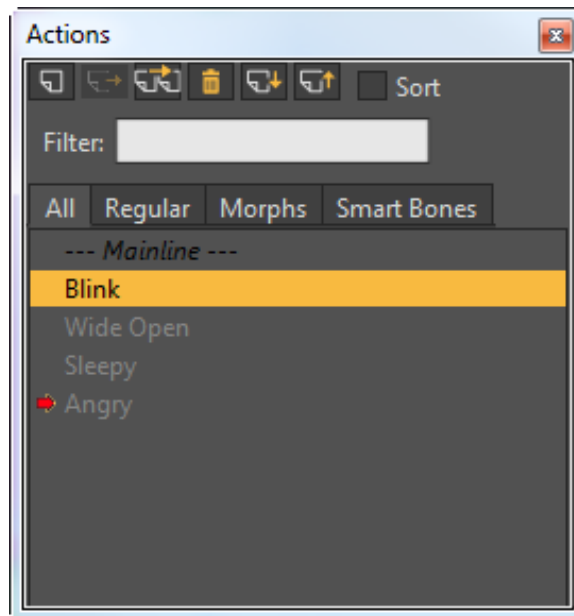


Audio Recording Window

Actions Window (Pro Only)

In Moho, “actions” are short clips of animation that can be inserted into the timeline and re-used over and over again. You might use actions to create little bits of animation that you don’t want to have to re-create each and every time you use them - for example, eye blinks, head turns, walk cycles, etc. The Actions window (as you may have guessed) is where you create and use actions. **“Tutorial 5.5.1: Animated Layer Ordering” on page 196 in your Moho Tutorial Manual** shows you step-by-step how to use actions in Moho.

When you start up Moho, the Actions window is hidden. To bring it up, select “Actions” from the Window menu. The Actions window looks like this:



The Actions window

Across the top of the window are several buttons and controls:

- **New Action:** Creates a new action, as described in “[Creating New Actions \(Pro Only\)](#)” on page 369
- **Insert Reference:** Adds an action to the timeline (see “[Using Actions \(Pro Only\)](#)” on page 373)
- **Insert Copy:** Adds a copy of an action to the timeline (see “[Using Actions \(Pro Only\)](#)” on page 373)
- **Delete Action:** Deletes the action from the actions list.
- **Import Action:** Allows you to import an action file that was previously exported from another project. Click the **Import Action** button and locate the action file you want to import (.asaction or .mohoaction extension). Alternatively, you can right-click inside the action list and choose **Import** to select your file.
- **Export Action:** Actions can be exported for use in other projects. Either select the action you want to export and click the **Export Action** button, or right-click the action and choose **Export** from the context menu. The file will be saved with the .mohoaction extension.
- **Sort:** If you have many actions in your list you might find it convenient to check the **Sort** option. If this option is unchecked the Actions window will display the actions in the order in which they were created in the layer. You can manually reorder the items in the list when the checkbox is not checked.
- **Filter:** When you enter a string in the **Filter** field, only action names that contain that string will appear in the list along with mainline and the current action.

The Actions List

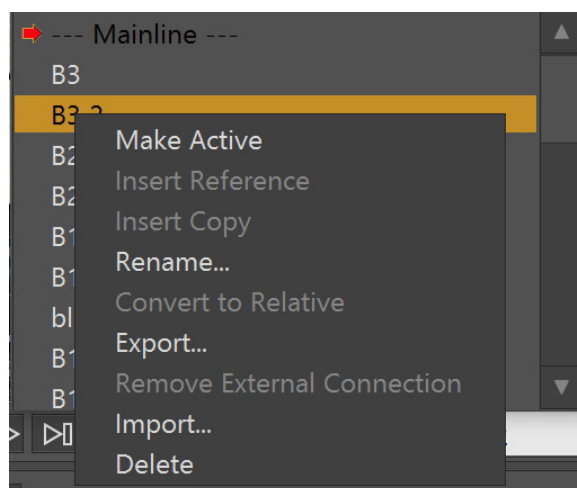
Below the buttons is the actions list, which contains a list of all actions available for the current layer. You can display the Actions list in one of four views:

- **All:** Displays all actions in your project.
- **Regular:** Displays actions of a general nature, and which are not configured as morphs or smart bones.
- **Morphs:** Displays a list of actions that apply to morphs only. See [“Creating Morphs \(Pro Only\)” on page 370](#) for further steps.
- **Smart Bones:** Displays a list of actions that apply only to Smart Bones. See [“Smart Bones \(Pro Only\)” on page 103](#) for more information.

New layers have no actions, just “Mainline”, which represents the main animation timeline.

The Actions List Context Menu

If you right-click an action in the Actions list, a context menu presents several options, many of which serve the same functions as the buttons at the top of the Actions window:



The Actions window

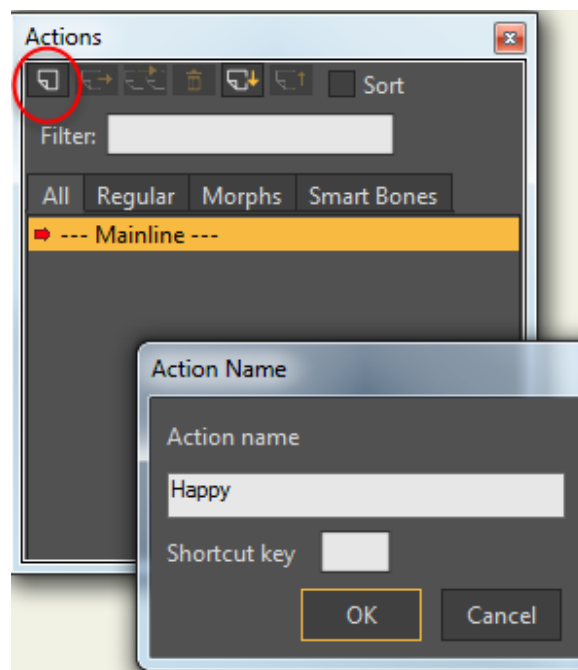
- **Make Active:** Sets the action that you right-clicked as the currently active action.
- **Insert Reference:** Adds an action to the timeline (see [“Using Actions \(Pro Only\)” on page 373](#))
- **Insert Copy:** Adds a copy of an action to the timeline (see [“Using Actions \(Pro Only\)” on page 373](#))
- **Rename:** Opens the Action Name dialog, where you can enter a new name and shortcut key for the action.
- **Convert to Relative:** When characters have the same bone structure but do not have the same proportions, export the action to a file, and then import it into

another character that has different proportions. After importing the action to the new character, right-click and choose Convert to Relative. This will cause the bones to adapt to the proportions of the new character.

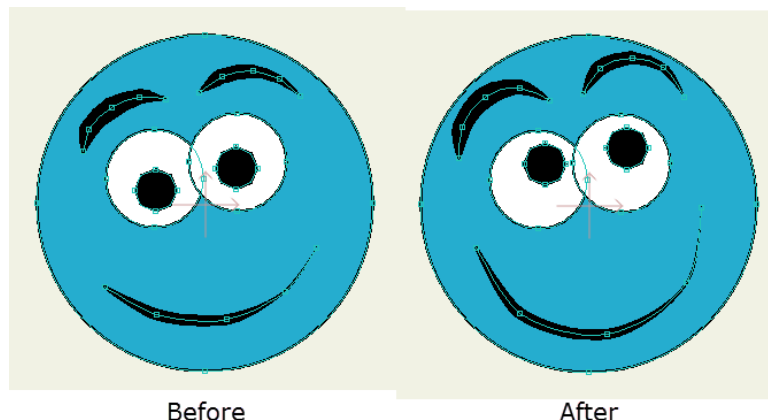
- **Export:** Actions can be exported for use in other projects. Right-click the action and choose **Export** from the context menu. The file will be saved with the **.mohoaction** extension.
- **Remove External Connection:** When you import an action from an external file, it will be connected to that file. If you modify the action, the change will be reflected in every project that uses that action. If you remove the external connection, the action will no longer be dependant.
- **Import:** Allows you to import an action file that was previously exported from another project. Click the **Import Action** button and locate the action file you want to import (.asaction or .mohoaction extension). Alternatively, you can right-click inside the action list and choose **Import** to select your file.
- **Delete Action:** Deletes the action from the actions list.

Creating New Actions (Pro Only)

To create a new action, just click the **New Action** button. Moho will prompt you to name the action. The new action is created in the current layer and, if the layer is a group-type layer, in all of its child layers.



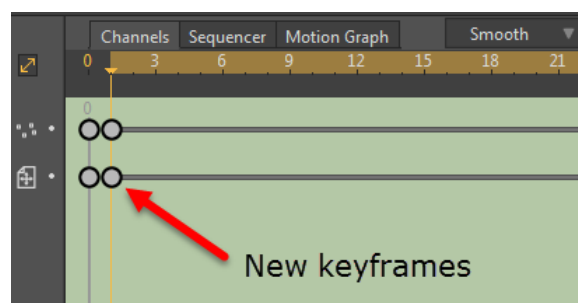
Creating a New Action



Default state (left) and Happy morph (right).

After you create your new morph, click the Mainline (top) line in the Actions window. The character should return to its default state.

Double-click to select the Happy action again in the Actions window, and notice a single-frame action in the Channels tab of the timeline. Notice that all of the keyframes are on Frame 1. This is very important when blending poses. A general action can have as many keyframes as you like ... but if you want to blend poses, the action can only contain a keyframe at Frame 1.



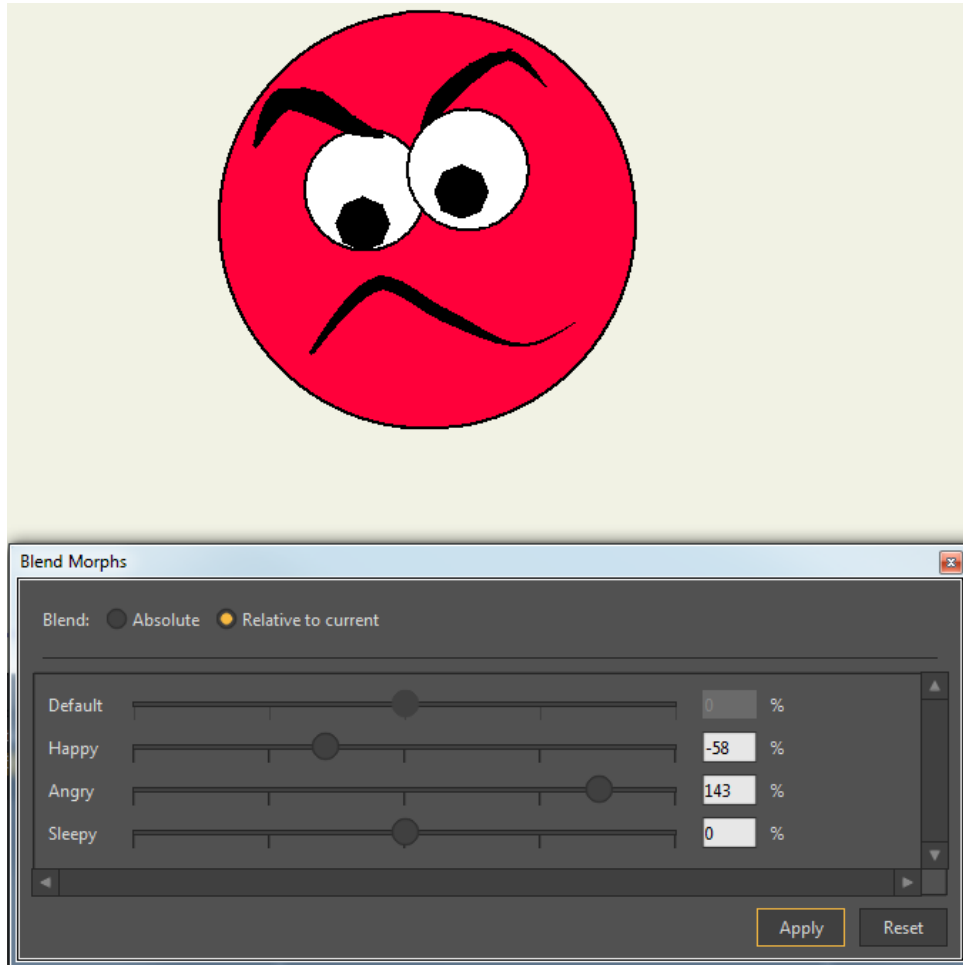
Select the Happy morph in the Actions window, and notice the keyframes in the timeline

Creating Morphs (Pro Only)

Moho allows you to blend several different morph targets together to create a combination of actions or effects. For further information on this feature, see ["Blend Morphs" on page 494](#).

For example, after we finish our Happy morph, we continue by creating additional actions (such as Angry and Sleepy) that we can blend together. Note that the action can change keyframes for anything. For example, in addition to moving some points, the Angry action also changes the color of the face. Now you should have a number of actions, all with single-frame animations that have keyframes on frame 1.

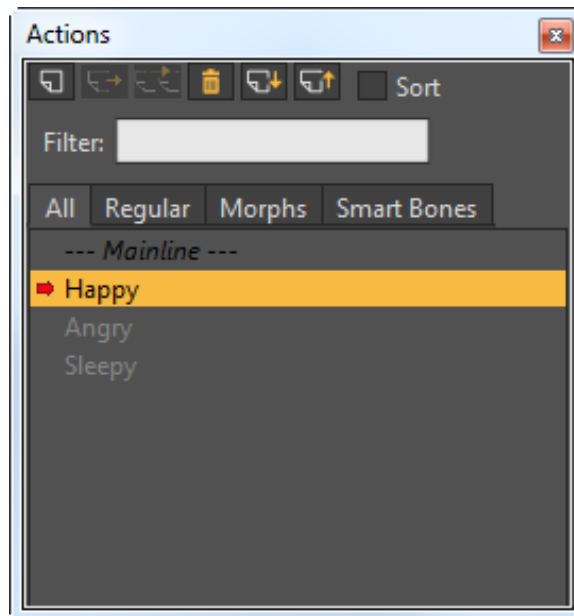
You can use the **Window > Blend Morphs** command to blend the various morphs together. For example, you can combine the Happy and Angry morphs to create a new expression on the face, as shown below.



You can morph any type of value. The Angry morph will change the color of the face in addition to changing the facial features.

Editing Actions (Pro Only)

To edit an action, double-click it - this will switch an action into editing mode. (When you create a new action, it also starts off in editing mode.) You can tell which action is in editing mode by the red arrow to its left, as seen below.

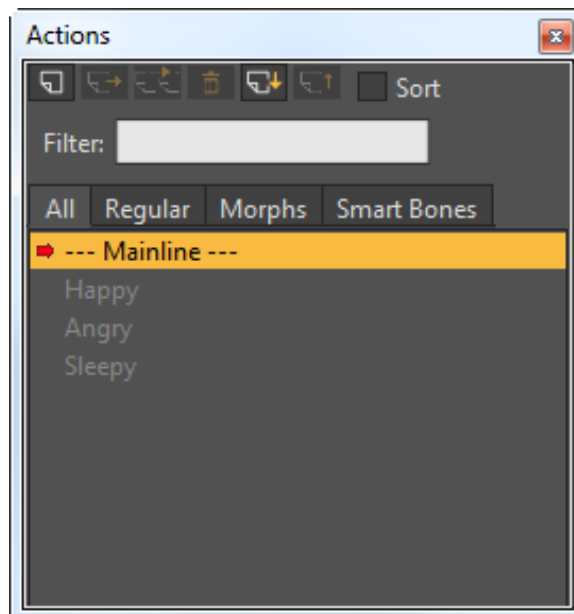


The Happy action in editing mode.

When you're editing an action, you'll also notice a change in the Timeline window. The background of the timeline changes color to remind you that you're editing an action, and not the main timeline.

As you edit an action, the timeline works like normal, but instead of working on your main animation, you're working on a little reusable clip. Actions by themselves do not appear in your final animation - they only appear if you use them in the main timeline.

To switch back to the main timeline, double-click on the "Mainline" action in the actions window. (Mainline is not really an action - it's just a way to refer to the main animation timeline.)



Double-click the Mainline action to return to the regular timeline.


Using Actions (Pro Only)

When you simply create actions, they won't appear in the final animation - they need to be used in the main timeline. To use an action, you just need to insert it into the main timeline, which is a simple process.

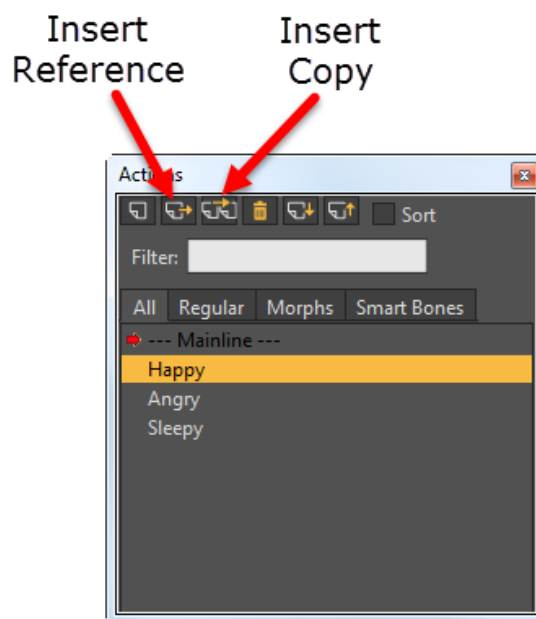
Make sure the "Mainline" action is active (double-click it so that it has a red arrow next to it).

1. Set the current time to the frame at which you wish to use the action.
2. Click once on the action you wish to use to highlight it.

 You can select multiple items in the actions list, allowing you to move or delete more than one at the same time. Undo can reverse accidents.

 The actions window also allows you to filter the action list to display only the actions whose names contain the text you enter. The Mainline and current action will also be displayed along with them.

3. Click either the "Insert Reference" or "Insert Copy" buttons in the Actions window.



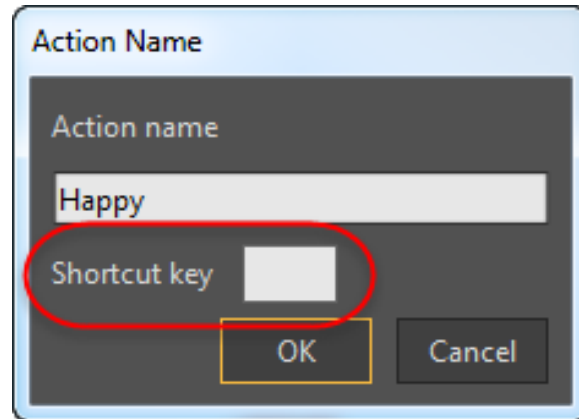
Inserting an action.

- If you insert an action by reference, Moho will insert a special keyframe in the Mainline that refers back to the action you used. Later, if you make changes to the action, these changes will automatically be reflected in the mainline.
- If you insert an action by copy, Moho will simply copy all of the keyframes in the action to the mainline, and they will act just like other normal

keyframes. If you later modify the action, any changes you make will **not** appear in the mainline.

If you create actions for objects in your scene you can assign shortcuts to those actions. You can assign the shortcut when you create an action, or you can right-click on an existing action and assign a shortcut.

The shortcuts make it easy to reuse the actions in an animation. You can press the shortcut keys while an animation is playing back to insert the action into the timeline.



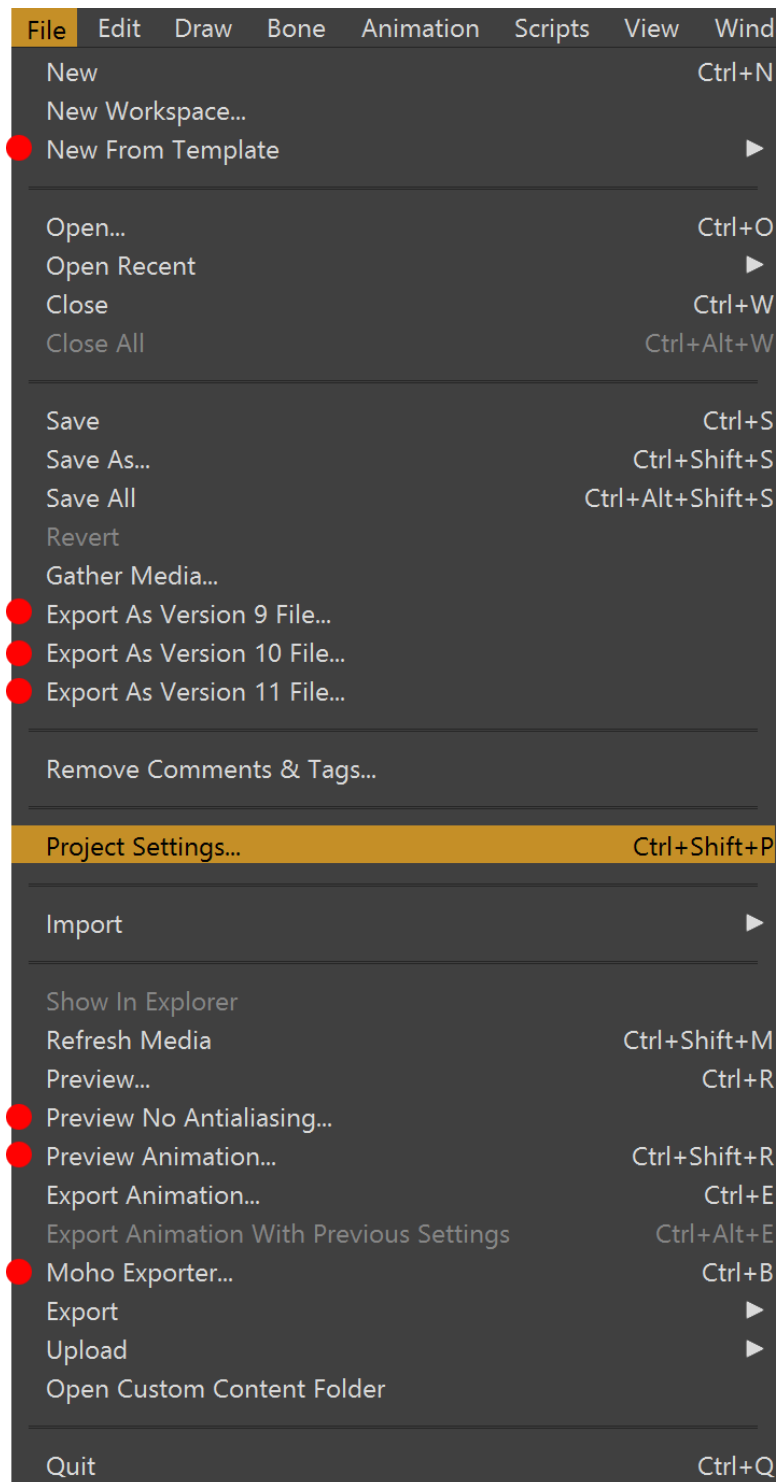
Setting an Action Shortcut.

Deleting Actions (Pro Only)

To delete an action, click once to make sure it is highlighted, then click the Delete Action button. When you delete an action, if that action was inserted by reference into the mainline at any point, those inserted references will also disappear. If you inserted the action as a copy, those copies will remain unchanged.

Moho Menus

Chapter 18: File Menu



File Menu (Pro-only features marked)

New

Creates a new, empty Moho project using the default project settings (NTSC D1, 720 x 534 pixels). Use the Project Settings command ("[Project Settings...](#)" on page 385) to change your project settings if desired.

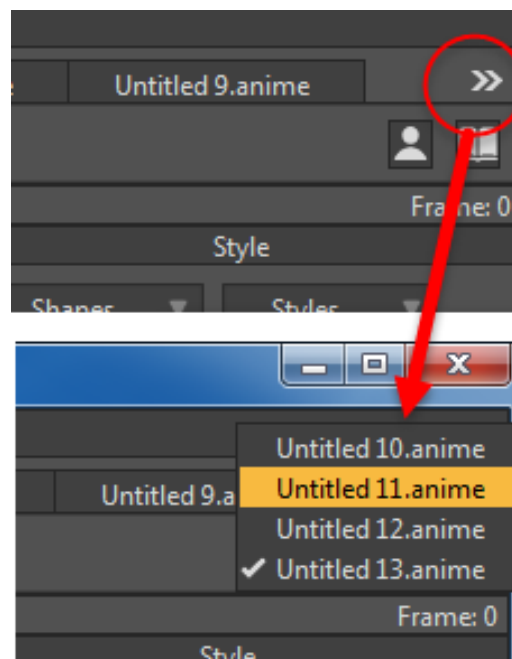
Moho names the first new document **Untitled.moho**. After that, each new document is named **Untitled x.moho**, where **x** is a number that is one higher than the number of untitled documents that are currently opened.

Multiple Document Support

When you create a new document, it will open in a new tab and keep the other documents open in their own tabs. You can drag the tabs left or right to change the order in which they appear. Moho allows you to have up to 64 documents open at the same time. You will receive an alert when that number is exceeded.

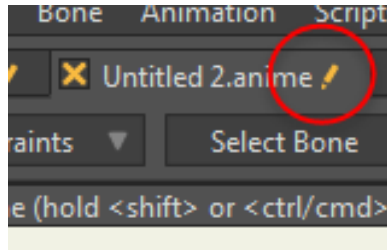
Use the **View > Show Document Tabs** command or the keyboard shortcut **Command/Ctrl Shift J** to show and hide the document tabs in the interface. If the tabs are hidden, you can select documents in the following ways:

- A chevron control appears in the far right corner of the document tab bar when you have opened more documents than can be displayed there. Click this chevron to display a menu of all opened documents. When you choose a document from the menu, Moho will move it to the first tab in the document tab bar.



Click the chevron at the far right corner of the document tab to display a menu of additional opened documents.

- A document tab will display a pencil icon to the right of the document name when that document contains any unsaved changes.



Unsaved Changes icon.

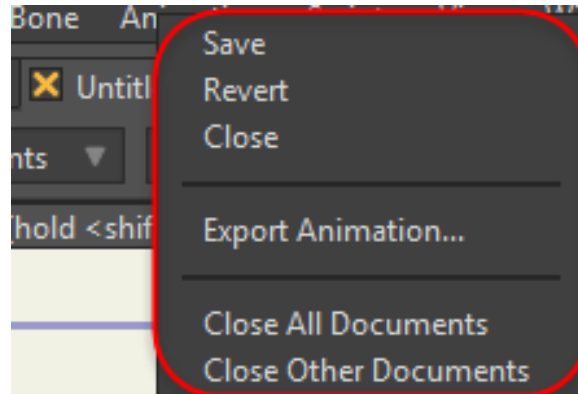
- Open documents also appear in a list at the bottom of the View menu. Select one of the documents in the list to bring it to the foreground.
- To switch to the next document press **Ctrl Tab** (Windows) or **Alt Tab** (Mac).
- To switch to the previous document press **Ctrl Shift Tab** (Windows) or **Alt Shift Tab** (Mac).

Autosave files are generated for all open documents. If the application doesn't shut down properly for some reason, a dialog will give you the opportunity to reopen them the next time you launch Moho. Viewport settings and tool selections will also be restored.

Document Tab Context Menu

When you right-click one of the document tabs, a context menu displays four menu options:

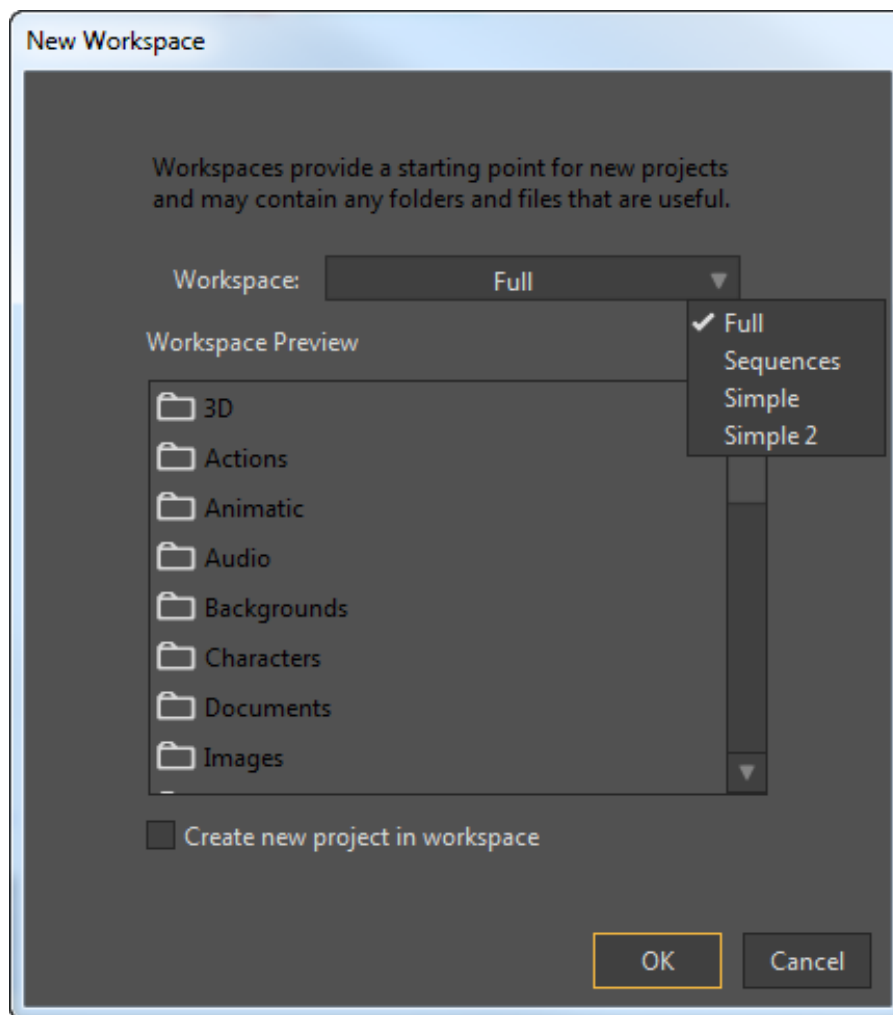
- **Save:** Saves the document that you right-clicked.
- **Revert:** Reverts the document to the version that was last saved to disk.
- **Close:** Closes the document on which you right-clicked.
- **Export Animation:** Opens the Export Animation dialog, where you can specify settings for creating an animation. For further information, see "[Export Animation...](#)" on page 407.
- **Close All Documents:** Closes all currently opened documents.
- **Close Other Documents:** Leaves the current document open but closes all other opened documents.



Document Tab Context Menu.

New Workspace (Pro Only)


Choose **File > New Workspace** to select a starting point for your next new project. You can select a workspace template from the Workspace dropdown menu. Several workspaces are provided with Moho Pro. Each workspace contains different folders and files that are useful for that type of workspace.



New Workspace dialog.

New from Template (Pro Only)

Allows you to create a new project based on a template. Expand the submenu to see an available list of templates.


 *Templates are standard MOHO files that are saved to the Templates folder within your Moho installation folder. For example, if you want to create a template for use in Moho Pro, you can save your MOHO file to Lost Marble > Moho 13.5 > Templates folder.*

Open...

Prompts you to open a Moho project file that was previously saved to disk. The Open dialog allows you to select multiple documents. You can also drag one or more documents from Windows Explorer or Finder to open them in Moho. Each document will open in its own tab.

 *Moho will display an alert if you try to open more than 64 documents.*


See “Multiple Document Support” on page 377 for more information.

 *If you open an Anime file that references an image file that has been renamed, you only need to locate it one time, even if it used multiple times in the Anime file.*


The Moho file format is a JSON-based file format, which is saved with a **.moho** extension. This format will make it easier to maintain backward and forward-compatible features as newer versions of Moho are released.

The JSON format organizes data in specific, yet flexible, hierarchies. This file format is a text-based format that is widely used on the web to communicate data between web pages and web services. In Moho, the JSON-based file format will also remove the need to export files that are version-specific.

 *Moho will still read .anme files going back to Anime Studio 6.*

 *In Moho Pro, the .moho format can be saved with Metadata in the document. This behavior will also be deprecated in favor of a “ScriptData” object that is only used in user scripts. We recommend that you prefix any script data with a distinguishing name in order to avoid data collisions with other user scripts. In addition, we recommend that this data is no longer intermingled with data that Moho saves as metadata.*

The .moho format is a compressed JSON-based file format, which is the default file format used by Moho. Essentially, it is a ZIP archive with a .moho extension. We have used a standard compression file format so that you can expand the archive with standard archive tools. When you decompress the file you will find a file named project.mohoproj. The archive file may also include a preview.jpg file, which is a preview image of the document. You can choose the desired thumbnail size in the Documents tab of the Preferences dialog. Select the desired thumbnail size (or choose No Thumbnails) from the Document preview thumbnail size dropdown list.

 *Detailed information about the new file format appears in “Appendix F: Moho Document File Format” on page 551.*

Open Recent

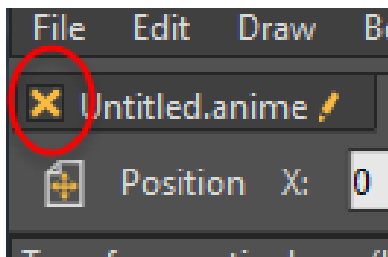
Displays a list of recent files that you can reopen. Files that have been moved or deleted since saving them will automatically be removed from the list.

To clear the list of recent files, choose **File > Open Recent**, and click the **Clear Menu** command at the bottom of the list.

 On Macintosh systems you can also open recent documents by right-clicking the application icon in the dock, and selecting one of the recent documents from the popup menu.

Close

Closes the current project. You can also close a document by clicking the **X** that appears in the left side of the document tab when you hover over the tab.



Click the X in the tab to close the current document.


Close All

Closes all opened documents. You will be prompted to save unsaved changes before the document closes.

 You can also right-click on a document tab and select Close All from a context menu.

Save

Saves the current project to disk.

 Your Moho project is automatically saved every 30 seconds while you work, to a temporary location on your hard drive. If the application crashes, you will be asked if you want to reopen the previous project the next time you start Moho.

 Moho documents are now saved with a preview thumbnail. By default the it generates a thumbnail that is 128 x 128 pixels. You can set thumbnail preferences in the Preferences dialog. See "General Tab" on page 435 for more information about thumbnail options.

Save As...

Prompts you for a name and location, then saves the project to disk.

Save All

Saves all open documents that have unsaved changes.

Revert

Revert the current document to its last saved state. This command is disabled if the active document has not yet been saved, or if there are no unsaved changes.

Gather Media

When you import something into a Moho project, such as an image, movie, or audio file, the original locations of the imported objects are only referenced within the Moho project. In other words, they are not actually part of the project file itself, rather the project file links to the files on your disk(s).

If your project contains many external files, we recommend that you place them in a common folder. When you do that, you have a self-contained folder that you can copy, archive, or move the project and the project will still work.

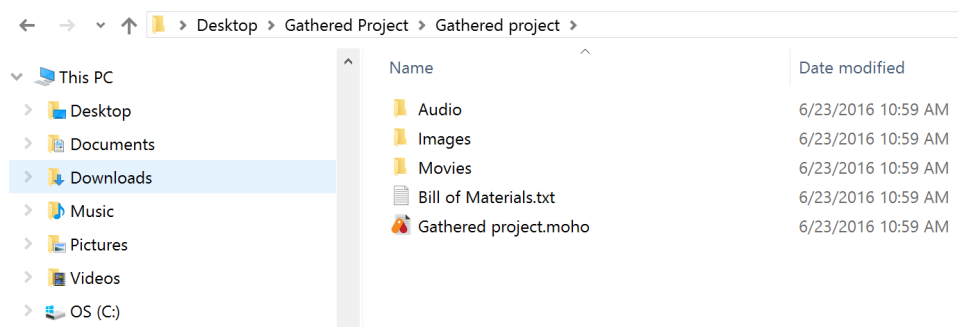
If you haven't kept your files in a single folder, the **File > Gather Media** command allows you to create a single location for all related project files. This is very useful if you need to send your project to someone else for collaboration or for technical support.

After choosing the command, you are prompted to select or create a folder in which to store the project-related files. You then enter a name for the gathered project and click Save to save it to the selected folder. When you look in the folder, you will see the Moho project file, along with Audio, Images, and/or Movies folders that store the collected media associated with it. A thumbnail image of the project will also be saved.

A bill of materials.txt file is also included, and lists all files required by the project. This bill of material also lists switch layer data as well as items such as fonts, and brushes that may not be included when gathering. The Bill of Materials document also lists other Moho documents with layers referenced by the gathered document. Media used by reference layers is gathered, but not the Moho document containing the referenced layer.




Poser scenes will not get gathered, due to the complex structure of the Poser library folder hierarchy.



A Gathered Media folder

Export as Version 9 File (Pro Only)

The **File > Export as Version 9 File** command will export a project file that is compatible with Anime Studio 9.

 *The algorithms that underly blurs (layer blur, shadows, shading, depth of field, etc.) and variable width lines changed in Anime Studio 10. Exporting them to Version 9 may produce slightly different results.*

Any of the following features that are used in an Anime Studio 10 project will not be exported when you choose this command:

- Bone targets
- Independent bone angles
- Squash and Stretch bones
- Hidden bones
- Shy bones
- Stagger interpolation
- Bounce and Elastic interpolation
- Texture fill effects with transparency option
- Threshold effects
- Use of new brushes.

Export as Version 10 File (Pro Only)

The **File > Export as Version 10 File** command will export a project file that is compatible with Anime Studio 10.

Export as Version 11 File (Pro Only)

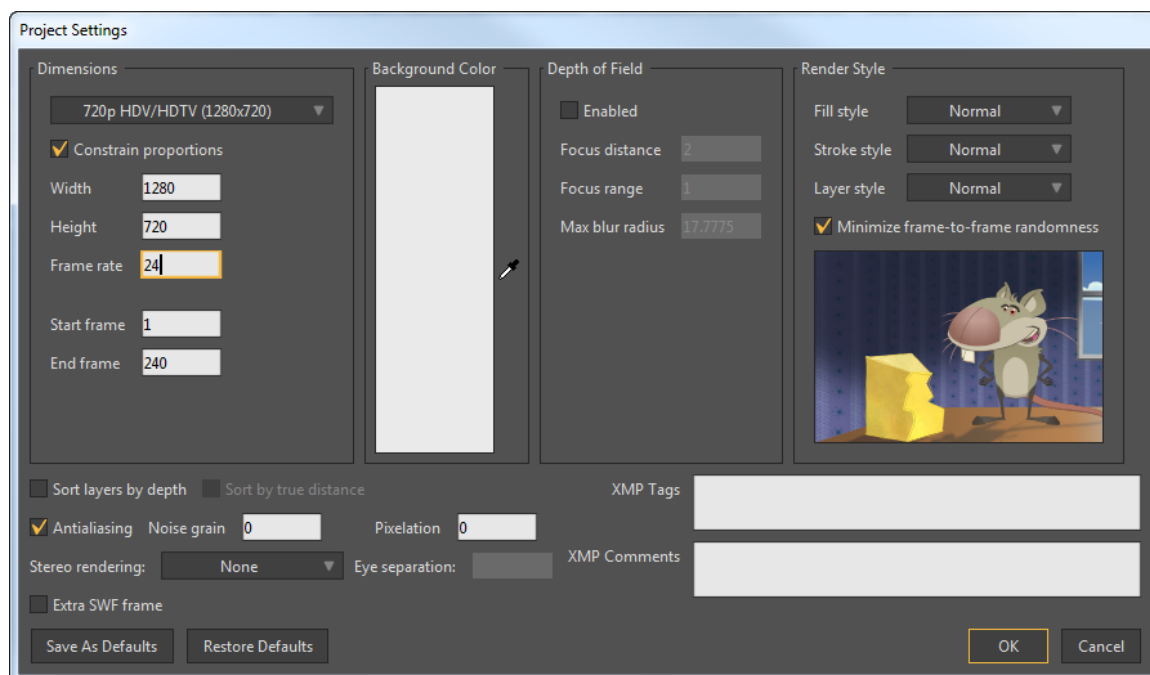
The **File > Export as Version 10 File** command will export a project file that can be opened in Anime Studio 11. This command does not make the project compatible with Anime Studio 11.

Remove Comments & Tags

The File > Remove Comments and Tags command will remove all comments and tags from the currently selected document. They will be removed from the Project Settings dialog, as well as all layers in the document.

Project Settings...

Brings up the project settings dialog. As seen below, the project settings dialog lets you control the pixel width and height of the project, as well as the number of frames per second. You're free to change these values at any time, although it's easiest if you set up the values you want before you start creating your animation (particularly the frame rate). Also in this dialog, you can set the start and end frames of your animation, defining how long the overall animation will be.



The Project Settings dialog

Dimensions

- **Dimensions menu:** Allows you to set Custom dimensions, or choose from a wide variety of presets. Presets include the following:
 - **Custom:** Allows you to enter or edit your own settings.

- **NTSC D1**: 720 x 534 pixels, 24 frames per second
 - **NTSC D1 Widescreen (Pro Only)**: 872 x 486 pixels, 24 frames per second
 - **PAL D1/DV**: 788 x 576 pixels, 24 frames per second
 - **PAL D1/DV Widescreen (Pro Only)**: 1050 x 576 pixels, 24 frames per second
 - **480p Widescreen**: 852 x 480, 24 frames per second
 - **720p (HDV/HDTV) (Pro Only)**: 1280 x 720 pixels, 24 frames per second
 - **1080p (HDTV) (Pro Only)**: 1920 x 1080 pixels, 24 frames per second
 - **VGA**: 640 x 480 pixels, 24 frames per second
 - **Web**: 320 x 240 pixels, 24 frames per second
 - **Web Widescreen**: 426 x 240 pixels, 24 frames per second
 - **YouTube**: 640x480 pixels, 24 frames per second
 - **YouTube 720p (Pro Only)**: 1280 x 720 pixels, 24 frames per second
 - **YouTube 1080p (Pro Only)**: 1920 x 1080 pixels, 24 frames per second
 - **iPhone**: 480 x 320 pixels, 24 frames per second
 - **Constrain Proportions**: This option allows you to maintain the aspect ratio of your animation project. When the option is checked, you can enter a new width or height, and the other dimension will automatically change to maintain the same width-to-height aspect ratio. If you choose one of the preset configurations from the Dimensions drop-down list, it will ignore the Constrain Proportions option and resize your project to the dimensions specified in the selected preset.
- When you select a preset, the following settings appear below.
 - **Width**: The width, in pixels
 - **Height**: The height, in pixels
 - **Frame Rate**: The number of frames per second in the animation.
 - **Start Frame**: The starting frame of the animation.
 - **End Frame**: The ending frame of the animation.

Background Color

- **Background Color**: Sets a background color for the project - just click on the color swatch to select a color from the Color Picker. You can also click and drag from the Eyedropper to select a color from the style window or from anywhere on your screen.

Depth of Field (Pro Only)

- **Depth of Field**: Depth of field simulates a camera, where a certain range of objects are in focus, while closer or more distant objects become blurry
 - **Enabled**: Check this option to enable or disable the Depth of Field feature in your project.

- **Focus Distance:** The focus distance value is the distance from the camera to the plane of perfect focus.
- **Focus Range:** Objects that are within the “focus range” distance of this plane will also appear in focus. For this feature to work correctly, you need to set up multiple layers with different depth values so that some can be in focus, and others out of focus. If you move the layers (or the camera) in your animation, the focus will automatically change based on distance from the camera.
- **Max Blur Radius:** Sets a maximum value for the blurriness of your scene.

Moho makes it easy to define sharp and blurry areas when Depth of Field is used. “Tutorial 6.6: Using Pre-made Particle Effects (Pro Only)” on page 256 in your Moho Tutorial Manual shows how to use these features.

Render Style (Pro Only)

The Render Style section allows you to select the type of rendering that will be performed when you choose the File > Preview command, or use the Cmd +R (Mac) or Ctrl R (Windows) shortcuts.

The following settings are included in this section:

- **Fill Style:** Select the fill style that you want to use each time you render. Choices are **Normal**, **None** (same as turning the **Fill** option off in the **Style** window); **Background**; **Back Transparent**; **Crayon**; **Hatched**, and **Pen**. The preview window updates as you make your selections.



Normal



None



Background



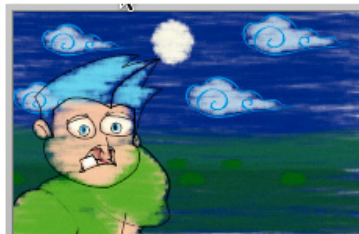
Back Transparent



Crayon



Hatched



Pen

Global Fill styles

- **Stroke Style:** Select the stroke style that you want to use each time you render. Choices are **Normal**; **None**; **Basic Black**; **Sketchy**; **Crayon**; and **Pen**. The preview window updates as you make your selections. In addition, there is a **Chalk** style that is designed for use with a white stroke color on a dark background as shown below.



The Crayon style is also available as an effect in the Advanced view of the Style window.



Normal



None



Basic Black



Sketchy

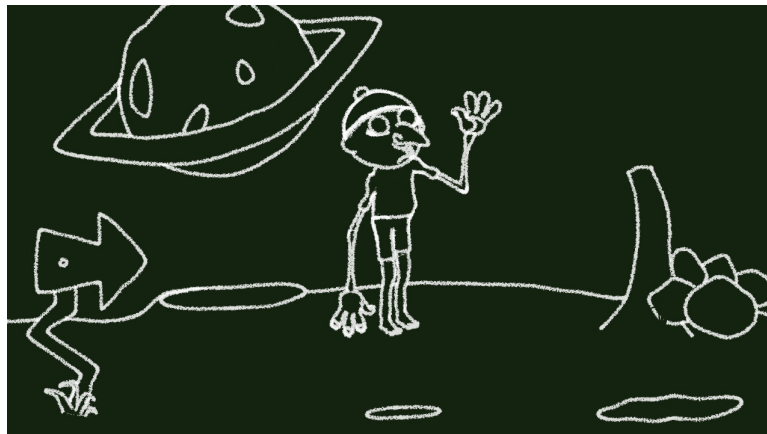


Crayon



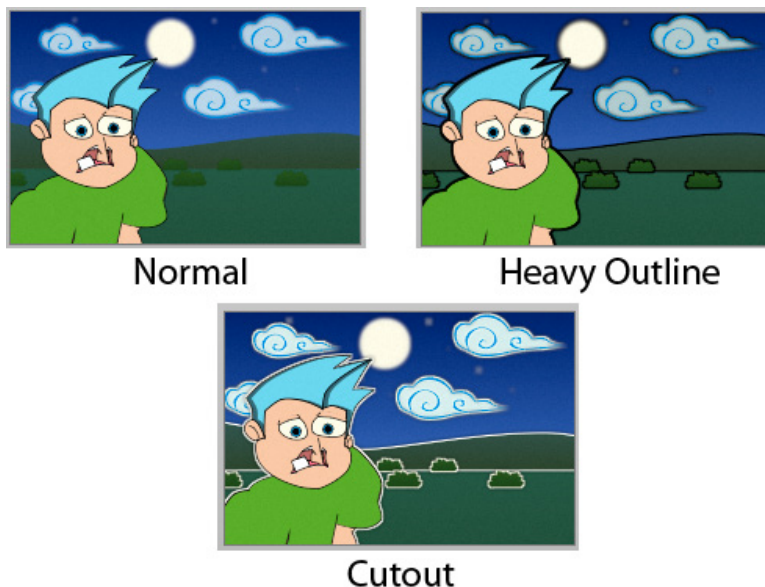
Pen

Global Stroke styles.



Chalk Stroke style.

- **Layer Style:** Select the layer style that you want to use each time you render. Choices are **Normal**, **Heavy Outline**, and **Cutout**. The preview window updates as you make your selections.



Global Layer styles.

- **Minimize frame-to-frame randomness:** If this option is not checked, styles like crayon will have lines that appear different on each frame, which can cause some distraction unless frame rates are lower and the effect is intentional. When you turn this option on, Moho will try to use the same crayon strokes from frame to frame to reduce the amount of flickering.

Other Settings

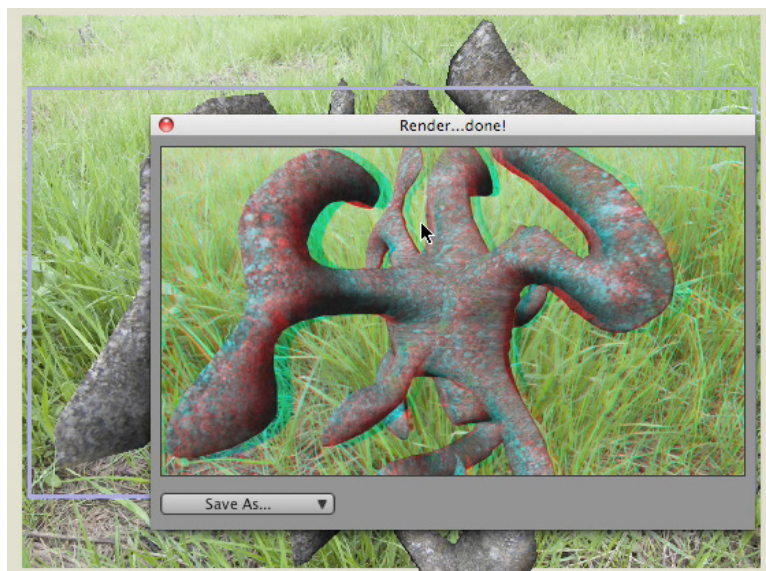
- **Sort Layers by Depth:** The “Sort layers by depth” checkbox allows top-level layers in Moho to move in front of and behind each other during an animation. Normally, layers are drawn in the order they appear in the Layers Window. However, with this option turned on, layers are displayed according to how far they are from the camera. See **“Tutorial 5.5: Sorting Layers by Depth (Pro Only)” on page 192 in your Moho Tutorial Manual** for an example of using this feature.
- **Sort by True Distance:** Typically, layers are sorted by their depth from the camera, but if you're trying to create a 3D object using multiple Moho layers (like a cube or pyramid), you may want to turn on “Sort by true distance”. This tells Moho to sort layers by the distance from the camera to the layers' origins, rather than by depth. Usually this option will be left unchecked.
- **Antialiasing (Pro Only):** Antialiases the project. Can be used on its own, or combined with pixellation.
- **Noise Grain (Pro Only):** With the “Noise grain” field, you can set up some noise grain for the project. Noise grain is a subtle film grain-type effect that adds slight variations to the pixels in your project and leads to a more natural look to the final image. It can also increase the visual quality in some kinds of movie compression when you generate an animation. If you want to try out noise grain, a value of 16 is a good start for a subtle noise effect.

- **Pixelation (Pro Only):** Allows you to create pixelated renders. The amount of pixelation is determined by the value you enter in the Pixelation field. The higher the value (for example: 2, 4, 8, or 16) the more blocky the render appears.
- **Stereo Rendering (Pro Only):** Use the Stereo Rendering drop-Down to select the type of stereo rendering you want to perform:
 - **None:** Turns off stereo rendering capabilities.

 *3D Rendering settings should be set to None if you do not want to render out in a 3D format).*

- **Red/Blue Anaglyph (Pro Only):** When you render or preview your project with this setting enabled, you will see 3D objects rendered as a red/blue stereo pair. You will need special red/blue stereo 3D glasses to see the object in three dimensional space.
- **Side By Side (YouTube friendly) (Pro Only):** Produces two separate images rendered side by side in the same image, one for the left eye and one for the right eye.
- **Cross-eyed (Pro Only):** Looks similar to Side by Side, except that the left eye image is on the right side, and the right eye image is on the left side. This is the type of stereo rendering that YouTube expects.

 *Choose **View > Stereo** to see a live preview of the Red/Blue stereo effects. This makes it easier to preview and reposition your 3D objects*



3D Stereo view

- **Eye Separation (Pro Only):** This setting controls how far apart the right and left eyes are when rendering two images for a stereo rendering. If the value is too close, the 3D effect is lost. If the value is too far apart, the 3D effect will cause eye strain or won't look as effective.

- **Extra SWF Frame:** Check this option to add an extra frame at the end of the video
- **Save as Defaults:** When you create a new project in Moho, your animation defaults to 320x240 pixels at 24 frames per second. If you create most of your projects at different settings, you can change these defaults. Just type in new values in this dialog, and click "Save As Defaults" to make the new settings the default settings for all new projects.
- **Restore Defaults:** Resets the project to the default values.
- **XMP Tags:** (Pro only) Allows you to enter metadata tags that apply to the entire document.
- **XMP Comments:** (Pro only) Allows you to enter comments that apply to the entire document.

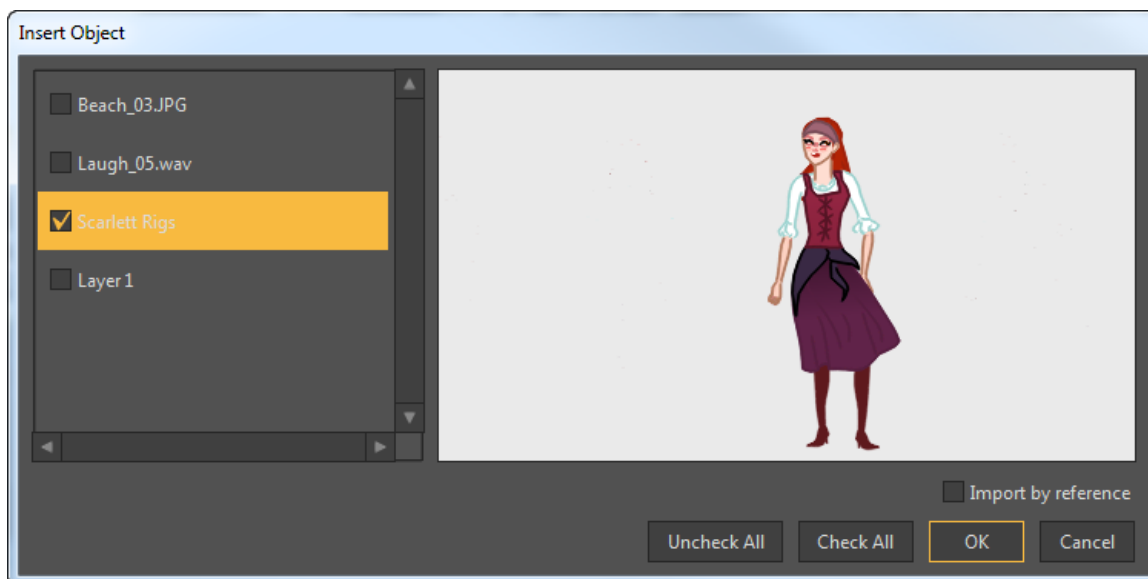


(Pro Only) Project tags and comments that are entered in the XMP Tags and XMP Comments fields will be stored within the moho project file. XMP information also includes height, width, framerate, frame start and frame end information from the project.

Import

Moho can import several kinds of other media files into an animation project. The commands in this sub-menu let you import these files.

- **General Import:** This menu option will allow you to import any type of file that is supported by Moho.
- **Moho Object:** This command will ask you to choose a Moho project file. Once you've chosen a file, a list of layers in the project will show up in the dialog. If the imported Moho project file used Lua scripts, you can import the script as a copy, import by reference, or ask user.



The Insert Object dialog

Checkboxes appear to the left of each of the items in the scene you want to import. Check one or more of the layers to add it to your own project (a preview of the selected layer appears on the right side of the dialog. The Uncheck All or Check All buttons can be used to deselect or select all of the items in the project. Press OK to copy the selected layers into your open project, including any animation in the layer. This is an easy way to share objects between project files and reuse bits of animation here and there.

Several files are included with Moho that contain scenery, characters, props, etc. You are welcome to include these in your own projects by using this menu command.

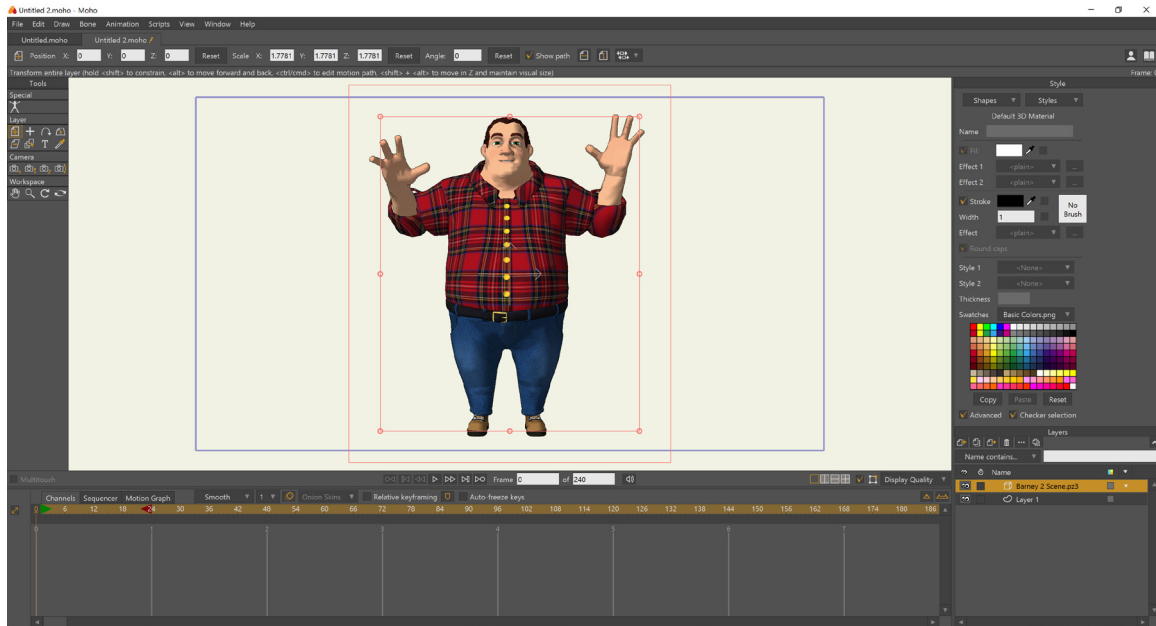
- **Moho Styles (Pro Only):** Choose this command to select a .mohostyle document or a .moho project containing styles you would like to import into the current project. If the item you select contains styles not already in the current project they will be added to the project.
- **Image** Imports an image file as a new Image layer. The most common type of file to import into Moho is images. It doesn't matter how the images are created, so feel free to use pictures from digital cameras, backgrounds from scanned drawings or painted on the computer, textures, computer-generated 3D scenery, etc. The image formats supported by Moho are: JPEG, BMP, Targa, GIF, and PNG. Generally, we recommend PNG, since the PNG format provides for variable levels of transparency, allowing you to create non-rectangular images that can blend in smoothly with other elements in the scene.
- **Movie:** Imports a movie file as a new Image layer. Moho supports importing QuickTime (Windows and Mac OS) and AVI (Windows only) movie files. A movie that you import into Moho will play back along with the Moho animation, allowing you to combine 2D and 3D elements, or to composite a Moho animation on top of a pre-recorded video sequence. On Windows, if you have problems importing QuickTime movies, then you probably need to download and install QuickTime (<http://www.apple.com/quicktime/>). Moho will also import native Anime Studio files (files ending with .anme or .anime).

- **Vector File (Pro Only):** (Moho Pro only) Asks you to select an Adobe Illustrator (.ai) file (<http://www.adobe.com>), SVG file, or EPS file. Moho will import the bezier curve shapes in this file into a new Moho vector layer. These objects can then be further edited and animated in Moho. Moho can import vector artwork created in other vector illustration programs. These files can be in Adobe Illustrator, EPS, or SVG format. If your files are in Illustrator format, make sure that you save them as Illustrator 8 (or earlier) format.




You can open multiple Illustrator files at once. Simply drag and drop multiple Illustrator files into the Moho window.

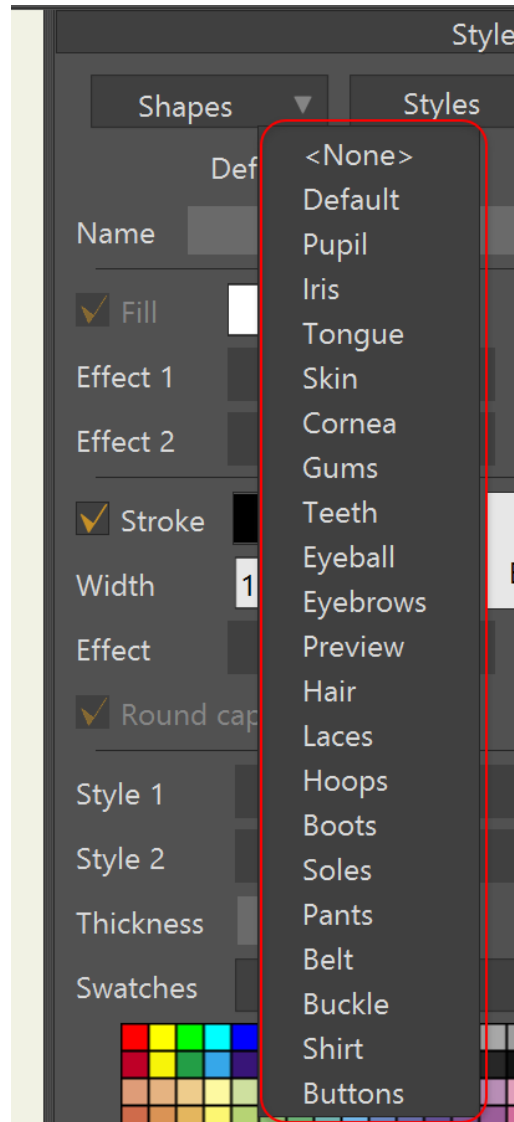
- **Tracing Image (Pro Only):** (Moho Pro only) Loads an image file to be used for tracing purposes. The image formats supported by Moho are listed in “[Appendix A: Product Comparison](#)” on page 524. The Tracing Image command is the same thing as “Select Tracing Image” in the View menu.
- **Audio File:** Loads a sound file to be used as a soundtrack for the current animation. The audio formats supported by Moho are listed in “[Appendix A: Product Comparison](#)” on page 524. Moho uses libsndfile to handle sound files (see <http://www.mega-nerd.com/libsndfile/>), so any format that libsndfile supports is fair game. Generally, it's best to stick with uncompressed WAV or AIFF files.
- **OBJ 3D Model (Pro Only):** Imports a 3D model as a new Moho 3D layer. Moho can import 3D files that are in OBJ format. More information about 3D layers can be found in “[3D Layers \(Pro Only\)](#)” on page 200. Finally, Moho can import 3D files created by 3D modeling programs. At this time Moho can only import OBJ files, but it's a quite common format, and most 3D programs can export to OBJ. OBJ files can include texture maps, and if your model uses one, Moho will import and use it as well. If you're new to 3D, and you're looking for a program to create 3D models for use with Moho, we recommend Poser.
- **Poser Scene (Pro Only):** If you already own Poser, you can import Poser scenes directly as discussed in “[Poser \(Pro Only\)](#)” on page 142.



An imported Poser scene

They are also editable in the Style window. You can turn the stroke on or off, and adjust the width of the stroke.

 Many OBJ files and Poser objects have multiple materials. The multiple materials will show up as Shapes in the Style window. Select a material from the Shapes drop-Down (discussed in "Shapes" on page 256) and change material settings if desired. If you select **None** from the Shapes drop-Down it controls the default material and stroke.



Materials appear as Shapes in the Style window

When you are using a 3D layer, you can open the Layers Window and go to the 3D Options tab to control some additional properties. See "3D Options (Pro Only)" on page 250 for more information.

The lower section of the **File > Import** menu displays several different categories that allow you to open content that is furnished with Moho. You will also find these items in the Library (see "[Chapter 14: The Library Window](#)" on page 289). In the Import menu this content is arranged in the following categories: **3D**, **Audio**, **Characters**, **Effects**, **Images**, **Props**, **Scenes**, and **Video**.

Real-Time Media Connection (Pro Only)

The “live linking” feature allows you to import images, movies and sound files and then edit them in their native editors without worry. Any edits you make later in third party editors will automatically be recognized and updated within Moho.



When media that is referenced by projects is changed in the background, Moho will sync those changes your project. If a large number of changes are updated at once, Moho may not notice the changes until the main window is brought to the foreground, or brought to the front after appearing behind a non-floating window.

Real-time media connections, combined with Photoshop layer support on import, provide an exceptional way to design characters and other content for your Moho scenes. For more information on Photoshop support, see “[About Photoshop Layer Support \(Pro Only\)](#)” on page 403.

Poser Integration (Pro Only)

Choose **File > Import > Poser Scene**. Locate the PZ3 file that you want to import. After a brief wait, the Poser file will be imported into your scene. For further information, see information on the Poser tool, discussed in “[Poser \(Pro Only\)](#)” on page 142.

Import Notes and Tips

Referenced Files

Please note that Moho references the directory location of images, OBJ's, sound files and movies files that have been imported for use. When exporting into movie format, Moho continues to reference this directory location. Moving referenced items from one location to another will prevent the item from being displayed or heard. We recommend that all items used in your animations or artwork accompany it's native file format (ANME) and final exported format.

Startup Folder


Adding your own .moho file to the “Startup Folder” (located in the root directory of your Moho installation) will always make Moho open this .moho document first when it's initially launched. Please make sure to rename your .moho file to “StartupFile.moho”.

Moho Files

Moho will also import native Moho files (files ending with .moho).

Library Content

Please read Section 6 of the EULA (End User License Agreement) for rules on using the content that has been supplied with your version of Moho. Please note that when importing existing content/movies from the Moho Content Library using the **File > Import** option, some animations/movies exceed the default “End Frame”. This will prevent you from seeing the full movie. To adjust the default “End Frame” settings, please select **File > Project Settings** and change the field beside “End Frame”. You can also double click the movie/content file you would like to view from within the Content Library. To access the Library, select **Help > Open Content Library**.

 *The Library content files (characters, props, etc.) are installed in a shared documents location on both Windows and Macintosh. This allows multiple users on the same computer to share library resources, and to install additional content that they might download (from Content Paradise, for example). On Windows systems in particular, it can be difficult to add new files to the Program Files directory when running newer versions of the Windows operating system, which is why the shared documents location is used.*

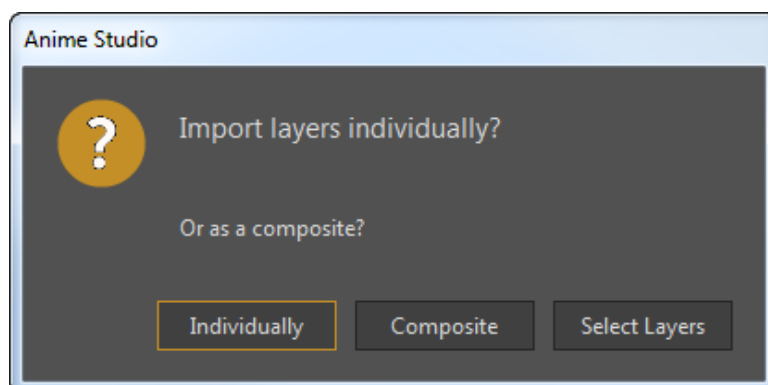
Importing 3D OBJ's (Pro Only)

Please note that loading 3D OBJ files may take some time. Loading times depend on the complexity of the OBJ file.

Photoshop Tips

Importing Photoshop Files (Pro Only)

When you use the **File > Import > Image** command to import a Photoshop file into Moho, a dialog will ask how you want to handle the layer import within Moho.

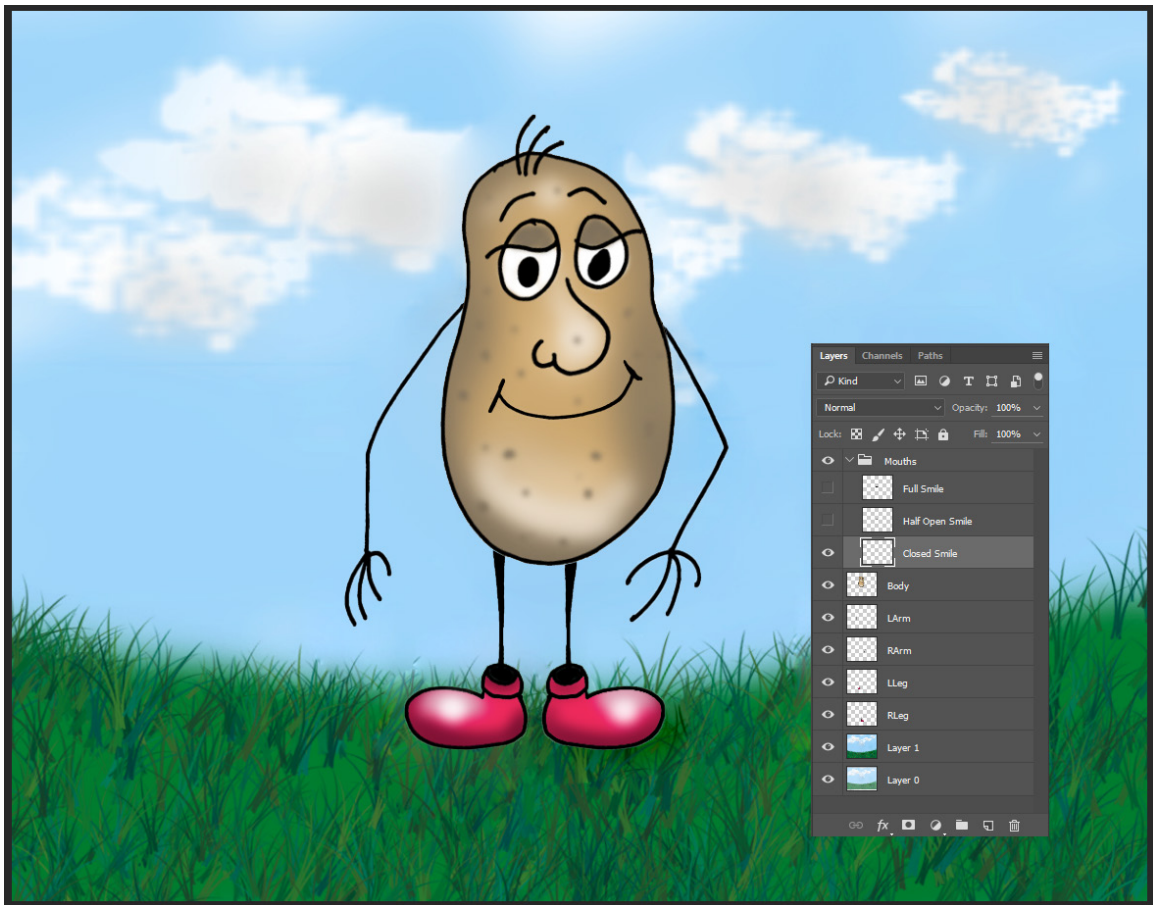


Photoshop images can be imported with individual layers, or as a composite image.

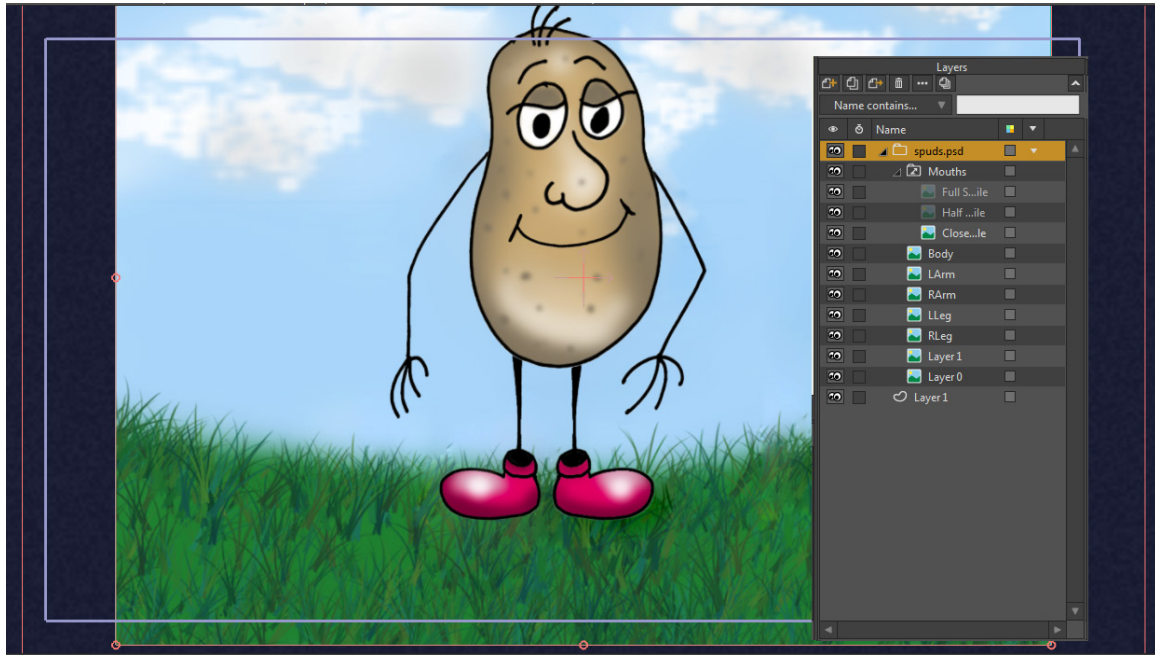
 If Moho detects unsupported layers, you will be prompted to cancel the import, or to import the PSD file as a composite image.

The choices are:

- **Individually:** Choose this option if you want to retain the Photoshop layers when you import your Photoshop file. Each Photoshop layer will appear in the Layers Window and will be named exactly as they are named in the original Photoshop file. You will be able to show and hide the layers individually within Moho in the same way that you can in Photoshop, and you will be able to use the Moho tools to modify or animate the layers.

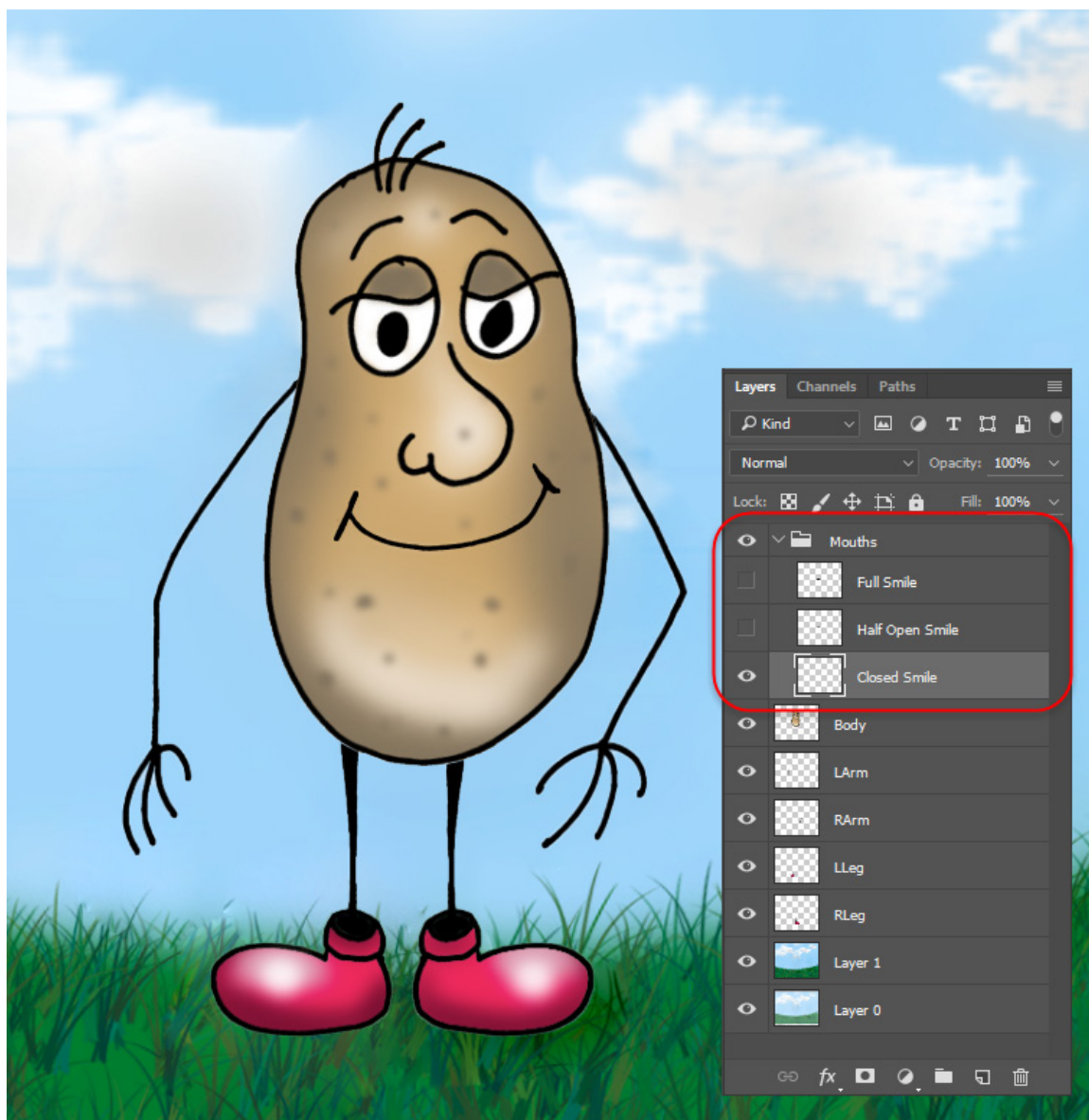


Photoshop layers shown in Photoshop.

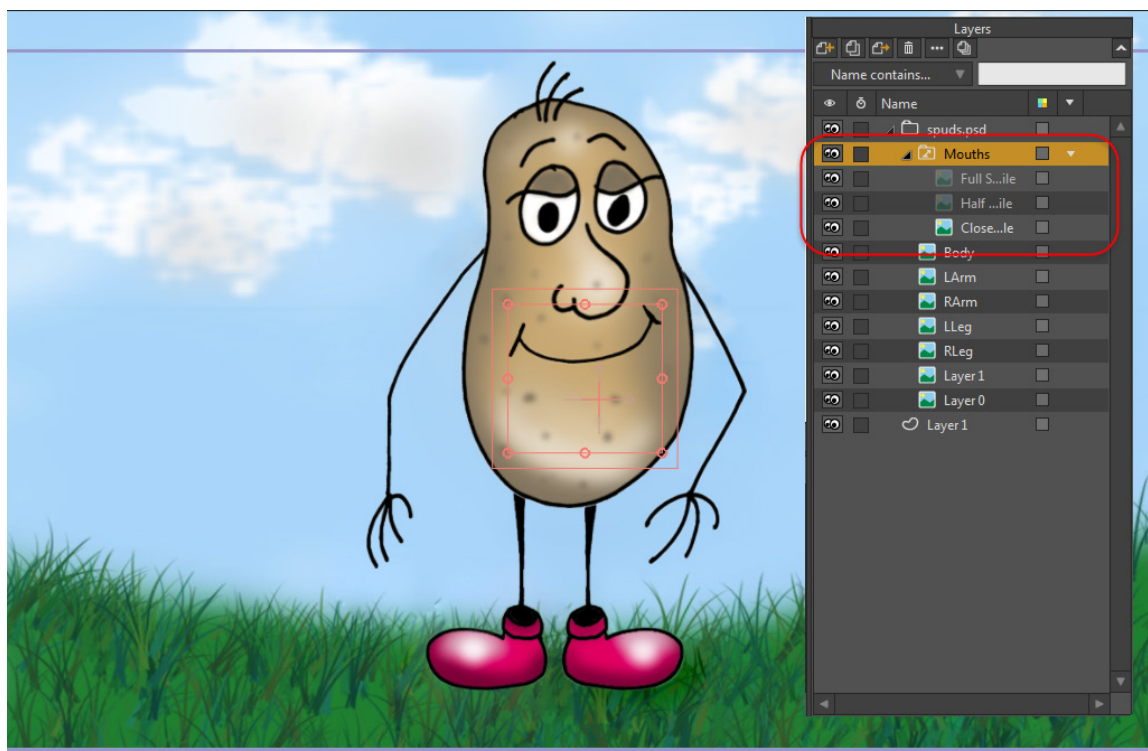


Photoshop layers shown in Moho Pro.

Further, you can group layers in Photoshop that can be interpreted as layers in Moho. For example, you can create a Photoshop group that contains various mouth positions. If you make only one of those mouths visible in the group before you import the Photoshop file into Moho, the other layers in the group will be configured as switch layers for the visible mouth when it appears inside Moho.




Mouth group in Photoshop (with one mouth layer visible).




Mouth group in Moho Pro (with the same mouth layer visible).

There will also be a live connection between Moho and Photoshop, such that if you make changes to the Photoshop file and resave it, the changes will also appear in your Moho project.

 If you add new layers to a PSD file that has been imported into Moho, the new layers will automatically be imported into your project.

 If layers are reordered in the original PSD file, Moho will maintain its own layer order, but the PSD layers will still be properly referenced.

 The opacity of a Photoshop layer will be baked in Moho when imported. In other words, if the opacity of a layer was set to 50% in Photoshop, Moho will see that as the 100% value. You will not be able to increase to 100% in Moho.

- **Composite:** Choose this option if you want the Photoshop file to be combined into a single image layer in Moho.
- **Select Layers:** Click the Select Layers button to choose specific layers in the Photoshop file for import into Moho. The Insert Object dialog appears and allows you to check or uncheck all of the layers in the Photoshop document, or to select or deselect layers one at a time.

About Photoshop Layer Support (Pro Only)

When importing a PSD file, you have the option to load layers individually or load the composite as a single layer.



The live linking feature between Photoshop and Moho may work unexpectedly in certain situations. The live link works as expected when layers are edited and left visible in Photoshop. However, the live link may work unexpectedly after importing into Moho if you later move, delete, or hide layers in Photoshop and then return to Moho.

Photoshop has many features, and not all of them are supported within Moho. In general, standard 8-bit RGB files with regular pixel layers are the best way to go for compatibility.

Moho has been tested with several Photoshop examples, and the following Photoshop features are known to work within Moho:

- Blending modes are supported
- Layer opacity is supported.
- Layers that are set to invisible will be kept invisible upon import into Moho.
- Groups are supported. Groups where only one child of the group is visible come in as switch layers.
- Smart objects and smart filters do work internally to the PSD. They store a flat representation of themselves.

The following Photoshop features are not supported in Moho:

- Layer effects are not imported.
- Any layer that has a mask in Photoshop gets skipped.
- 3D layers, text layers, and other kinds of non-basic or non-pixel layers cannot be imported.
- Layers that have visibility turned off in Photoshop will have their names grayed out in the Moho Layers Window.

Using Moho with Unity (Pro Only)

Moho Pro provides a Unity Import script that improves performance of Moho projects in Unity 5.3 or later. When you use the FBX export in Moho in conjunction with a Unity Import script (also provided with Moho Pro), you will see improvements in how Unity displays layering and lighting of your Moho FBX files.



FBX files that were exported from Anime Studio 11 or Anime Studio 11.1 will have to be imported into Anime Studio 11.2 or later and then re-exported as FBX again in order to work properly with the steps noted below.

To use Moho projects inside Unity, proceed as follows:

1. After your Moho project is complete, choose **File > Export > Export FBX**. Choose a folder and a file name for your FBX file and click Save.
2. Create a new project in Unity.
3. From Moho Pro, choose **File > Open Custom Content Folder** to open the Custom Content Folder on your hard drive. Select the **Extra Files > Unity Importer** folder, and locate the **AnimeStudioFBXImporter.cs** script. Copy this script into the **Assets > Editor** folder in your Unity project. (If this folder does not exist in your project you will need to create it).
4. Locate the FBX file that you saved with Moho Pro, and import it into the Unity Assets window.
5. Preview the content in the Unity preview window to verify that it appears the same as it did in Moho.

Exporting from Photoshop

Moho is equipped with a Photoshop export script that will give you the ability to take your PSD files and export them into .moho format. The .moho format is the native Moho format. This process helps users from having to re-draw or export individual layers as images into Moho.

The PSD to ANME script is named **Export Layers To Moho.jsx**. To access this script, please make sure you've configured a content location as described in **"Creating a Content Folder"** on page 16. The script will be copied into that folder.

To use the script within Adobe Photoshop, copy the **Export Layers To Moho.jsx** file to your **.../Photoshop/Presets/Scripts** folder. You should then be able to open up a Photoshop document, run this script from **File > Scripts > Export Layers to Moho**, and it will generate a new Moho file complete with an image layer for each original Photoshop layer. Basically, the script converts PSD formatted files to .moho files. It exports every layer that was created originally in Adobe Photoshop and makes it completely readable when imported into Moho. All versions of Adobe Photoshop since version 7 should support this script.

The script exports the following 2 things: Firstly, it converts the PSD file into a .moho file. Secondly, all the individual layers of the PSD file are converted into individual PNG files and are placed in a folder of the same name as the .moho file. The folder with the PNG's and the newly converted .moho file will be located side by side. It is important to note that whenever you open the .moho file, it will reference the PNG folder. So please keep them side by side. If the PNG folder and the newly converted .moho are not located in the same folder, the layers within your newly opened .moho will not work properly in Moho.

Show in Explorer (Windows only)

The **File > Show in Explorer** command will reveal the source project file for the current document in Windows Explorer when this command is selected.

Show in Finder (Mac only)

The **File > Show in Finder** (Mac) command will reveal the source project file for the current document in the Mac Finder when this command is selected.

Refresh Media

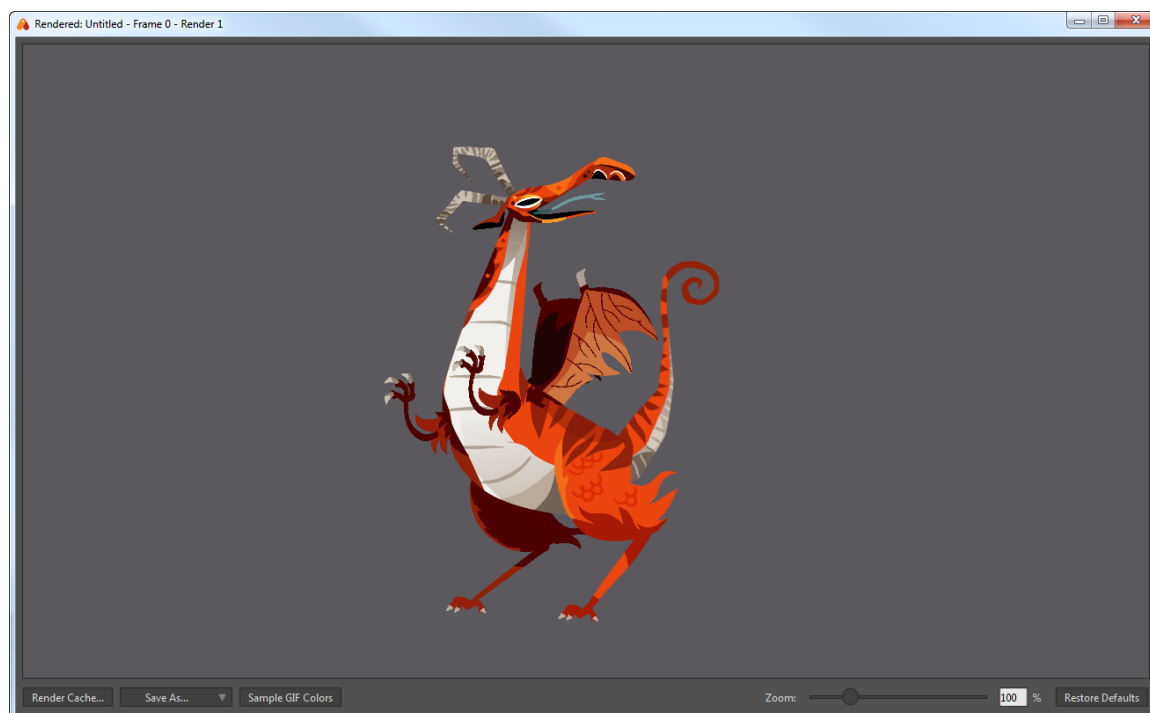
The **File > Refresh Media** command (or the keyboard shortcut **Command/Ctrl M**) causes Moho to check the modification dates of all of the media that is referenced in the project, and will reload the media that has changed.

Preview

Generates a preview image of what your project will look like. If you're in the process of animating your project, the image will be of the current frame in your animation. A preview image does not contain all the fill styles, and is of lower quality, but is quicker to generate than a fully rendered image.

When the Preview window opens up to display your work, you can save the preview as a still image, using the popup menu in the Preview window. By default, the file will be named with the name of your project, followed by the frame number.


The following options are available in the Preview window:



Preview window.

- **Render Cache:** Click to place a preview render in your render cache. By default you can store up to 100 preview images in your render cache, which has to be located in a User Content folder. If you did not set up a User Content folder

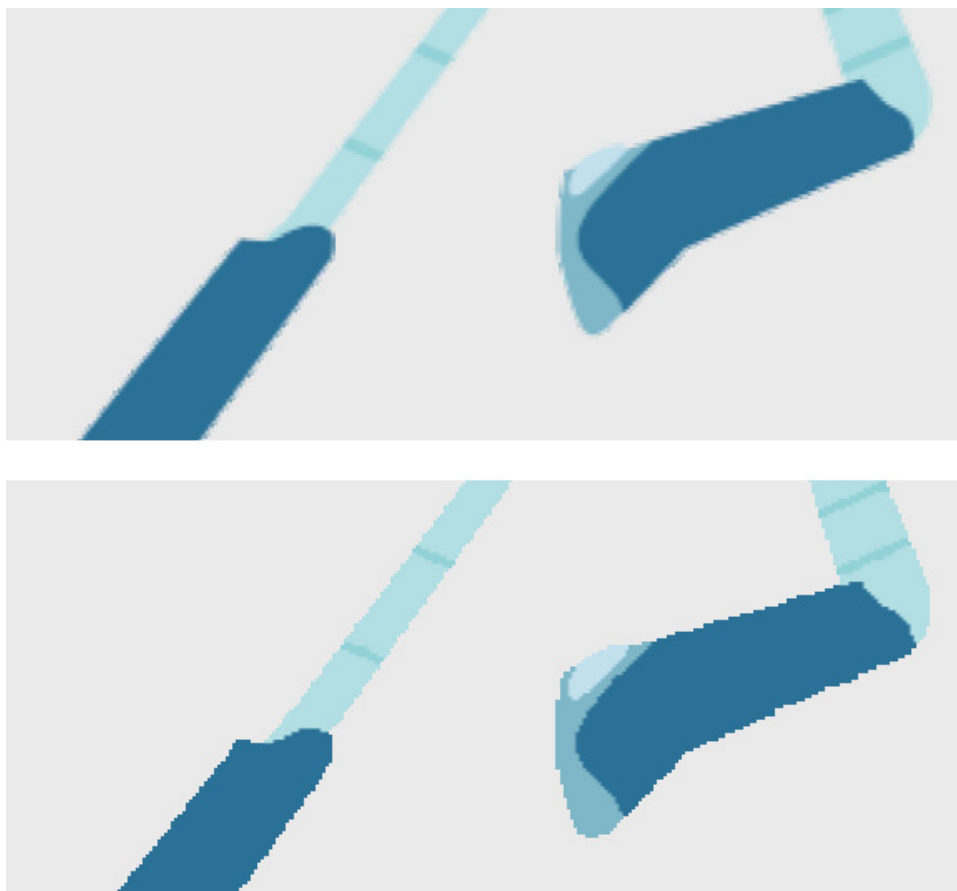
during installation, see [See “Creating a Content Folder” on page 16](#) for more information.

 *The Options tab in the General Preferences dialog allows you to specify the number of images stored in your Render Cache. See “General Tab” on page 435 for more information.*

- **Save As:** Expand the menu to choose the file format (JPG, BMP, Targa, or PNG). You can also copy the image to a clipboard and paste it into another application.
- **Zoom:** Move the scrollbar left or right to zoom in and out of the image. You can also use the mouse scrollwheel to zoom in or out.
- **Percentage field:** Allows you to enter a zoom percentage value.
- **Restore Defaults:** Resets the preview window to the default zoom level.

Preview No Antialiasing (Pro Only)

Use the **File > Preview No Antialiasing** command to generate a quick preview of your work. Jagged edges will be visible on slanted or curved surfaces.



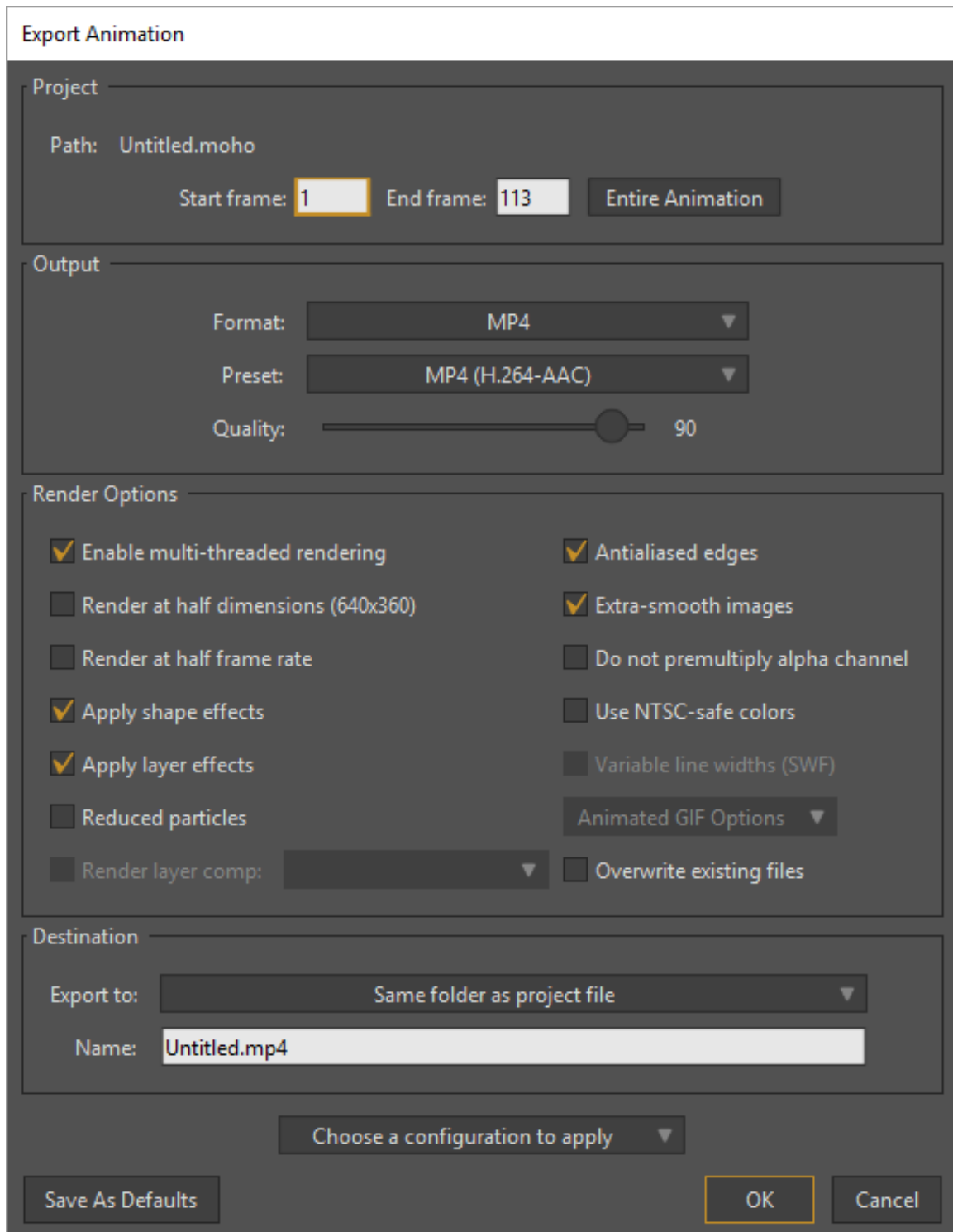
Antialiasing (top); No antialiasing (bottom).

Preview Animation (Pro Only)

The **File > Preview Animation** command performs a screen capture of the items on the canvas during playback and saves it as a movie file. You can also generate a preview animation by holding down the **Option** key (Mac) or **Alt** key (Windows) while clicking the **Play** button.

Export Animation...

This command brings up a dialog that lets you export an animated sequence and save it to disk. The Moho project file is where your work is saved, but to view the animation as a movie, to put it on the web, or to work with it in other programs, you have to export the animation.



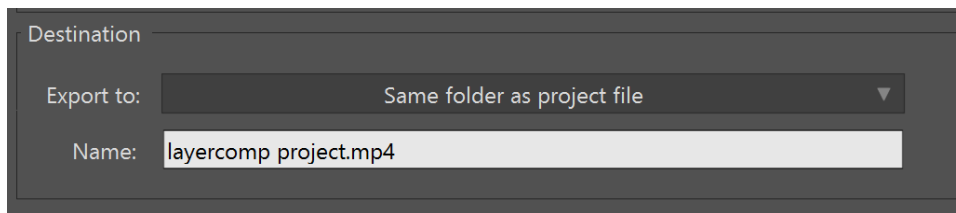
The Export Animation dialog.

The options in this dialog are:

- **Project:**
 - **Start Frame:** Enter the start frame for your exported movie here.
 - **End Frame:** Enter the end frame for your exported movie here.

- **Entire Animation:** Press this button to reset the start and end frames to include all frames in the movie
- **Output:**
 - **Format:** The options in the Export Animation dialog are described in [“Output Formats and Presets” on page 411](#):
 - **Preset:** The options in the Preset list are described in [“Output Formats and Presets” on page 411](#):
 - **Quality:** Move the slider left to decrease quality (creates a smaller file). Move the slider right to increase quality (creates a larger file).
- **Render Options:**
 - **Enable multi-threaded rendering (Pro Only):** With this option unchecked, only one thread will be used to rendering. With the option checked, up to four threads will be used.
 - **Render at half dimensions:** Check this box to render a smaller version of your movie. The output resolution is as indicated in the dialog. This makes rendering faster if you just want a quick preview, and is useful for making smaller movies for the web.
 - **Render at half frame rate:** Check this box to skip every other frame in the animation. This makes rendering faster, and results in smaller movie files.
 - **Apply shape effects (Pro Only):** If this box is unchecked, Moho will skip shape effects like shading, texture fills, and gradients.
 - **Apply layer effects:** If this box is unchecked, Moho will skip layer effects like layer shadows and layer transparency.
 - **Reduced particles (Pro Only):** Some particle effects require hundreds of particles to achieve their effect. Check this box to render fewer particles. The effect may not look as good, but will render much faster if all you need is a preview.
 - **Render layer comp (Pro Only):** Check the option and select the desired layer comp to render.
 - **Antialiased edges (Pro Only):** Normally, Moho renders your shapes with smoothed edges. Uncheck this box to turn this feature off.
 - **Extra-smooth images:** Renders image layers with a higher quality level. Exporting takes longer with this option on.
 - **Do not premultiply alpha channel (Pro Only):** Useful if you plan to composite your Moho animation with other elements in a video editing program.
 - **Use NTSC-safe colors (Pro Only):** Automatically limits colors to be NTSC safe. This is only an approximation - you should still do some testing to make sure your animation looks good on a TV monitor.
 - **Variable line widths (SWF) (Pro Only):** Exports variable line widths to SWF. See [“What to Avoid” on page 417](#) for more information about variable width lines and Flash.


- **Animated GIF Options (Pro Only):** Enabled when Animated GIF is selected for output format. For additional information, see “Exporting Animated GIF Files (Pro Only)” on page 413.
- **Render layer comp:** (Pro only) When you export layer comps, the name of the layer comp will be added to the name of the output file. Check the option and select the layer comp you want to render.
- **Overwrite existing files:** (Pro only) Check this option to overwrite existing files if desired. If you choose not to overwrite existing files, a number will be appended to name of the new file to prevent overwriting the existing version.
- **Destination:** (Pro only) Options in the Destination section determine where your renders will be saved:




Destination options.

- **Export to:** Allows you to choose the location where the project will be exported. You can export to the same folder as the project file, or specify another location.
- **Name:** Assigns a name for the exported project.
- **Other Settings:** (Pro only)
 - **Choose a configuration to apply:** Allows you to choose, edit, or create render configurations. Click the **Edit Configurations** button to create a new render configuration. If there are no custom configurations, the only choice will be Application Defaults.
 - **Save As Defaults:** Click the button to save the present settings as the new export defaults.

When exporting a movie, Moho will include an alpha channel if the codec you're using supports it. This makes it possible to composite Moho movies with other media in a video editing program.

 *If you're using QuickTime, set the color depth to “Millions of Colors+”. The “+” is QuickTime's indication of an alpha channel. The codecs that support this include Animation, None, PNG, TGA, and TIFF.*

 *Moho can only export to a maximum size of 900 pixels x 900 pixels and 3000 frames. (Moho Pro does not have this limitation.)*

Output Formats and Presets

The Export Animation dialog has several options for adjusting the output quality of your animation. These default to the highest quality rendering, but you may sometimes want to lower the quality to increase rendering speed or to output animations with smaller file sizes for streaming over the internet.

Supported formats for Windows and Mac, as noted, include the following:

- **Image Sequence:** Supported image formats are JPEG, BMP, Targa, PNG, or PSD.
- **M4V:** When choosing M4V format, the following presets are available:
 - **Apple M4V (H.264-AAC):** Saves the movie in M4V format using H.264 video and AAC audio codecs.
 - **Apple M4V (JPEG-AAC)** (Macintosh Only):
- **MP4:** When choosing MP4 format, the following presets are available:
 - **Apple M4V (H.264-AAC):** Saves the movie in mp4 format using an H.264 video and AAC audio codec. Windows 7 or higher.
 - **Apple M4V (JPEG-AAC)** (Macintosh Only):
- **AVI:** The following AVI options appear on Windows XP or higher systems only:
 - **AVI (MJPEG):**
 - **AVI Movie (DV):** (Windows XP and higher only). Saves the movie as a 720 x 480 file in avi format.
 - **AVI Movie (Uncompressed):** (Windows XP and higher only). Saves the movie in avi format using an uncompressed video codec. Expect these movies to be large compared to a compressed format like DV.
- **AVI (Video for Windows):** The following legacy AVI format appear in Windows XP or higher systems only:
 - **AVI Movie:** Saves the movie in avi format. In the next dialog, the user will be prompted for the video codec of the export.
- **Flash (SWF):** One preset appears for Flash movie export:
 - **Flash (SWF):** Exports your animation to a Flash SWF file, using the dimensions of your project.
- **QuickTime:** (Mac and 32-bit version of Moho Pro for Windows only. Not available in Moho Debut or 64-bit Windows). Saves the movie in QuickTime (mov) format.




On Windows, QuickTime output format only appears in the 32-bit version of Moho Pro. The 32-bit version of Moho Pro is not installed by default; you will need to check the option to install during setup. You will also need to have QuickTime player installed.


- **QuickTime (H.264-AAC):**
- **QuickTime (H.264-PCM):**
- **QuickTime (JPEG-AAC):**
- **QuickTime (ProRes 422-AAC):**

- **QuickTime (ProRes 4444-AAC):**
- **QuickTime (ProRes 4444-ALAC):**
- **QuickTime (ProRes PNG-AAC):**
- **Legacy QuickTime:** (Mac and 32-bit version of Moho for Windows only, not available in Moho 64-bit Windows). Saves the movie in QuickTime (mov) format. In the next dialog, you will be prompted for the video codec and quality of the export.

 *On Windows, this output format only appears in Moho Debut, and the 32-bit version of Moho Pro. QuickTime software must be installed.*

 *The Mac App Store prevents the export of media formats using the QuickTime media library. Because of this, the QuickTime (PNG-AAC), iPhone Movie, and QuickTime Movie movie formats are not supported. The other QuickTime formats are supported using the newer AV Foundation media library.*

- **QuickTime Movie (Animation):**
- **QuickTime Movie (H.264):**
- **QuickTime Movie (JPEG):**
- **QuickTime Movie (MPEG-4):**
- **QuickTime Movie (PNG):**
- **Flash:** One preset appears for Flash movie export. See “Exporting Flash” on page 414.
 - **Flash (SWF):** Exports your animation to a Flash SWF file, using the dimensions of your project. Quality choices allow you to choose a range of movie qualities between Maximum and Minimum, with the default selection being High quality. The higher the quality, the larger the file size will be, and the longer it will take for others to download.

 *When choosing a compression format or codec for export, keep in mind that viewers must also have the same codec available to view the file. We recommend that you select a basic compression format/codec that is installed with Mac OS X.*

- **Animated GIF:** (Moho Pro only)
 - **Animated GIF:** See “Exporting Animated GIF Files (Pro Only)” on page 413
- **SVG:** (Moho Pro only)
 - **SVG:** See “Exporting Sequential SVG Files (Pro only)” on page 417.

After you select your format and quality, choose **OK** to render the animation.

Exporting Animated GIF Files (Pro Only)

Moho allows you to easily create animated GIF files that can be shared on FaceBook, or included in web pages and emails. Animated GIF files do not contain sound, and they cannot contain any more than 256 colors. However, they can be read in a wide variety of applications, including being directly embedded into web pages.

To create an animated GIF file, follow these steps:

1. Choose **File > Export Animation**. The Export Animation dialog appears.
2. Choose **Animated GIF** from the Format dropdown in the Output section. This automatically selects the Animated GIF preset.
3. Click the **Animated GIF Options** button in the Render Options section. You will be presented with the following options:

- **Number of colors:** Choose 2, 4, 8, 16, 32, 64, 128, or 256. Default is 16 colors.



Moho looks at the first frame in your animation to choose the colors that will be included in the animated GIF. If your first frame is a solid color, there is a workaround that you can use to select colors from a frame that is more representative of the entire animation. See "Notes and Tips" on page 413.

- **Dithering:** Reduces bending by creating graduated color transitions.



If possible, turn off dithering in the Animated GIF options - for animations with a lot of solid colors this can reduce the resulting file size.

- **Transparency:** Renders your animation against a transparent background.



If using transparency, set the background color to something close to your expected background (often white, gray, or black). (This is because animated GIF transparency is an on/off situation, so some of the background color can still blend into your artwork.)

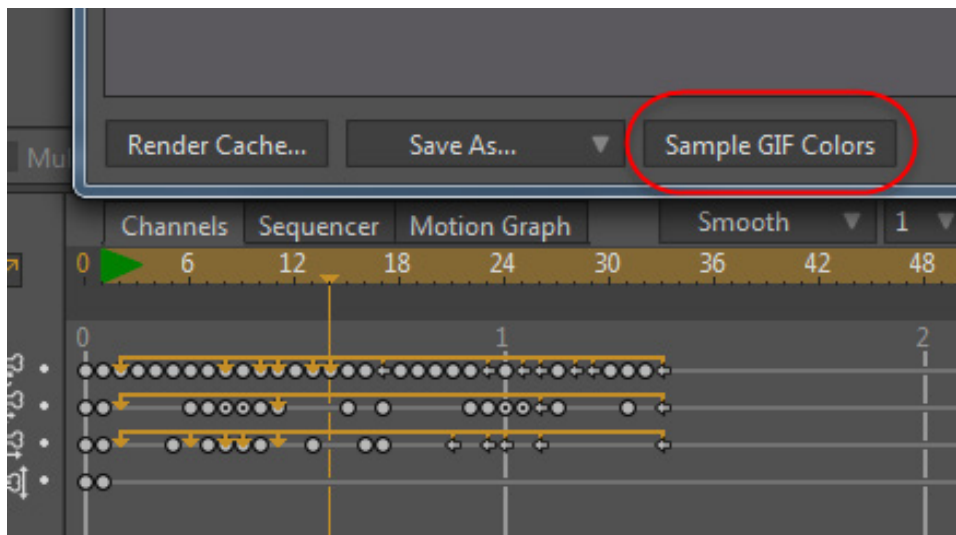
- **Frame Difference:** Keep this option checked to create an optimized animation that stores only the changes that are made from frame to frame. Unchecking the option creates a larger file because each frame is stored in its entirety in the animation.
4. Choose **OK** to apply your settings. Moho prompts you to select a folder and enter a name for your animation. After your animation is exported, you will find the GIF file in its saved location.

Notes and Tips

- Be careful with pixel dimensions and duration - the smaller and shorter, the better. You will probably want to reduce the project dimensions, because the

default settings will create animated GIF files that are very large (1280 x 720 pixels).

- Flat colors will compress better, and will dither less - avoid gradients and image textures if possible.
- Try reducing frames per second to get smaller files.
- Avoid things that cause the entire screen to update, like moving the camera.
- If the first frame in your animation is not a good representation of the colors that are included in the entire animation, advance to a frame that does include all or most of the colors. Render a preview of that frame (**File > Preview**, or the **Ctrl/Cmd+R** shortcut) and click the **Sample GIF Colors** button at the bottom of the Preview window. The sampled colors will be remembered in the document. When you choose the **File > Export Animation** command, Moho will remember the sampled colors and will use them to compile the animated GIF.



Click the Sample GIF Colors at the bottom of the preview window to sample colors from a representative frame.

- You can choose specific colors to be included in your animated GIF. To do so, create a separate vector layer that you can set as invisible or hidden during rendering. This custom color layer can contain simple shapes that are filled with the colors you want to include. For example, you can include various shades of gray which will cause Moho to convert your animated GIF to grayscale. Use the Sample GIF colors in the Preview window to sample the custom colors as described previously.

Exporting Flash

Moho can also export Flash files in SWF format. Flash is a common vector animation format on the Web. When exporting Flash, Moho will also include the soundtrack (if any), if the soundtrack is in MP3 format. If you plan on exporting Flash files, it is important to read ["How to Create Efficient Flash Files" on page 416](#).



If you plan to export your animations to Flash (SWF) format, you will need to use MP3 audio files instead of WAV audio files. In addition, if you plan to render to SWF format, you can only use a single audio file in the project.

Flash Tips

Advice for working with Moho and Flash

Among the other export formats that Moho offers, you also have the option to output Flash SWF files. SWF is a format created by **Adobe** as a way to deliver animated vector artwork and interactive applications. Flash animations are very common on the web, and most users already have the Flash player installed on their computers. Because Moho is also vector-based, there are enough similarities to make it possible for Moho to export SWF files.

However, Moho and Flash are not completely compatible. Therefore, not all the features of Moho can be exported successfully to Flash. In addition, because Flash is a web format, small file size is important - there are certain issues to keep in mind when working with Moho if Flash is your intended output format.

When exporting SWF files, you may want to use Macromedia's Flash authoring tool to combine multiple SWF files, add extra elements, sound, etc. Be aware that Moho's SWF files are compatible with Flash MX and later - Flash 5 and earlier are not able to load Moho-created SWF files.

What Can be Exported

Most common objects in Moho can be exported to Flash. These include:

- Vector layers
- Fills/Outlines/Colors
- Transparency
- Gradients
- Variable-width lines (try to use these sparingly - see below)
- Bone warping of vector layers
- Image layers (PNG and JPEG only, and only if they are not warped by a bone layer)
- Particle layers (careful - a complex particle effect can easily overwhelm Flash)
- A soundtrack can be exported if it's in MP3 format, and at either 44100 Hz, 22050 Hz, or 11025 Hz sample rate. If you want your SWF file to contain audio, make sure that your project contains **only one audio track**, and that the audio track is in MP3 format. In order for Moho to play MP3 format audio files, you must have QuickTime installed

What Can't be Exported

On the other hand, some things in Moho are just not compatible with Flash, and cannot be exported to a SWF file. The following list covers the most important of these objects and effects.

- Brushes
- Fill and line effects (except gradients)
- Layer effects (shadows, shading, layer blur, motion blur, etc.)
- Image warping or 3D movements in image layers
- Image layers that use progressive JPEG images (Flash can't handle progressive JPEG images)
- Layer masking
- 3D layers
- Multiple audio tracks, or audio tracks other than MP3 format

How to Create Efficient Flash Files

When you're creating an animation with the intent to produce an SWF file as output, there are several things to keep in mind. An important concern with SWF files is keeping the file size down.

A new layer is optimized to start with, but depending on the effects you apply, that optimization can go away. The following things will "de-optimize" a layer. Note: a non-optimized layer will still export to Flash, it just won't be nearly as efficient.

- 3D camera movements (this will de-optimize all layers in the project, so it should be avoided if possible when targeting SWF)
- 3D layer rotation (X or Y rotation, or perspective rotation)
- Layer shear
- A group layer that has 3D rotation or shear will cause all of its sub-layers to be non-optimized
- Uneven scaling in the X and Y directions
- Point animation
- Bone animation is a common cause of non-optimized layers. What's happening is that because Flash doesn't have a bone system like Moho, Moho needs to export a lot of extra information for Flash to be able to produce the same effect. One way to use bone animation and to stay optimized is to attach a vector layer to a single bone, instead of letting the bones warp all the points in the vector layer. The vector layer will then remain optimized. While you can't do this in all cases, sometimes you can break up a character into multiple body parts - some parts will be warped with the bones, and some will be attached to a single bone. At least some parts of the character can remain optimized.

Here are some other things to think about when exporting to SWF:

- Consider using a lower frame rate (12 fps, for example) for your animation. Fewer frames means a smaller file.
- If some of your layers can do without any animation at all, or just layer translation/scaling/rotation (background scenery, props, background characters, etc.), that can save a lot of space.
- If most of a layer is stationary, except for one small object, move that object into its own layer if possible. Example: a character who is waving his arms, but is otherwise still - move the arms into a separate layer from the rest of the body. The body will remain optimized and take up much less space.
- If an object sits still for a time with no animation, consider replacing it with a non-animated object for that time period.

What to Avoid

If your goal is to create a SWF animation, there are some things you should try to avoid. Besides the effects that just are not possible to export, you should try to avoid the following effects if possible. These are all things that can be exported - it's just that they make for a less efficient SWF file. Of course, you won't want to avoid all of these things all of the time. However, if you plan your animation carefully, and use as few of the following effects as possible, the resulting SWF file will be smaller, and will load quicker over the web.

- 3D camera moves - no Flash optimization is possible when you're moving the camera around in 3D. Simple side-to-side pans and zooms are OK, but when you start using camera pan/tilt, Flash efficiency goes down the drain.
- Try to use as few control points as possible in your vector artwork.
- The freehand tool and the insert text dialog can generate a lot of points, resulting in a big SWF file.
- Limit the use of variable-width lines. It's easy to overwhelm Flash with the complexity of variable-width lines, making the resulting SWF file play back unpredictably. Read "Flash Movie Size Limit" at http://kb2.adobe.com/cps/144/tn_14437.html for more information. If possible, only use variable-width lines in SWF-optimized layers.
- Avoid compound shapes (two adjacent circles filled as one, shapes with holes, or figure 8's).

Exporting Still Images

Finally, you can export an animation as a sequence of numbered still images. This option is not used very often, but sometimes for certain post-processing tasks, you may prefer to work with a sequence of separate still image files. You can choose between JPEG, BMP, PSD, Targa, or PNG.

Exporting Sequential SVG Files (Pro only)

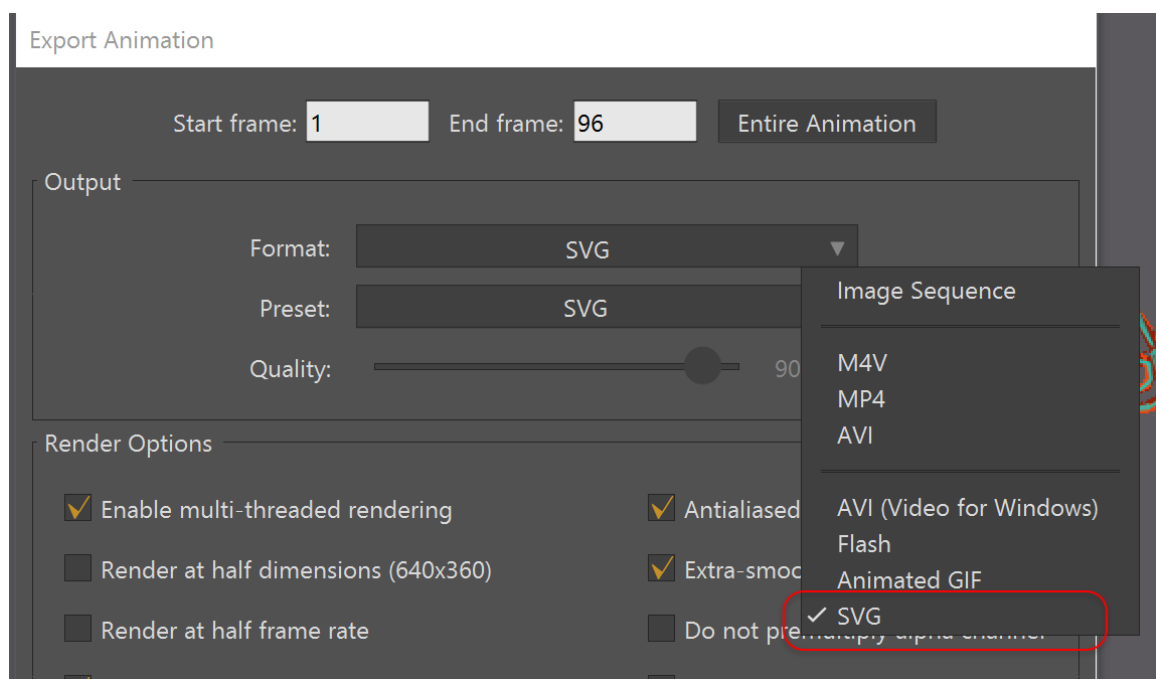
To export sequential SVG files (either through the Export command or the Moho Exporter), choose SVG from the format popup in the Export Animation dialog.

Image-based features that work only on rendered images in Moho (such as layer blur, layer shadows, and so on) will not be exported to the SVG files.

The progress bars will display render progress. Sequenced files will appear in the directory that you selected. Each file can be brought into Adobe Illustrator (or another vector editing program).

SVG export does not support all features found in Moho 13.5:

- You can output vectors, bone features, physics, colors, styles, and gradients.
- Image-based features like layer blur, layer shadow, and other features that work like pixel filters on a layered image are not supported in the SVG export.
- Masking is limited.
- Images can be exported, but it is not possible to warp them.



Exporting Sequential SVG files.


Export Animation with Previous Settings

After you export an animation once, you can use the **File > Export Animation with Previous Settings** command to render another animation without having to specify animation settings again. The new file will be rendered with the settings that were previously used.

 By default, Moho will notify you when a file of the same name already exists in the location that you are exporting to. You can disable this alert in the General tab of the Preferences dialog. Uncheck the **When exporting alert on file conflict** option to suppress the alert.


Export FBX (Pro Only)

The **File > Export FBX** command exports your Moho project in FBX format so that you can import it into other 2D or 3D applications that support the FBX file format. No export options are provided. After choosing this command, you will be prompted to specify a folder and filename for the export.

 *Many Moho commands (point binding, curvatures, bone stretching, etc.) that are not supported in FBX format. When designing files for FBX export, we recommend that you use the **View > FBX Preview** command to preview your project before export. For additional information on how to address unsupported features, see “FBX Preview Mode (Pro Only)” on page 491*

Export OBJ (Pro Only)

If your scene contains 3D objects, including those that you have converted from 2D to 3D with Moho's 3D Conversion feature (see “3D Options (Pro Only)” on page 250), you can use the **File > Export OBJ** command to save the objects to WaveFront OBJ format. You will be prompted to enter a file name and choose a location for the exported OBJ file.

 *If you import an OBJ file that has been exported from Moho into your 3D software, and some or all of the faces appear to be missing, it may be due to inverted normals. Select the missing faces and invert the normals in your modeler.*


Export POV (Pro Only)

You can use the **File > Export POV** command to export 3D objects from Moho to POV format, which is compatible with POV-Ray, a free raytracing application that produces high quality 3D renderings. For more information about POV-Ray, see <http://www.povray.org/>.

Export Styles (Pro Only)

Choose the **File > Export Styles** command to save an Anime Styles Document. This command allows you to save all the styles from the current project, or only the styles used in the selected layer(s) in the current project. The styles will be saved with an .mohostyle extension.

 *You can also simply open a styles document to export styles to the current project.*

 *If your current document contains styles, but there are no styles used by the layer(s) that you select for a selected layers-only export, an empty styles document will be created.*

Export Frame to SVG

Choose **File > Export > Export Frame to SVG** to export the current frame in the timeline as an SVG vector file. You will be prompted to select a folder and enter a filename for the SVG file.


 You can also use the **Export Animation** dialog to export sequential SVG image files. Choose **SVG** from the **Format** menu, and set other render option settings as required.

Upload to YouTube

The **File > Upload to YouTube** command allows you to upload your Moho animation to YouTube. After choosing the command you are prompted to locate the animation that you want to upload.

Upload to Facebook®

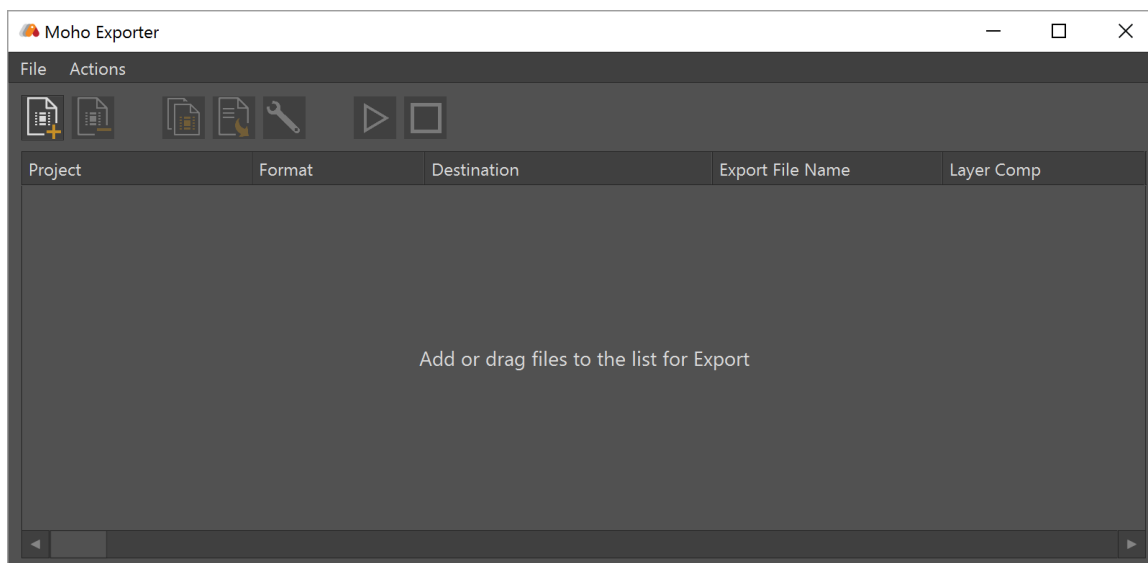
The **File > Upload to Facebook** command allows you to upload your Moho animation to your page on Facebook. After choosing the command you are prompted to locate the animation that you want to upload.

 Before using this features, you will need to sign in to your Facebook account and authorize Moho as an application that can upload to your Facebook account.

After logging in to your Facebook account and choosing the **Upload to Facebook** command, your browser will display a screen that prompts you to allow the **Lost Marble Software Video Uploader** to upload files to your Facebook account. Click the **Allow** button to enable this feature, and then the upload will continue. You should only need to authorize the uploader the first time you use it

Moho Exporter

Choose **File > Moho Exporter** or use the keyboard shortcut **Ctrl/Cmd+B** to open the Export Queue window. This window allows you to easily add projects to the queue for final output. When you choose the **File > Moho Exporter** command, the Moho Export Queue window appears.




The Moho Exporter Window.

The Moho Exporter window consists of two main areas:

- **Action buttons:** The Action buttons provide quick access to common export tasks. The functions of these buttons are described in [“Using the Moho Exporter Action Buttons”](#) on page 421.
- **Export List:** The export list shows the items that are being sent to the export queue. See [“Moho Exporter”](#) on page 420 for additional information.




Using the Moho Exporter Action Buttons

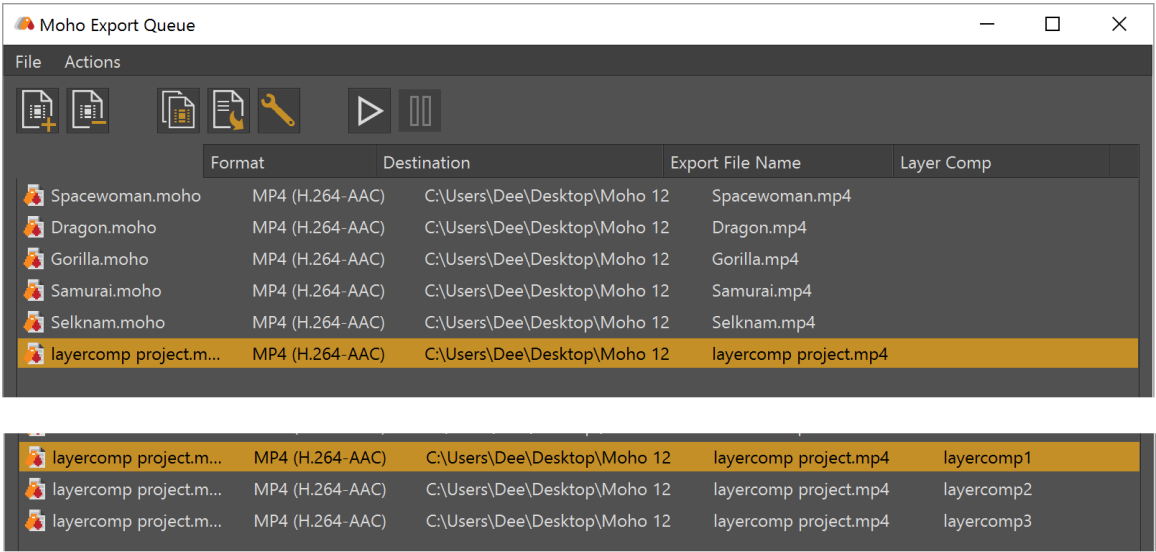
The action buttons for the Export Queue appear in the upper section of the Moho Export Queue window. They serve the following functions:

-  **Add Files:** Click the **Add Files** button to open the **Add Files** dialog, where you can select Moho files to add to the export queue. Navigate to the folder that contains the item or items you want to add, then click Open to add them to the export queue.







You can also add files to the Export Queue list by dragging and dropping files from Windows Explorer or Mac Finder.

-  **Remove:** To remove items from the queue, highlight the file or files that you want to remove, and click the **Remove** button.
-  **Duplicate Selected Item:** Select one or more items in the Export Queue list, and then click the **Duplicate** button to duplicate selected items.
-  **Split Selected Item by Layer Comp:** This button will be enabled when you select a queue item that contains layer comps. Click the button to separate the items in the queue list by layer comp. You can then delete the layer comps that you do not want to render.



Before splitting layer comps (top); after splitting (bottom).

-  **Settings:** Click this button to open the Export Settings dialog, described in “Export Queue Settings” on page 424.
-  **Start:** Press the **Start** button to begin rendering the items in the queue. The items will be output in the order in which they appear in the list.
-  **Pause:** Press the **Pause** button to pause rendering output. Press again to resume rendering.
-  **Stop:** Press the **Stop** button to completely stop rendering of the current item.

Using the Export List

The Export list contains a tabled list of the files that you send to the Export Queue. You can perform actions on one or more items in the list.

- To add items to the list, click the **Add Files** button, or drag and drop files from Windows Explorer and Mac Finder, or export files from the Library by right-clicking a library file and choosing **Add to Exporter** from the context menu.
- To delete items from the Export list, select one or more items, and press the **Delete** key, or click the **Remove** button at the top of the Moho Exporter.
- To reorder the list, select one or more items and drag the selection up or down to change the order that files will be rendered. Note that the Exporter will not allow you to position files above the top entry if it is currently being rendered.
- By default, the columns in the list are arranged as follows: Project, Format, Destination, Export File Name, and Layer Comp. You can rearrange the order of the columns by dragging one of the headers left or right in the list.
- Right-click an item in the Export List to display a context menu that allows you to perform several tasks:

- **Show In Explorer/Finder:** Opens Windows Explorer or Mac Finder to the folder in which the item is located.
- **Remove:** Removes the selected item(s) from the Export list.
- **Duplicate:** Duplicates the selected item(s).
- **Change Format:** Allows you to change the output format for the selected item. For example, if you want to render an item in both MP4 and sequential image format, you can add the first copy of the file to the Export list and output that to MP4 format. Then Duplicate the item, and use the Change Format command to output the file as a series of sequential images.
- **Change Destination::** Use this command to choose a different folder to export the animation or image sequence.

Export Queue Settings

Export Settings

Project

Path: layercomp project.moho

Start frame: 1 End frame: 96 Entire Animation

Output

Format: MP4

Preset: MP4 (H.264-AAC)

Quality: 90

Render Options

☒ Enable multi-threaded rendering ☒ Antialiased edges

☐ Render at half dimensions (640x360) ☒ Extra-smooth images

☐ Render at half frame rate ☐ Do not premultiply alpha channel

☒ Apply shape effects ☐ Use NTSC-safe colors

☒ Apply layer effects ☐ Variable line widths (SWF)

☐ Reduced particles ☐ Animated GIF Options

☒ Render layer comp: layercomp1 ☐ Overwrite existing files

Destination

Export to: Same folder as project file

Name: layercomp project.mp4

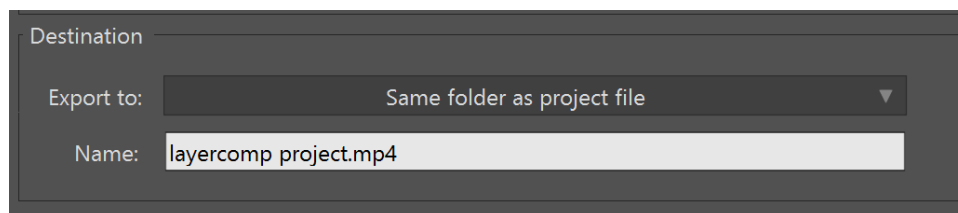
Choose a configuration to apply

Save As Defaults OK Cancel

Before splitting layer comps (top); after splitting (bottom).

- **Project Settings:**
 - **Path:** Displays the path to the project that is added to the export list.
 - **Start Frame/End Frame:** Enter the start and end frames for your exported movie here.
 - **Entire Animation:** Press this button to reset the start and end frames to include all frames in the movie
- **Output Settings:**
 - **Format:** Select one of the supported movie formats from the Format chooser.

- **Preset:** Choose the desired preset for your renders. These are described in ["Output Formats and Presets" on page 411](#).
- **Quality:** When the preset allows for a quality option, select the desired quality from the chooser.
- **Render Options:**
 - **Enable Multi-Threaded Rendering:** Check this option to enable multi-threaded rendering of your projects.
 - **Render at half dimensions:** Check this box to render a smaller version of your movie. This makes rendering faster if you just want a quick preview, and is useful for making smaller movies for the web.
 - **Render at half frame rate:** Check this box to skip every other frame in the animation. This makes rendering faster, and results in smaller movie files.
 - **Apply shape effects:** If this box is unchecked, Moho will skip shape effects like shading, texture fills, and gradients.
 - **Apply layer effects:** If this box is unchecked, Moho will skip layer effects like layer shadows and layer transparency.
 - **Reduced particles** (Moho Pro only): Some particle effects require hundreds of particles to achieve their effect. Check this box to render fewer particles. The effect may not look as good, but will render much faster if all you need is a preview.
 - **Antialiased edges:** Normally, Moho renders your shapes with smoothed edges. Uncheck this box to turn this feature off.
 - **Extra-smooth images:** Renders image layers with a higher quality level. Exporting takes longer with this option on.
 - **Do not premultiply alpha channel:** Useful if you plan to composite your Moho animation with other elements in a video editing program.
 - **Use NTSC-safe colors:** Automatically limits colors to be NTSC safe. This is only an approximation - you should still do some testing to make sure your animation looks good on a TV monitor.
 - **Variable line widths (SWF)** (Moho Pro only): Exports variable line widths to SWF. See ["What to Avoid" on page 417](#) for more information about variable width lines and Flash.
 - **Animated GIF Options:** This option is enabled after you choose Animated GIF from the Format menu described above. Click this option to choose the number of colors in the animated GIF, and to choose Dithering, Transparency, and Frame differencing options.
 - **Overwrite existing files:** Check this option to overwrite existing files if desired. If you choose not to overwrite existing files, a number will be appended to name of the new file to prevent overwriting the existing version.
 - **Render layer comp:** When you export layer comps with the Moho Exporter, the name of the layer comp will be added to the name of the output file. Check the option and select the layer comp you want to render.
- **Destination:** Options in the Destination section determine where your renders will be saved:



Destination options.

- **Export to:** Allows you to export to the same folder as the project file, or to select a specific folder for the export.
- **Name:** Enter a name for the exported file in the field provided.
- **Other Settings:**
 - **Choose a configuration to apply:** Allows you to choose, edit, or create render configurations. Click the **Edit Configurations** button to create a new render configuration. If there are no custom configurations, the only choice will be Application Defaults.
 - **Save As Defaults:** Click the button to save the present settings as the new export defaults.

After you complete your settings, click **OK** to render the output. Note that the **OK** button will be disabled if you are editing settings for an item that is currently being rendered.

Open Custom Content Folder

Opens your custom content folder in Explorer (Windows) or Finder (Mac).

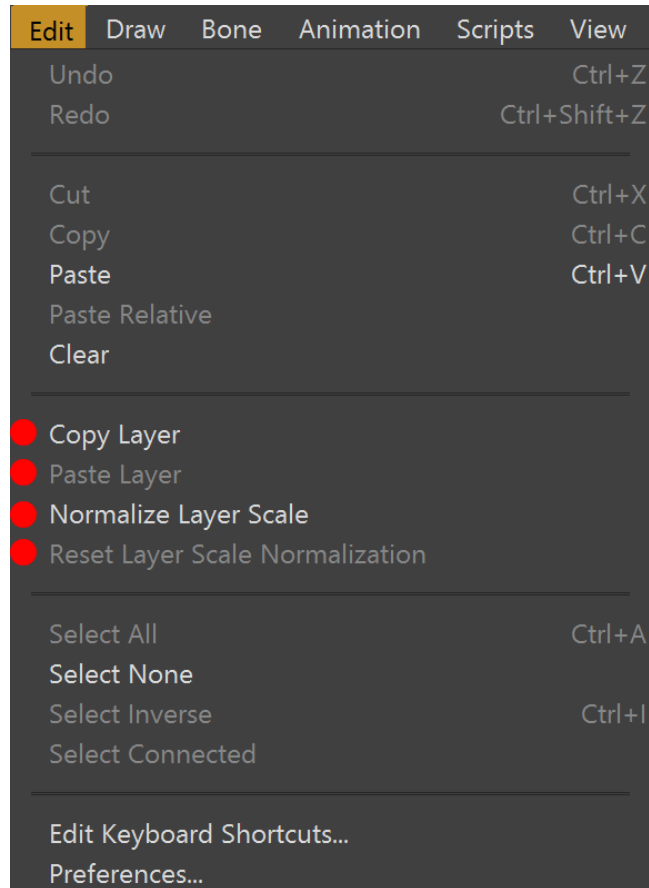
Relaunch in (x)-bit Mode (Pro Only)

The Universal installer allows you to install Moho Pro in both 32-bit and 64-bit versions. The File > Relaunch in 32-bit Mode and File > Relaunch in 64-bit Mode commands allow you to switch between modes.

Quit

Quits Moho. Moho will prompt you to save any unsaved projects before closing.

Chapter 19: Edit Menu



Edit Menu (Pro-only features marked)

Undo

Choose this command to undo the last operation. You may undo up to 8 of your most recent editing operations in Moho.

You will not receive a warning when you undo an operation. You will be able to undo the operation by using the **Edit > Redo** command.

Redo

This command will redo the last operation that you “un-did” with the Undo command.

Cut, Copy, Paste

These are the traditional clipboard commands. They can be used together with the Draw editing tools for vector layers, and operate on the currently selected group of points or keyframes.

When pasting keyframes, the **Edit > Paste** command pastes an exact copy of the keyframes. For example, if you copy keyframes that translate an object from a start point to an end point, and then move to a later frame and paste the keyframes in, the object will move back to the start point and repeat the same action.

Paste Relative

When using the **Edit > Paste Relative** command to paste keyframes that are copied into the clipboard, the pasted keyframes will continue animating the object from the last keyframe that was copied. In other words, if you copy keyframes that translate an object from a start point to an end point and then use the **Paste Relative** command to paste them later in the timeline, the object will continue from wherever it is at that point.

Clear

This command is the same as pressing the backspace or delete key: the currently selected object in the working area will be deleted from the project.

Copy Layer (Pro Only)

Places a copy of the selected layer into the clipboard so that you can paste it into the current document or another opened document.

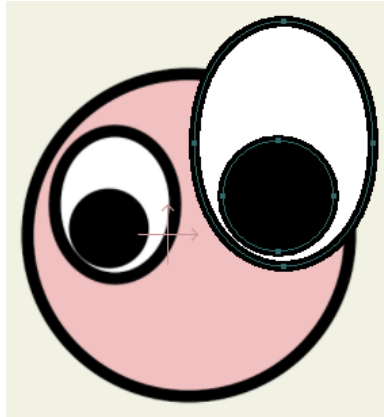
Paste Layer (Pro Only)

After using the **Edit > Copy Layer** command, select the layer above which you want to paste the copied layer. Then choose **Edit > Paste Layer** to paste the layer in the clipboard above the selected layer.

Normalize Layer Scale (Pro Only)

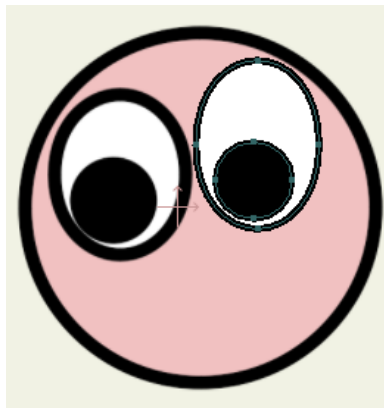
There is a feature in Moho called Scale Compensation, which you can enable or disable in the General tab of the Layer Settings dialog (see ["General Tab" on page 207](#)). When scale compensation is enabled, strokes get thinner as an object is scaled down, and bigger as you scale the object up.

There are times when you need to scale portions of a character down. For example, you have two eyes in a character, and you need to scale the larger eye down.



Two eyes of different sizes

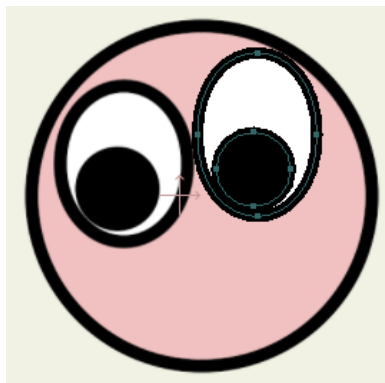
However, when you scale the eye down, the stroke that surrounds the eye is much more narrow than the strokes used on the rest of the character.



The larger eye is rescaled

Though you can turn off scale compensation, this may not be desirable for your workflow. You also have the option to change the stroke width in the Style window, but if you have many cases where strokes are not uniform, it can be time consuming to manually enter numbers to make all the stroke widths uniform.

The Normalize Layer Scale command allows you to quickly adjust the scale of the line widths. Select the layer or layers that have line widths that are out of sync, and then choose **Edit > Normalize Layer Scale**. The line width of the selected layers will automatically adjust to match the other layers.



After the layer scale is normalized

Reset Layer Scale Normalization (Pro Only)

Choose **Edit > Reset Layer Scale Normalization** to revert the selected layer(s) to their original scale before you applied the **Normalize Layer Scale** command. Strokes immediately revert back to their original scale.

Select All

Selects all the points in the active vector layer.

Select None

De-selects all the points in the active vector layer.

Select Inverse

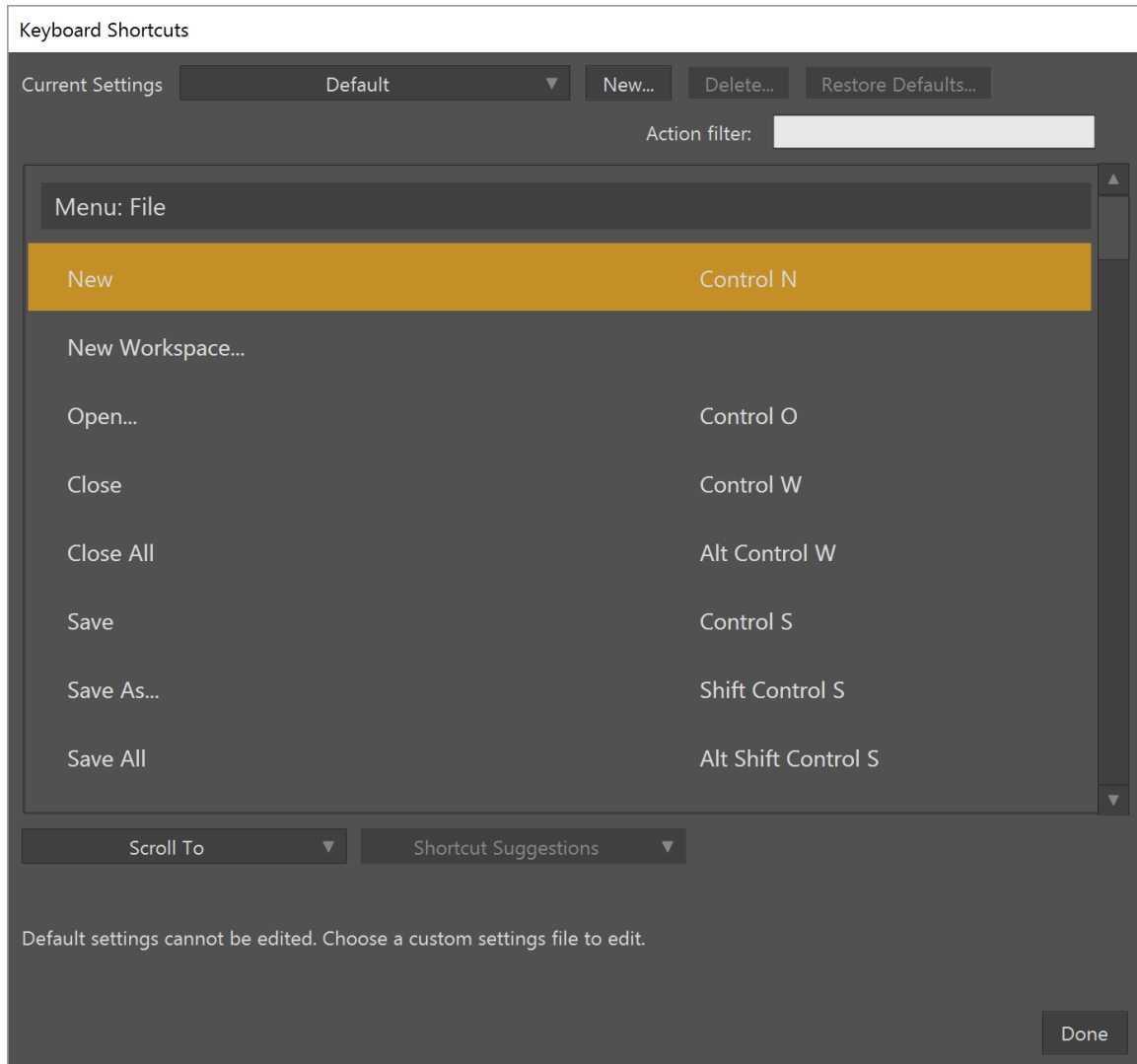
Selects the opposite points in the active vector layer. Selected points will become de-selected, and de-selected points will become selected.

Select Connected

Selects all points that are connected to any other currently selected points. For example, if you have a complex shape like a character's head, just select a few points on it, then choose this command: if all the points on the head are somehow connected together, the whole head will now be selected.

Edit Keyboard Shortcuts

The **Edit > Edit Keyboard Shortcuts** (or **Moho > Edit Keyboard Shortcuts** in Mac) command opens the Keyboard Shortcuts dialog shown in the following figure.



The Keyboard Shortcuts Editor.

By default, the shortcuts that are built-in to Moho are displayed in their default configuration, in three categories: **Menus**, **Tools**, and **Windows**. Simply start typing a command or action name to scroll it into view and select it.

You cannot edit the default configuration. In order to create your own shortcut configurations, you'll need to create a custom settings file.

The following options appear in the dialog:

- **Current Settings:** Displays the name of the shortcut configuration that is currently in use.
- **New:** Allows you to assign a name to a new shortcut configuration. Moho will notify you if the filename is too long. After you assign a name choose **OK**. Your new custom file will appear in the Current Settings list, and you can begin to assign your custom shortcuts.
- **Delete:** Select a custom shortcut configuration from the Current Settings list, and then click this button to delete it. You cannot delete the Default configuration file.

- **Restore Defaults:** Restores all keyboard shortcuts to the default values assigned with the Moho installation.
- **Action Filter:** Enter the name of the action that you want to search for in the field provided. This will filter the list to show actions that contain the text that you enter.
- **Shortcut List:** Displays all shortcuts by category: **Menu**, **Tools**, and **Windows**. You can use the scrollbar at the right side of the shortcut list to scroll further down the list. The left side of the list displays a menu command, tool name, or window; and the right side of the list displays the associated shortcut if one is configured.
- **Scroll To:** Jumps to a specific shortcut category. The categories are named in the order in which they appear in the shortcut list. Select the desired category to jump to that location. The group will be scrolled as close to the top of the list as possible.
- **Shortcut Suggestions:** Click this button to have Moho suggest an unused keyboard shortcut.
- **Done:** Click the Done button when you are finished editing your shortcuts.



If the shortcut list is edited outside of Moho, the settings in the external file will be loaded from disk. If you are in the shortcut editor at the time, you will receive an alert before you reload them that the settings have been modified outside of the application.


Adding Shortcuts


To create a custom keyboard shortcut file, follow these steps:

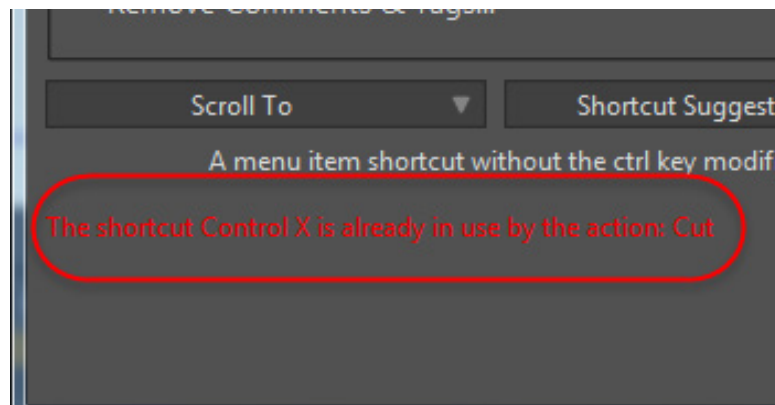


*If a user content folder is defined, Anime will save custom keyboard shortcuts files to a **Keyboard Shortcuts** folder in the user content folder. If names conflict with custom files saved to the default location, the user location will supercede the default location.*


1. Choose **Help > Keyboard Shortcut Editor** to open the Keyboard Shortcut window.
2. If a custom configuration file has not yet been created, click the **New** button to assign a name for a new configuration file. Otherwise, select the custom configuration that you want to edit from the **Current Settings** dropdown list.
3. Scroll through the keyboard shortcut list until you find the menu command, tool, or window item that you want to modify. Click inside the shortcut field to edit it.
4. With the shortcut field selected, press the associated keys on your keyboard that you want to assign for the command.

 Customized shortcuts will override default shortcuts unless there is a conflict with a default. If a conflict with a default shortcut exists, the default shortcut will take precedence over the custom shortcut.


 It is possible to create duplicate shortcuts. The editor will warn you when multiple actions have the same shortcut when you assign a shortcut that is already used by another action. When multiple actions use the same shortcut, the first enabled action found will be triggered.



You will receive a warning when the keyboard shortcut that you enter is already in use.

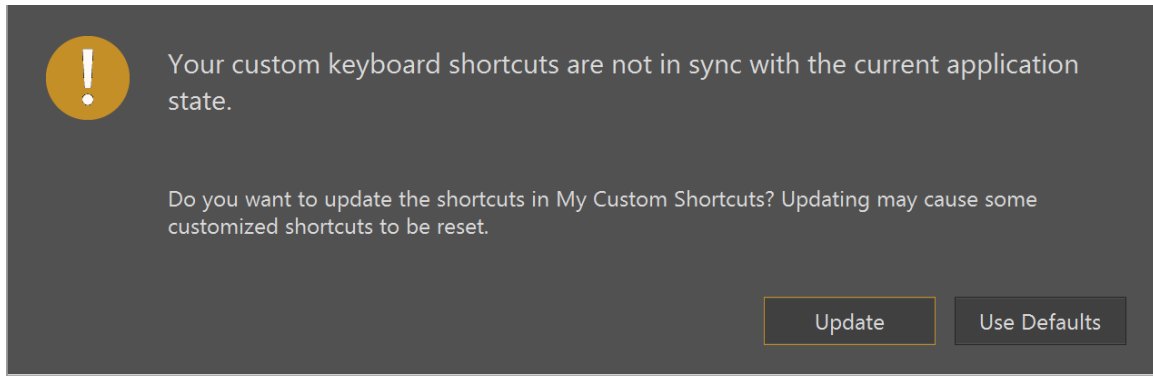
 Actions whose shortcuts are already used by other actions will appear with a red number that indicates how many actions already use that shortcut. Hover over the number to display a list of actions that use that shortcut. The number and tooltip only appear when editing custom shortcuts, and not when viewing default shortcuts.

5. After you are finished with your keyboard shortcuts, click **Done** to save the configuration file.

 If you change your locale, there may be localized shortcuts that conflict with your custom shortcuts. Your settings will be updated to eliminate conflicts.

 Switching from 32-bit to 64-bit or vice versa could potentially alter the shortcuts available and may lead to a conflict between default settings and custom settings. Your settings will be updated to eliminate conflicts.

If shortcuts have changed in the application since the last time you updated, a dialog will prompt you to update your custom shortcut list accordingly, or to use the new defaults.



Update Shortcuts dialog.

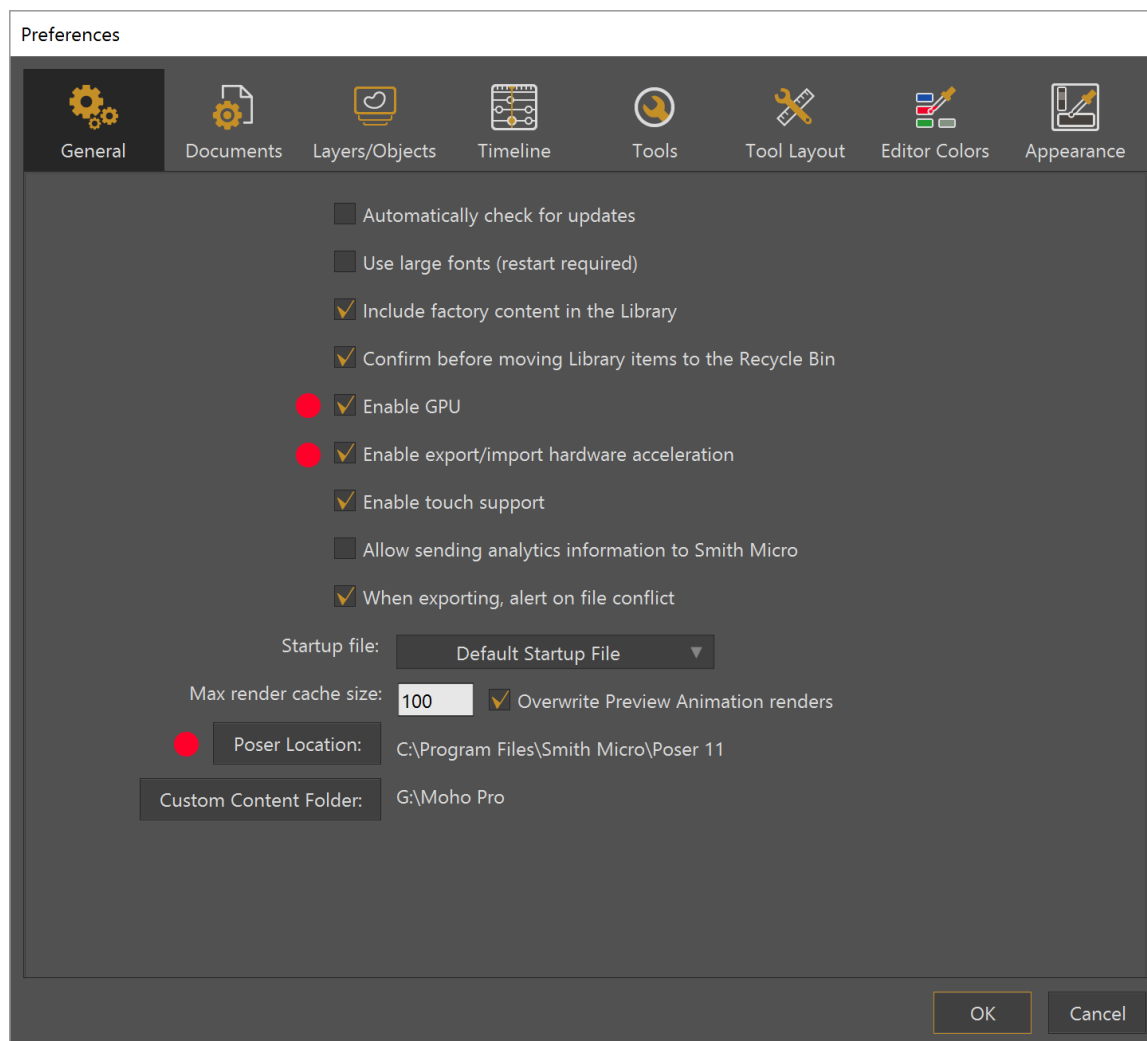
Preferences...



Mac users will find the Preferences command in the Moho menu category.

Brings up a dialog that lets you customize some aspects of Moho, such as the display colors used in the working area of the Moho window. Some of these features including Edit Colors and GUI Colors are only available in Moho Pro.

General Tab

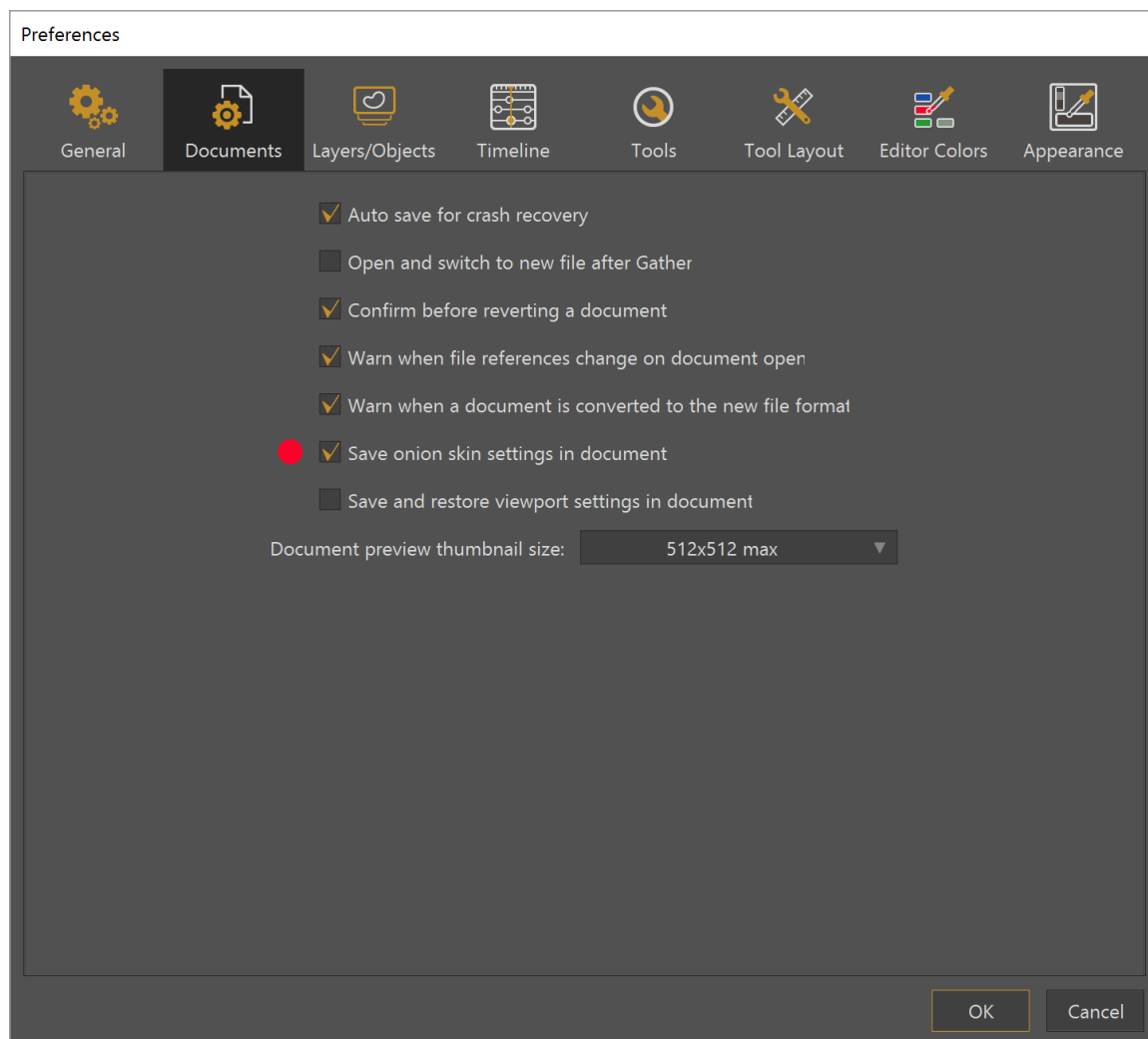


General Tab (Pro only features marked)

- **Automatically check for updates:** When this option is checked, Moho will automatically check for updates upon startup. Uncheck this option if you prefer to manually check for updates.
- **Use large fonts (restart required):** Check this option to use larger fonts in the Moho interface.
- **Include factory content in the Library:** This option is checked by default. When unchecked, factory content will not appear in the library. Content that is placed in your custom content folders or in other folders that you add to the library will still appear in the library.
- **Confirm before moving Library items to the Recycle Bin:** This option is checked by default, which causes you to confirm whether to send library items to the Recycle Bin/Trash after you press the Trashcan button in the library. When this option is not checked, items selected to be moved to the Recycle Bin/Trash will be moved there without confirmation.

- **Enable GPU:** (Pro only) Check this option to enable GPU acceleration if it is supported by your hardware.
- **Enable export/import hardware acceleration:** (Pro only, Windows Only). If a media codec (such as H.264) supports hardware acceleration you can speed up the exporting process by turning GPU acceleration on if your hardware supports it. Turn this option off if your card does not support hardware acceleration.
- **Enable touch support:** Turn this option on if you want to use Moho with a Wacom touch-enabled tablet.
- **Allow sending analytics information to Lost Marble:** When this option is checked, Moho will send hardware information and feature usage statistics to Lost Marble. Analytics will not be sent until after the application has been properly activated/serialized.
- **When exporting, alert on file conflict:** When this option is checked, an alert will appear when you use the Export Animation or Export Animation with Previous Settings command and it encounters files of the same name. You will be prompted to rename, overwrite, or cancel the export. When this option is unchecked, previous versions will be kept, and new versions will be appended with a version number.
- **Startup File:** Allows you to start Moho with a default startup file, an empty document, or a specified project file.
- **Max Render Cache Size:** Enter the number of renders that you want to store your Moho render cache. The default setting is 100 images. In order to store these images, you must create a user content folder.
- **Overwrite Preview Animation renders:** When checked, previously created preview animations will be overwritten with the current one. When unchecked,
- **Poser Location (Pro Only):** Allows you to specify the location of the Poser executable.
- **Custom Content Folder:** Allows you to specify a location in which to store your custom content. This content will be displayed in the Library Assets tab of the Library, in a root folder named **Content Folder Library**.

Documents Tab

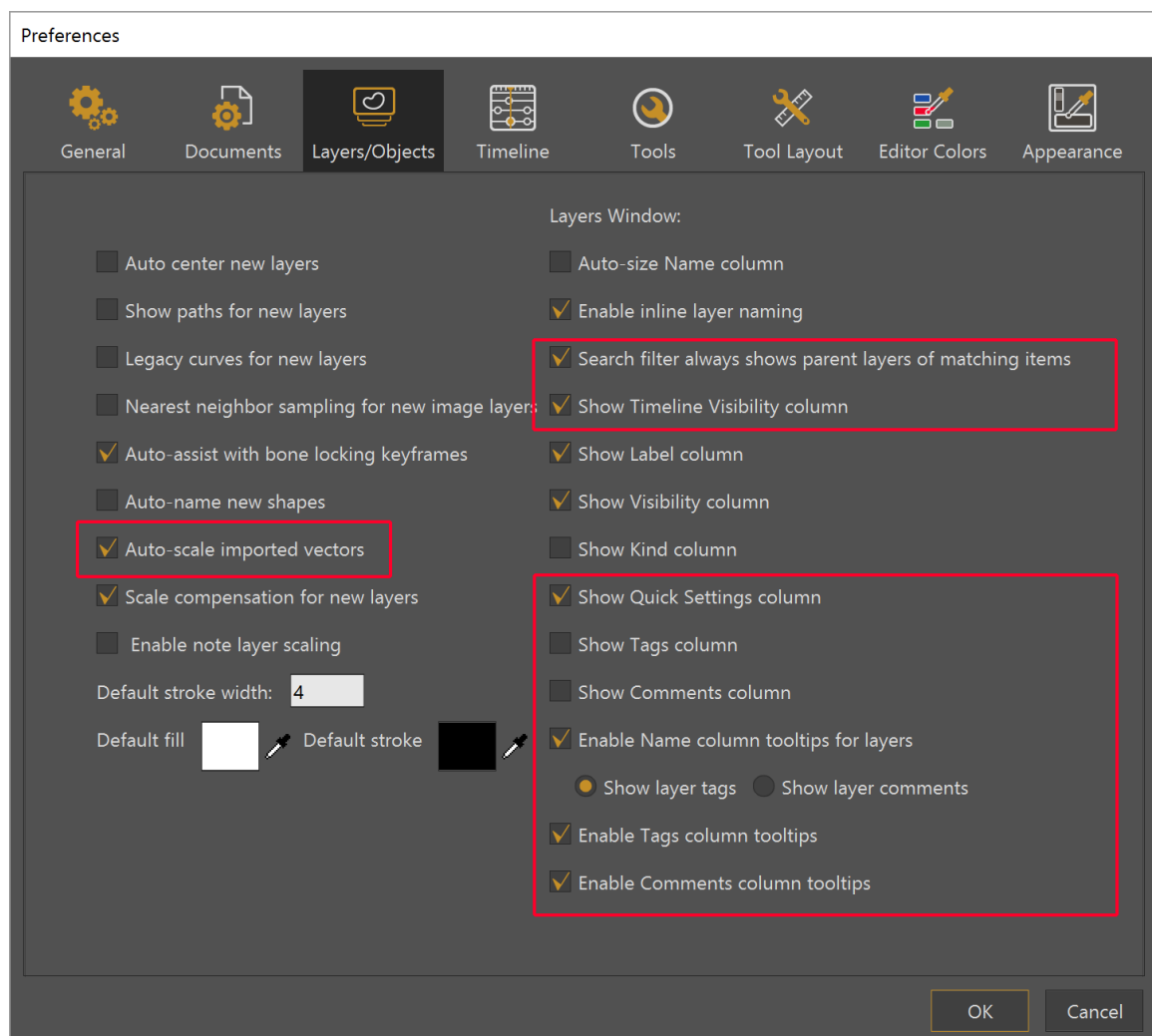


Documents Tab (Pro only feature marked)

- **Auto save for crash recovery:** When turned on, Moho will automatically save your work every thirty seconds to a temporary file. If the application crashes, you can recover your work the next time you start the application. In the event that you are working on very large files and your workflow is slowed down by saving every thirty seconds, you can turn this option off to improve performance.
- **Open and switch to new file after gather:** If you gather a document when this option is checked, Moho will close the current document (the document that you gathered) and open the gathered document. If the preference has not yet been set, Moho will give you the opportunity to select the default preference the first time you gather a document.
- **Confirm before reverting document:** When checked, Moho will ask for verification before a document is reverted to the last saved version.
- **Warn when file references change on document open:** Allows you to enable or disable warnings that appear when project files have changed location. Uncheck the option to disable the warnings.

- **Warn when a document is converted to the new file format:** Allows you to enable or disable notification that older project files will be converted to the new Moho file format.
- **Save onion skin settings in document (Pro Only):** Check this option if you want to save onion skin settings with your project file. If multiple users are working with the same scene at different times, it may be preferable to uncheck the option.
- **Save and restore viewport settings in document:** When checked, documents are saved with viewport state on. When this setting is enabled, if a saved document contains this information the viewport settings will be restored when the document is reopened.
- **Document Preview Thumbnail Size:** Moho can automatically generate thumbnails when you save your documents. The default maximum size for the thumbnails is 128x128 pixels. Other options are **None** (will not automatically generate a thumbnail), **256x256**, **512x512**, and **1024x1024**.

Layers/Objects Tab



Layers/Objects Tab

- **Auto Center New Layers:** If the camera is in its default position (such as it would be in a new document) this option won't do anything. The option will become noticeable if you have moved the camera (for example, if you are looking 90 degrees to the left). If this option is unchecked in such a case, new layers will be centered at 0,0,0 and will be off-camera. If this option is checked in such a case, the new layers will appear centered in front of the current camera position.
- **Show paths for new layers:** Determines whether the paths (previously called construction curves) are displayed for new layers. They're always shown for the selected layer, but usually hidden otherwise.
- **Legacy curves for new layers:** When checked, uses the old style curves, rather than the smoother curves found in Anime Studio 8 and later.
- **Nearest neighbor sampling for new image layers:** When an image is scaled up larger than its original size, Moho will try to smooth out the areas in between pixels to create a smoother image. Turn this option off if you want the enlarged image to appear blocky.
- **Auto-assist with bone locking keyframes:** Adds an extra keyframe when bones are locked or unlocked to prevent them from "drifting".
- **Auto-name new shapes:** Shapes can be named by the user. If this is turned on, all bones and shapes get names like "1", "2", etc.



Moho names bones automatically as you create them. For more information, see "Add Bone" on page 90.

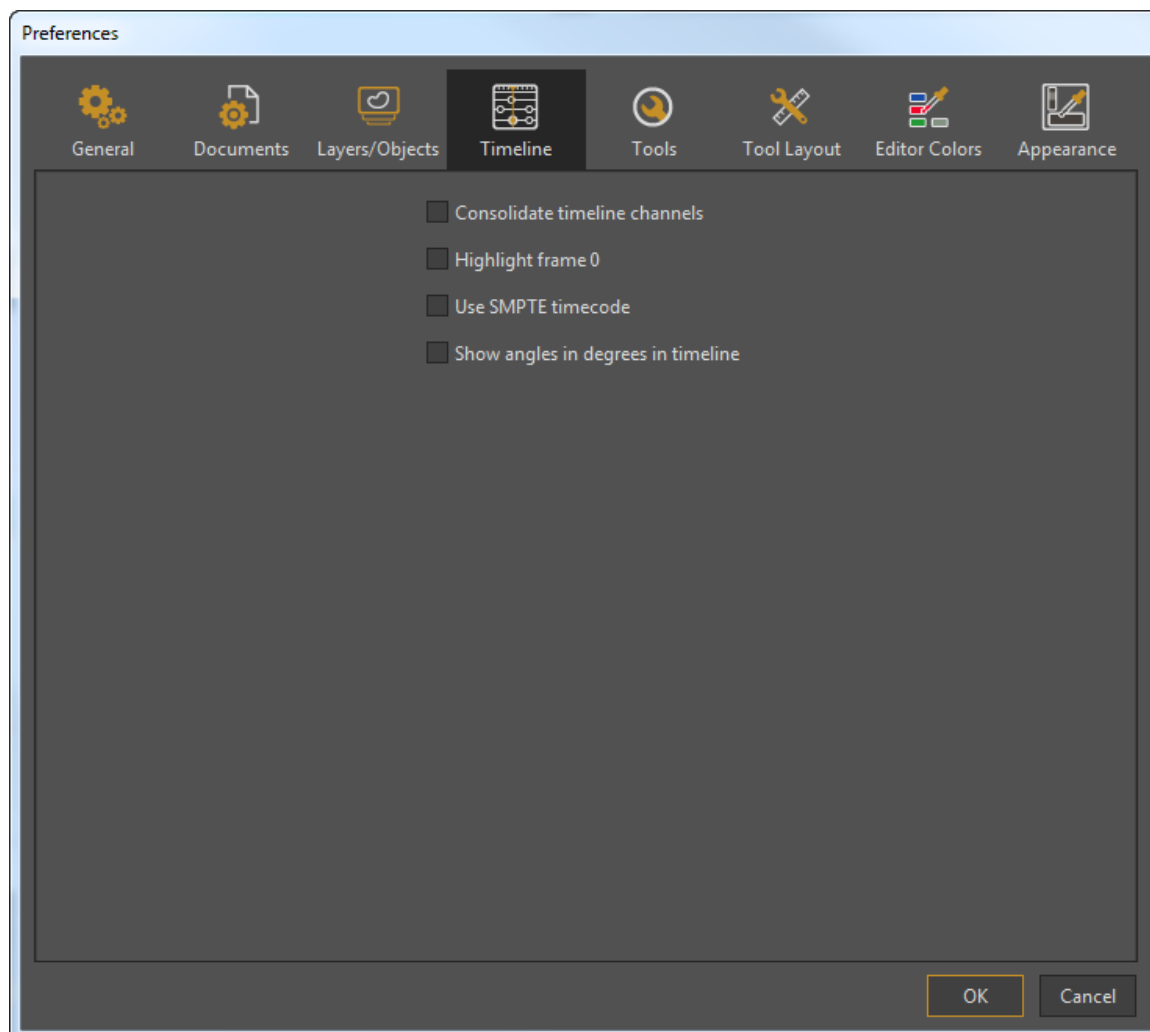
- **Auto-scale imported vectors (Pro Only):** Makes it easier to import multiple Illustrator files (for example, multiple body parts in a character). The imported files will all be in scale with each other when this option is checked. When this option is turned off, you may need to press the **Esc** key to automatically zoom in to the selected points after you import the files.
- **Scale compensation for new layers:** When a layer is scaled up (or down), its lines get thicker (or thinner) to match. If you don't want this behavior, turn off this option. You can also control this on a per-layer basis in the Layer Settings dialog. This option controls it for any new layers you create.
- **Enable note layer scaling:** Allows note layers to scale along with other selected content.
- **Default Stroke Width:** Choose the default stroke width that appears in the Style window.
- **Default Fill:** Choose the default fill color that appears in the Style window.
- **Default Stroke:** Choose the default stroke color that appears in the Style window.

Layers Window Preferences

- **Auto-size Name column:** When checked, the Name column in the Layers Window will automatically resize to accommodate the width needed to display the full layer name.

- **Enable inline layer naming:** When checked you can click the Layer name in the to rename a layer in the Layers Window. When unchecked double-clicking will open the Layers Settings dialog, where you can rename the layer in the General tab.
- **Search filter always shows parent layers of matching items:** (Pro only) When checked (default), Layers Window searches will always display parent layers of items that are returned in search results so that context is preserved. When not checked, search results will only return items that match the search filter.
- **Show Timeline Visibility column:** (Pro only) When checked, displays a column that allows you to selectively choose which layers will be visible in the Timeline.
- **Show Label column:** Enables or disables the display of the Label column.
- **Show Visibility column:** Enables or disables the display of the Visibility column.
- **Show Kind column:** Enables or disables the display of the Kind column.
- **Show Quick Settings column:** (Pro only) Right-click on the Quick Settings icon to set tags for the selected layer or layers. Click the Set button to apply the changes.
- **Show Tags column:** (Pro only) Enables or disables the display of the Tags column.
- **Show Comments column:** (Pro only) Enables or disables the display of the Layer Comments column. Click the word balloon icon to enter or display the comments. Then click the Set Comments button to apply the changes.
- **Show Comments column:** (Pro only) Enables or disables display of the Layer comments column.
- **Enable Name column tooltips for layers:** (Pro only):
- **Enable Tags column tooltips:** (Pro only) When enabled, tooltips will be displayed when you hover over the Tags column.
- **Enable Comments column tooltips:** (Pro only) When enabled, tooltips will be displayed when you hover over the Comments column.

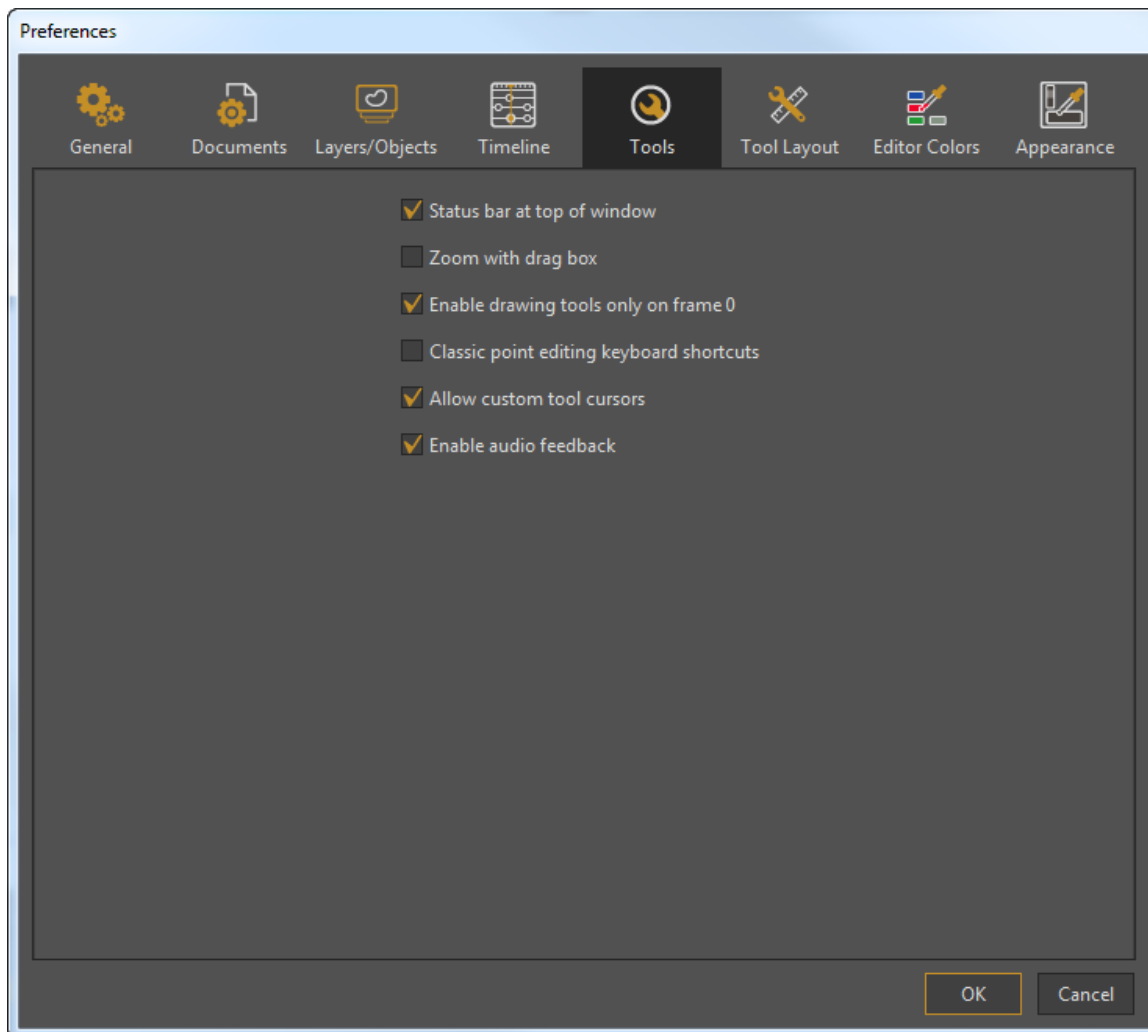
Timeline Tab



Timeline Tab

- **Consolidate timeline channels:** Instead of showing separate channels (point animation, bone animation, layer translation, layer rotation, etc.), this option groups all channels into one in the timeline palette. This is on by default in Debut, and off in Pro.
- **Highlight frame 0:** If on, a red box is drawn on the canvas if the current time is set to 0. This can be helpful to remind you when you're working on frame 0 (the setup frame) vs. some other frame.
- **Use SMPTE timecode:** Shows time in the timeline using SMPTE timecode instead of frame numbers. SMPTE timecode looks like this: **00:02:34:07** That would be 0 hours, 2 minutes, 34 seconds, and 7 frames.
- **Show angles in degrees in timeline:** Angle values (like layer rotation or bone rotation) are shown in radians in the timeline's Motion Graph. This is because angle values in radians are smaller numerically and fit in better with other values in the graph. But if the user chooses to, they can display these curves using degrees with this option.

Tools Tab



Tools Tab

- **Status bar at top of window:** Shows the status bar at the top of the window, rather than the bottom. The status bar is where tools show their descriptions, like what modifiers keys do what, etc.
- **Zoom with drag box:** When this option is on, allows you to draw a box around the area that you want to zoom into, rather than using a continuous zoom.
- **Enable drawing tools only on frame 0:** Creation tools (Add Point, Freehand, Draw Shape, Add Bone) are only available on frame 0 if this option is on. Otherwise, they can be used at any time.



In Moho, there are certain tasks that can only be performed on Frame 0, many of which pertain to rigging. When you move to Frame 0 in your project, each layer will go to its own "Frame 0," regardless of where it starts in the project timeline. If a layer starts before Frame 0, you will now be able to make edits to that layer without moving it back into the project timeline.

- **Classic point editing keyboard shortcuts:** This preference switches the shortcuts for point binding and de-selection. By default, this option is unchecked.
 - **When this option is not checked**, new shortcuts will be used:
The Enter key will be used for welding and creating shapes
The Escape key will be used to deselect all objects
The Spacebar will always be used to toggle playback.
 - **When this option is checked**, legacy shortcuts will be used:
The spacebar is used for welding and creating shapes
The Enter is used to deselect all objects.
The spacebar is also used in some cases to toggle playback.

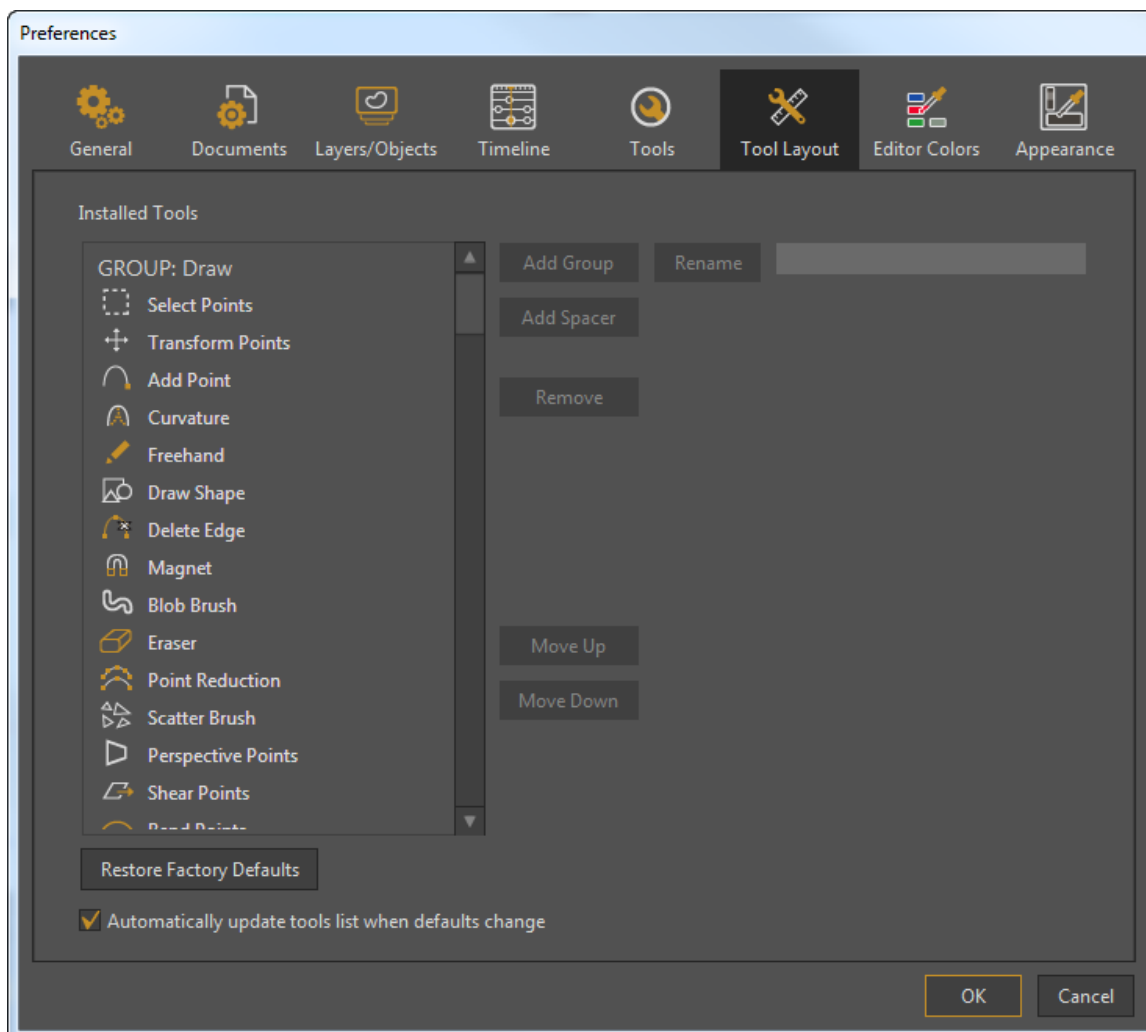


For a more detailed list, see “Classic vs New Shortcut Bindings” on page 540.

- **Allow custom tool cursors:** Turning on this option will just use the standard system arrow cursor, regardless of what tool is active on the canvas.
- **Enable audio feedback:** When welding points, you hear a “clicking” sound in Moho. Turning this option off will disable the click


Tool Layout Tab

The Tool Layout tab allows you to arrange the tools in the Moho tool palettes to your liking. In order to make changes to the default configuration, you must enable the **Automatically update tools list when defaults change** option located at the bottom of the Tool Layout tab. You also need to have a designated Content Folder for your tool scripts. After enabling the option, the other options in the tab will be enabled.



Tool Layout Tab


- **Installed Tools:** Click this button to add installed tools to the list.
- **Add Group:** Click this button to add tool groups to the list.

 *Groups contain tools that are relevant to the current context, and appear on the Tool palette in the order that they appear in your tool preferences.*

- **Rename:** Click this button to rename the selected item to the new name entered in the text field.
- **Add Spacer:** Click this button to add a spacer in the tool list. This creates a blank square where a tool would normally appear in the list.
- **Add Color:** A color marker sets the background color behind the tools and groups that follow the color marker. The color will continue until another color marker is encountered in the list.
- **Remove:** Click this button to remove the selected item from the list.
- **Move Up:** Moves the selected item up in the tool list.

 *The first item in the list must always be a group.*

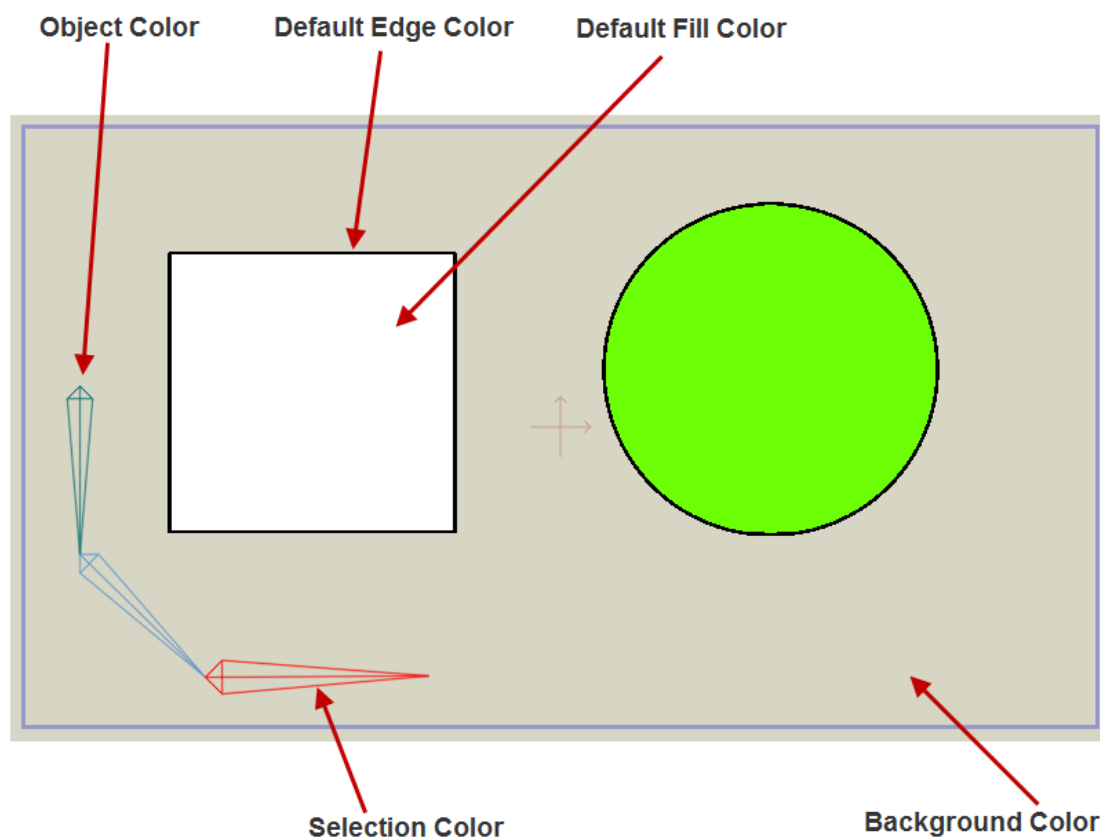
- **Move Down:** Moves the selected item down in the tool list.

 *If you move a group, all of the tools in that tool group move with the group item.*

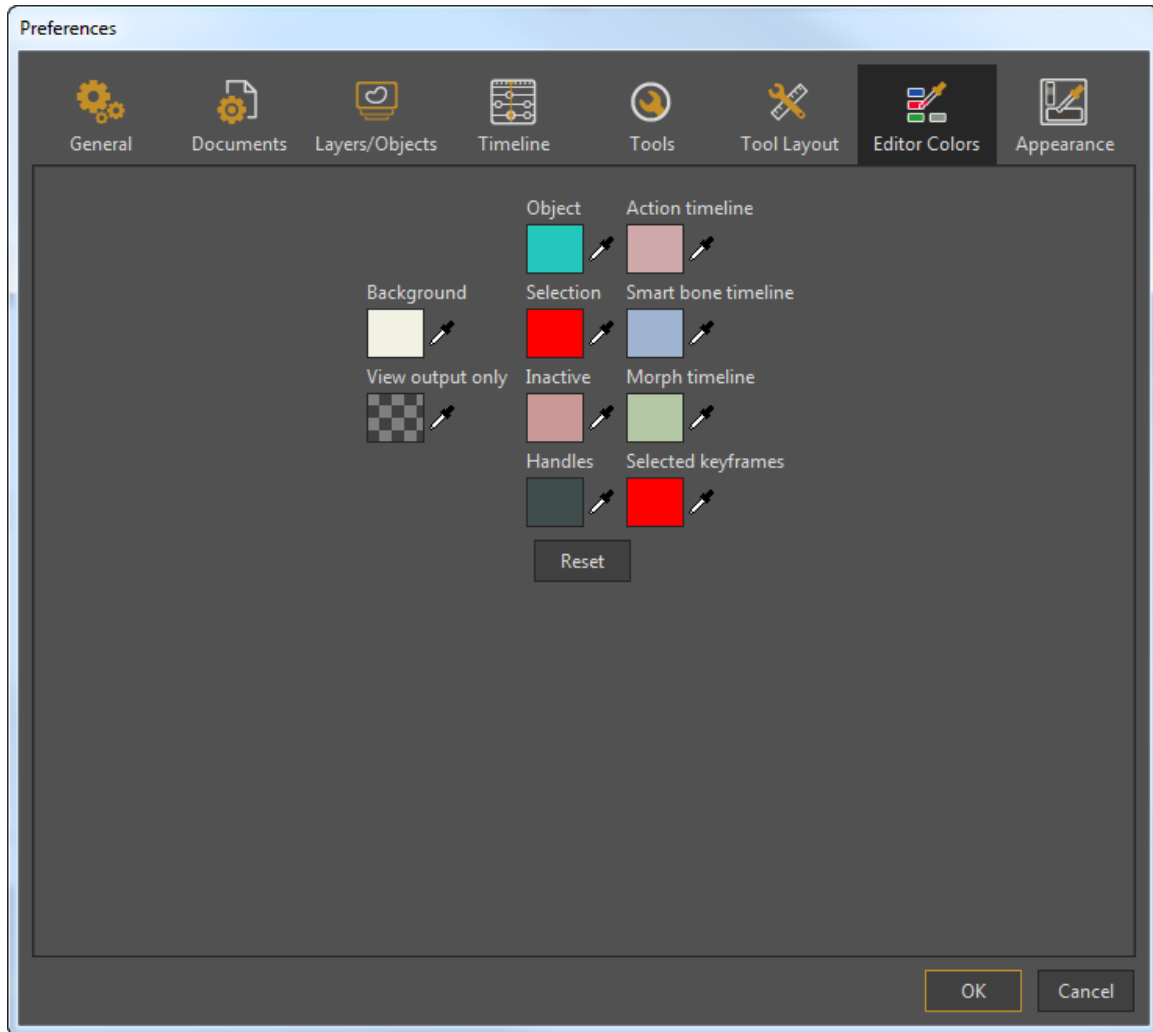
- **Restore Factory Defaults:** Click this button to reload the factory default tool configuration. You will be asked to confirm before the factory defaults are restored.
- **Automatically update tools list when defaults change:** When this option is checked, Moho will automatically integrate tool changes when your settings get out of date. Uncheck the option to update the _tool_list.txt file manually. The tool settings will be updated to add missing default groups and any tools that are missing from their default groups. Obsolete default tools will be removed from the list. Moho will not use an outdated custom_tool_list.txt file.

Editor Colors

Allows you to change the color scheme for the editor window, including various options for background and object colors. Press the Reset button to return to default application colors. The **Default Stroke Width** option allows you to specify the default Stroke Width setting that appears in the Style window.



Editor Colors

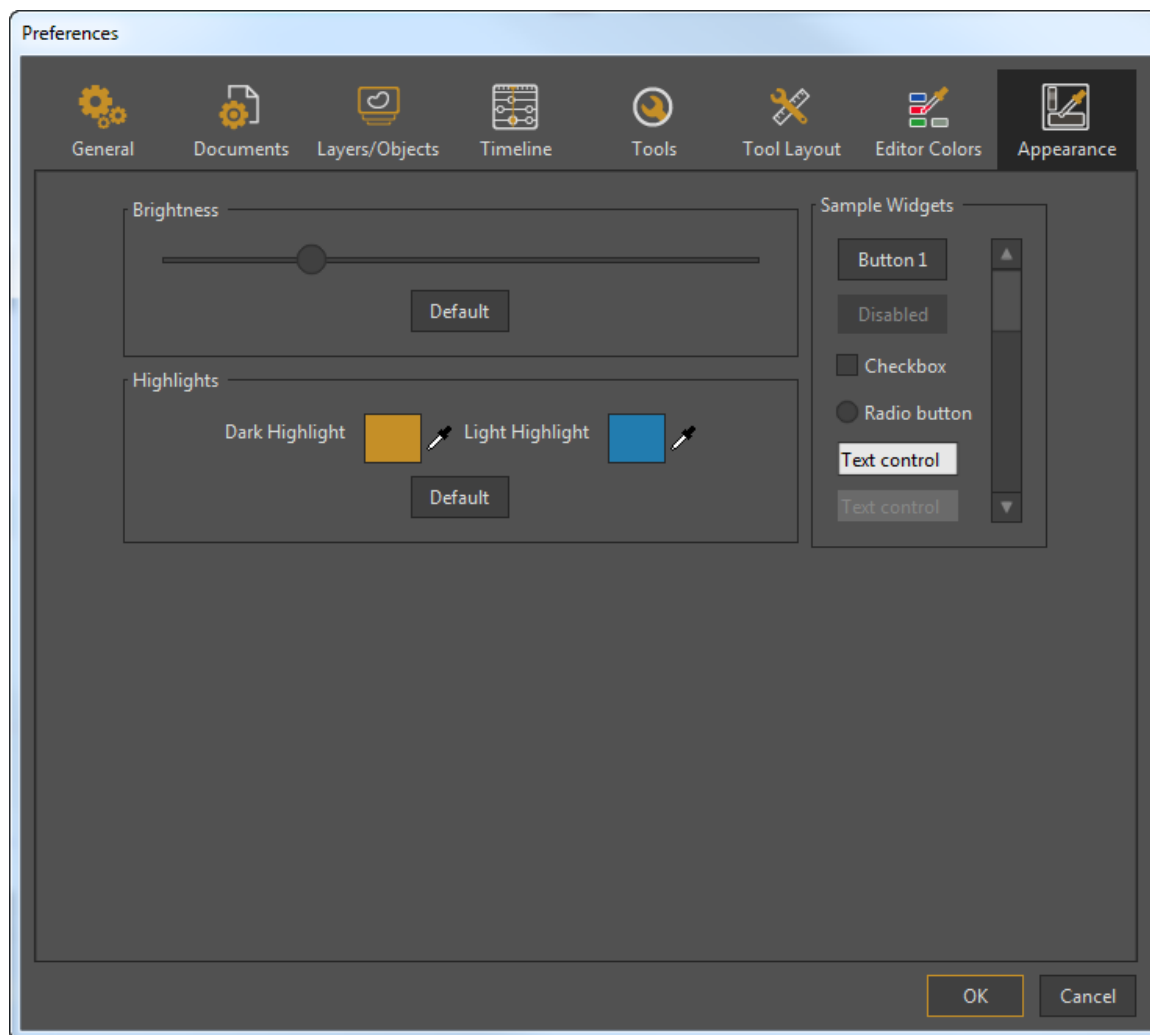


Editor Colors

Appearance

Allows you to change the color scheme for the application, including various options for background, text, and widget colors. A preview of your changes appears in the Sample Widgets area as changes are made.

- **Brightness:** Use the Brightness slider to lighten or darken the color theme. .
- **Highlights.** Allows you to change the highlight colors used in the application and icons:
 - **Dark Highlight:** Use the color chip and eyedropper to select the highlight color used for dark backgrounds.
 - **Light Highlight:** Use the color chip and eyedropper to select the highlight color used for light backgrounds.
- **Default:** Click this button to return to the default appearance.



GUI Colors

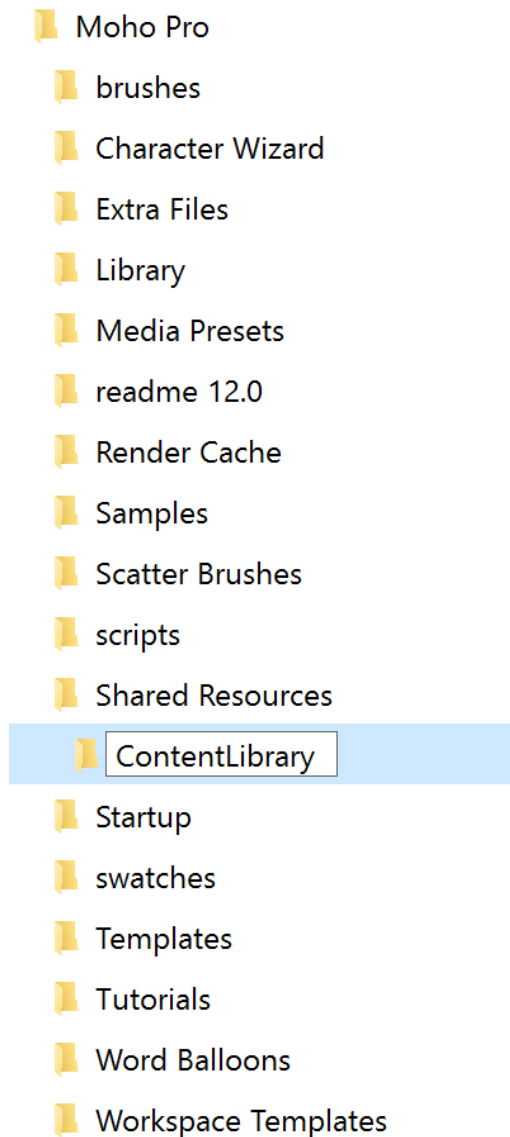
Using Custom Resource Images

The Custom Content folder now includes a subfolder named **Shared Resources**, where you can store your own custom resource images.


By default, the Moho resource images are stored within the application folder. For example, for Moho Pro, they are located in the following Windows folders:

- C:\Program Files\Moho 13.5\Resources

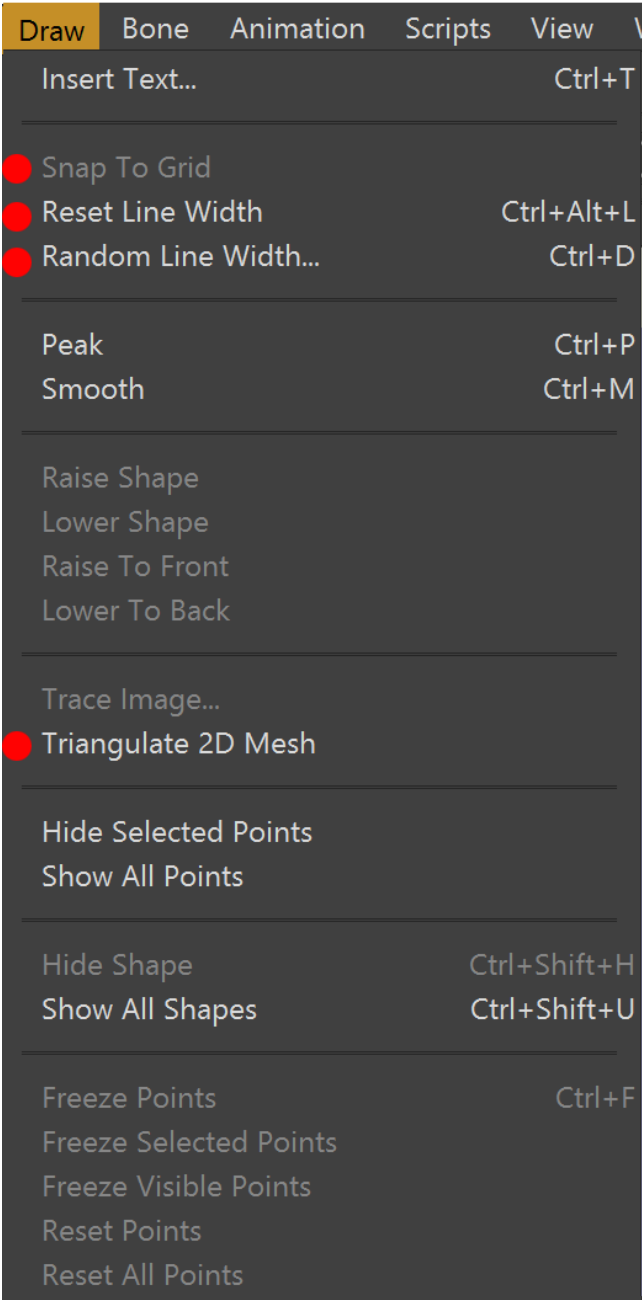
If you want to use custom resource images, we recommend that you do not replace the images that are located in the application folders. Instead, create your custom resource images, using the same filenames, formats (GIF, PNG, JPG, PSD, etc.) and dimensions as the originals in the application resource folders. Then place your custom images in the Shared Resources folder, located in your Custom Content folder, using similarly-named folder hierarchies. If the original application resource resides in a subfolder (such as ContentLibrary, Support, etc) in the application folder(s), you will need to create identically-named subfolders in your Custom Content folder and place the appropriate custom images there.



Create similarly-named subfolders in the Shared Resources folder in your Custom Content folder to store custom resource images

 Application image resource formats and dimensions may change over time. If the resource images in the application change in format or dimensions, you will need to update your custom images to remain compatible.

Chapter 20: Draw Menu



Draw Menu

Insert Text...

Choose **Draw > Insert Text** or use the keyboard shortcut **Command/Ctrl T** to open the Insert Text dialog, which is described in “**Insert Text**” on page 130.

Snap to Grid (Pro Only)

If the grid is turned on in the working area, then this command can be used to snap all selected points to the nearest grid intersection.

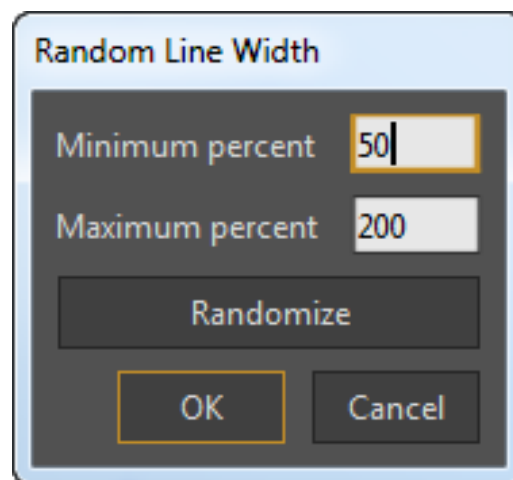
Reset Line Width (Pro Only)

Using the Line Width tool, you can adjust the width of a line at any point. Choosing this menu command will reset your custom line widths at any selected points.

Random Line Width (Pro Only)

Use this command to randomize the width of the line(s) through the currently selected points. You will be asked to specify the minimum and maximum width, and Moho will assign random line widths within that range.

You can use the **Randomize** button to randomize the transitions between minimum and maximum percentages.



Random Line Width dialog.

Peak

This command creates a peaked (or hard) transition between the curves at the point that you click.

Smooth

This command smooths the transitions between the curves at the point that you click.

Raise Shape

Select this menu item to raise a shape in the stacking order. This will move it in front of the next higher shape. The stacking order only applies to shapes within the same layer - all shapes in a layer will appear above any lower layers and behind any upper ones, regardless of stacking order. Note that if there is no shape overlapping the selected one, you may not see any change when this item is selected, even though the shape gets moved higher.



Press the Up arrow key on your keyboard to move the selected shape(s) one level toward the top.



Moho allows you to animate shape ordering on the timeline. Double-click the layer that contains the shapes you want to animate, and then enable the Animated Shape Order option in the Vectors tab of the Layer Settings dialog. See "Vectors Tab" on page 232 for more information.

Lower Shape

Select this menu item to lower a shape in the stacking order.



Press the Down arrow key on your keyboard to move the selected shape(s) one level toward the back.

Raise to Front

Works like Raise Shape, but raises the shape above all others in its layer.



Shift Up arrow will move the selected shape(s) to the top.

Lower to Back

Works like Lower Shape, but lowers the shape below all others in its layer.



Shift Down arrow will move the selected shape(s) to the bottom.

Trace Image

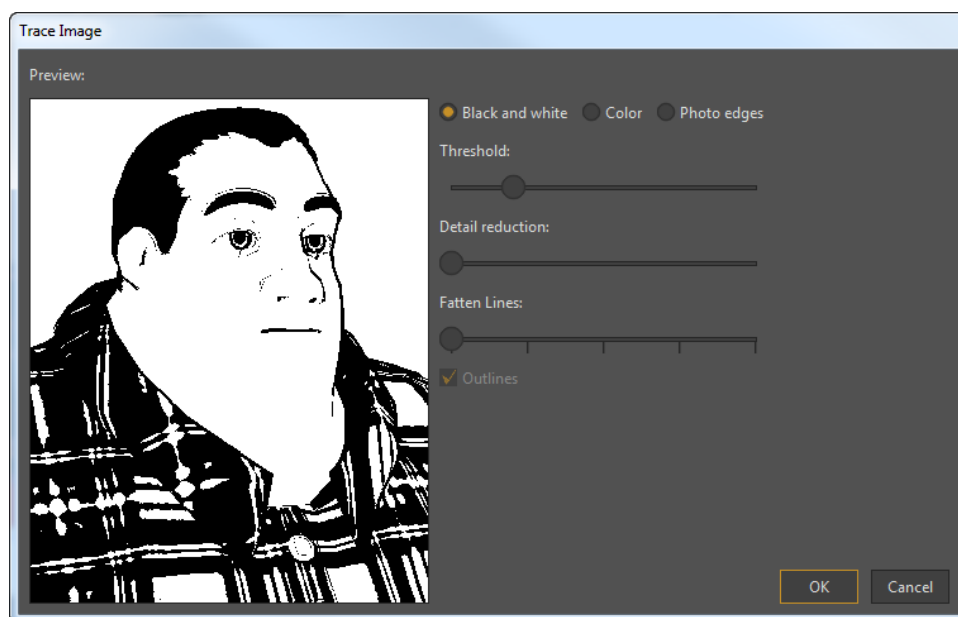
Moho has always allowed you to import black and white or color bitmap images and work with them. However, they are not as flexible as vector objects for several reasons. You can't zoom in an infinite amount, you can't bend them quite as much, and you can't edit them. Moho includes Automatic Image Tracing, which allows

you to convert a bitmap image to a black and white vector object. Moho offers the following conversion types:

- **Black and white:** Creates a black and white vector image.
- **Color (Pro only):** Check this option if your source image is color and you want to create a vector image that is also color.
- **Photo Edges (Pro Only):** Check this option if your source image is a line drawing and you only want to convert it to strokes; or if you want Moho to only draw strokes where one color meets another color.

For this feature to work its best, you should choose drawings that have bold lines, such as those created with a felt pen. Pencil sketches will be more difficult to trace.

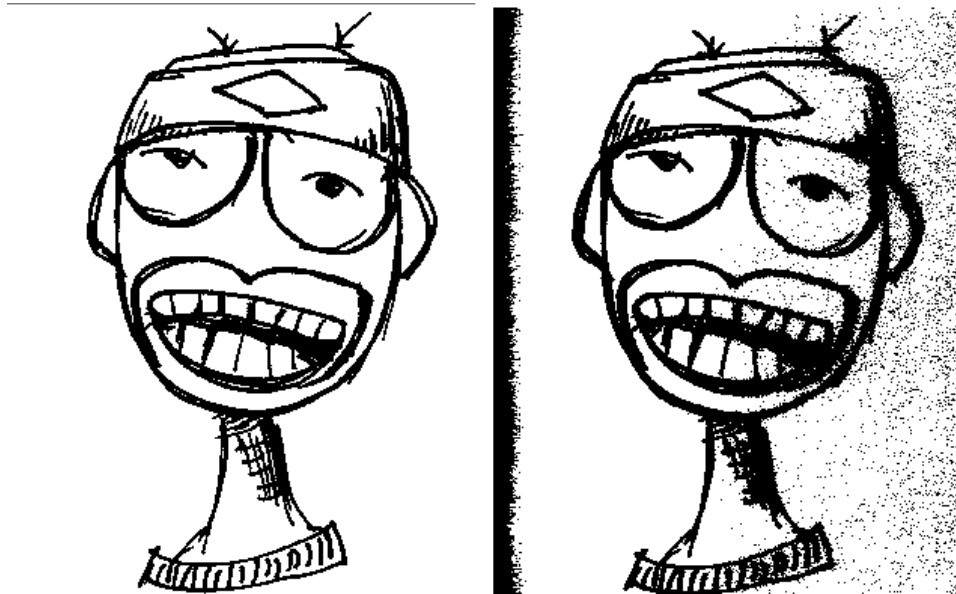
After you import your drawing into an Image layer, you can use the **Draw > Trace Image** command to display the Trace Image dialog.



Trace Image dialog.

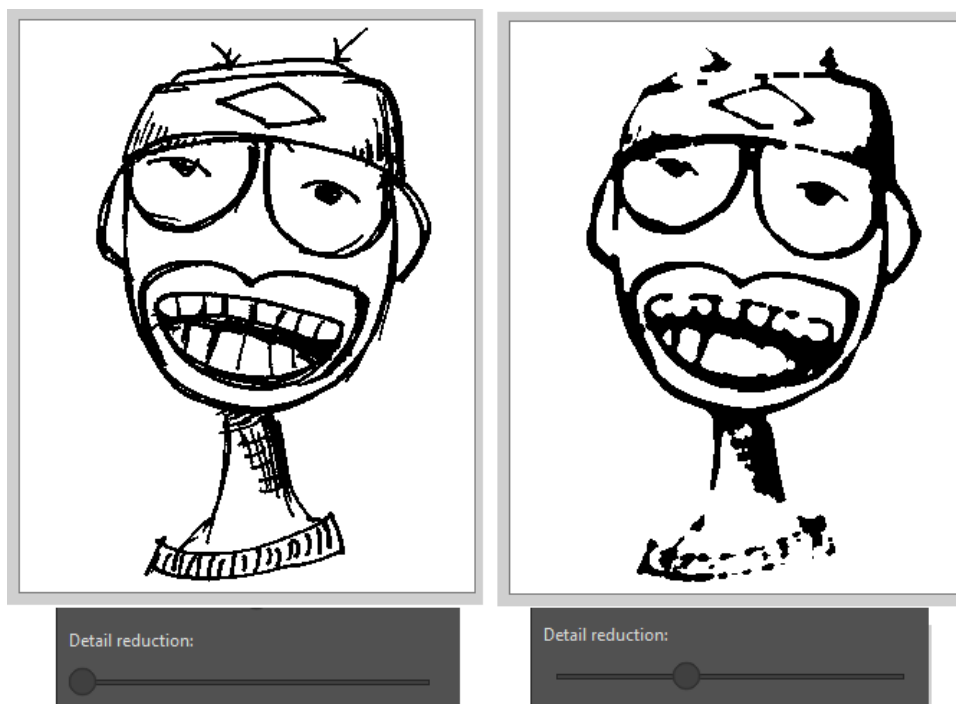
The settings in the Trace Image dialog provide the following functions:

- **Threshold:** Adjusting the Threshold value can help remove gray areas from the conversion. Move the slider toward the left to decrease the threshold value (accept less gray), or toward the right to increase the threshold (accept more gray). If your image contains compression artifacts or subtle color gradients you can decrease the threshold value to make the conversion cleaner.



Low threshold (left); high threshold (right).

- **Detail reduction:** The Detail Reduction is set, by default, to accept the most amount of detail possible (the slider is fully toward the left). Move the slider toward the left to increase the amount of detail in the conversion. This creates more points in the vector layer, but appears more true to the original. Move the slider toward the right to decrease the amount of detail. This creates fewer points in the vector layer, but appears less like the original image.



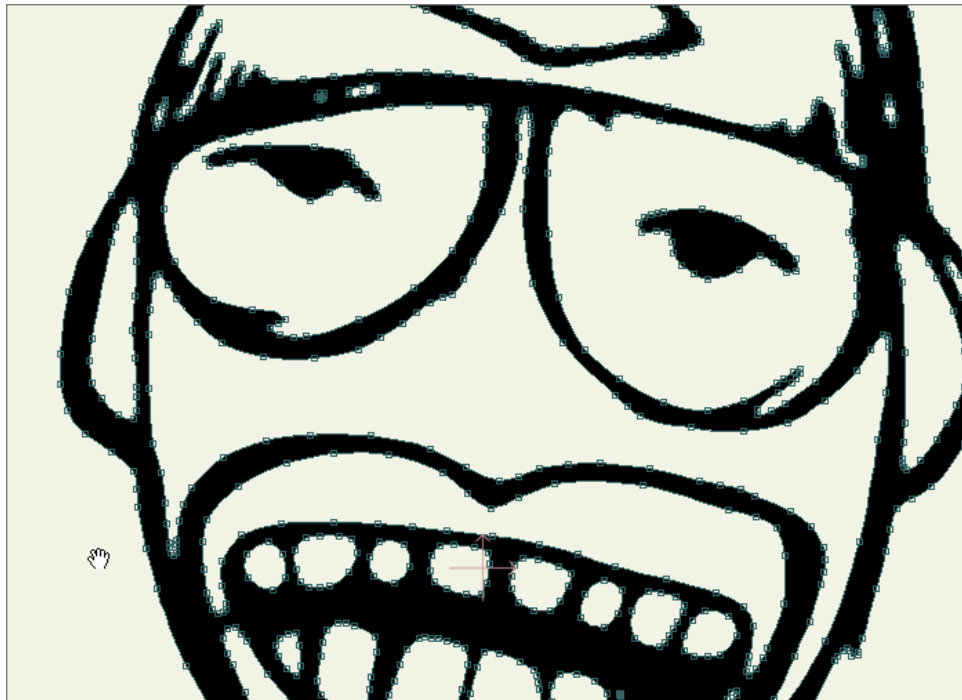
Maximum detail (left); reduced detail (right).

- **Fatten Lines:** This option controls the width of the lines in the black and white drawing. Move the slider toward the left to decrease the width, and toward the right to increase the width.



Default lines (left); thickened lines (right)

After you click OK, Moho traces the image and adds a new vector layer to the Layers Window. The image layer that contains the original bitmap image is turned off.



A close-up of the traced result



The Automatic Image Tracing feature remembers your last settings. If you are not quite happy with the results that you get, you can return to the Trace Image dialog and tweak your settings.

Tracing Color (Pro Only)

When you choose a Color conversion in Moho Pro, the following settings are available:

- **Number of Colors:** Move the slider toward the left to reduce the number of colors in the traced result. Move the slider toward the right to increase the number of colors. As you move the slider, the number of colors that will appear in the traced result will display above the slider.



4 colors (left); 7 colors (right).

- **Detail reduction:** Move the slider toward the left to add more detail to the vector layer. This will increase the number of points in the object and make it harder to edit, but it will look more like the original image.



Maximum detail (left); reduced detail (right).

- **Outlines:** When converting to a Color vector layer, you can check this option to also convert outlines in the drawing, or uncheck the option to omit the outlines.

After you click OK, Moho traces the image and adds a new vector layer to the Layers Window. The image layer that contains the original bitmap image is turned off.



The traced result.

Tracing Photo Edges (Pro Only)

To create a vector image that only contains the outlines in your original bitmap, check the Photo Edges option at the top of the Trace Image dialog. You are presented with the following settings:

- **Threshold:** Move the slider toward the left to accept less outline, or toward the right to accept more outline.

Triangulate 2D Mesh

The **Draw > Triangulate 2D Mesh** command allows you to perform a Delaunay triangulation on a 2D vector or image layer. This feature can be used in conjunction with Moho's Smart Warp feature to deform a 2D layer. For additional information, see ["Smart Warp Layers \(Pro only\)" on page 236](#).

Hide Selected Points

Sometimes when projects are complex and you have a lot of points and bones, you only want to work on one object or reshape it. When scenes are complex you sometimes select points in the group.

Select the object you want to work on, then choose **Edit > Select Inverse** to select all the points you want to hide. Then choose **Draw > Hide Points** to hide the selected points. The shapes are still there, but the points are hidden and you can't accidentally select them.

Show All Points

Choose **Draw > Show All Points** to unhide the points that were previously hidden with the Hide Selected Points command.

Hide Shape

Hides the currently selected shape

Show All Shapes

Shows all shapes that have previously been hidden.

Freeze Points

After selecting points, choose this command to freeze all points so that they cannot be edited.

Freeze Selected Points

Adds a keyframe at the current time for all selected points.

Freeze Visible Points

Adds a keyframe at the current frame for all points that are currently visible.

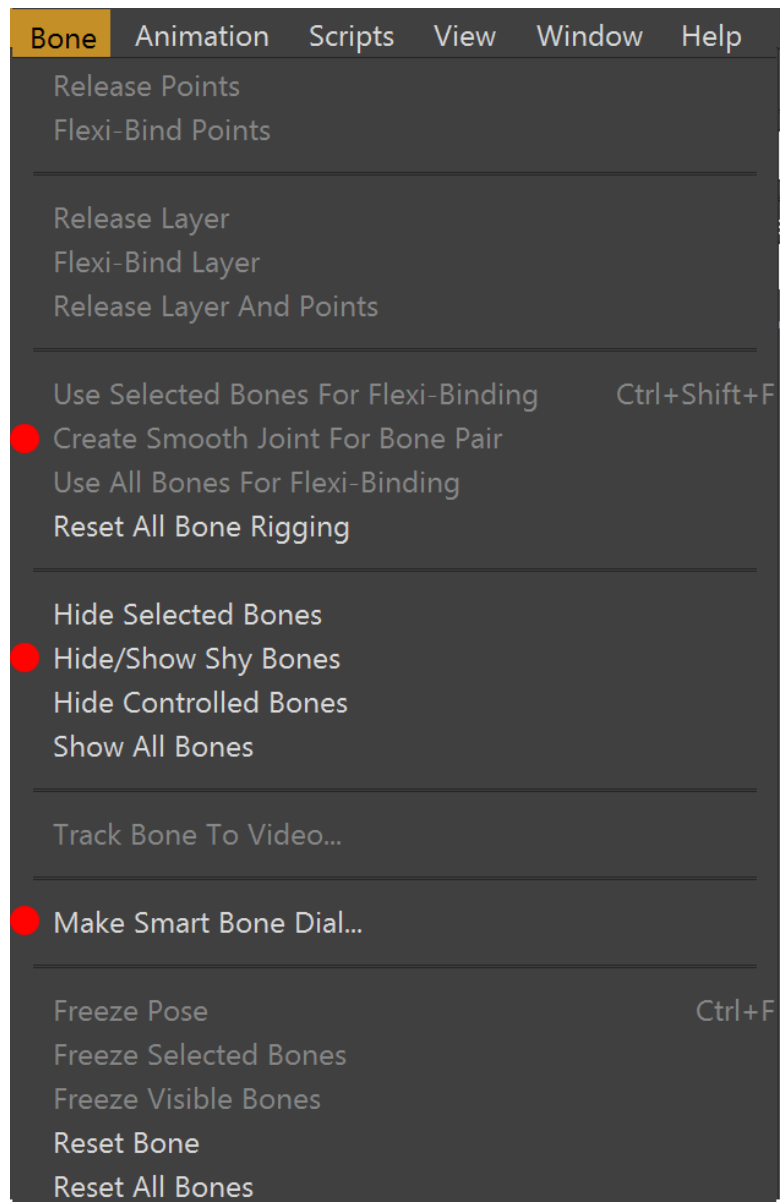
Reset Points

Moves the selected points back to their original positions, adding a new keyframe for them at the current time.

Reset All Points

Same as above, but moves all points in the layer back to their original positions, not just the selected ones.

Chapter 21: Bone Menu



Bone Menu

Release Points

This command detaches the selected points from any bones they may be bound to.

Flexi-Bind Points

This command binds the selected points to bones in such a way that they will be influenced by all the bones in the parent bone layer, depending on the strength and region of influence of each bone. This results in more of a “squishy” type of motion when the skeleton is animated. This is the default behavior for all drawings in Moho,

so you usually won't have to use this menu command - the points are probably already flexi-bound.

Release Layer

This command detaches the current layer from any bone it may be bound to.

Flexi-Bind Layer

This command binds the current layer to the bones in the parent layer in such a way that the child layer will be influenced by all the bones in the parent bone layer, depending on the strength and region of influence of each bone. This results in more of a "squishy" type of motion when the skeleton is animated.

Release Layer And Points

Detaches selected points and layer from any bones that they are bound to.

Use Selected Bones for Flexi-Binding

Assigns the selected bones to the currently-selected layer in the Layers Window. For more information, see **"Tutorial 3.5: Flexi-Binding" on page 136 in your Moho Tutorial Manual.**

Create Smooth Joint for Bone Pair (Pro Only)

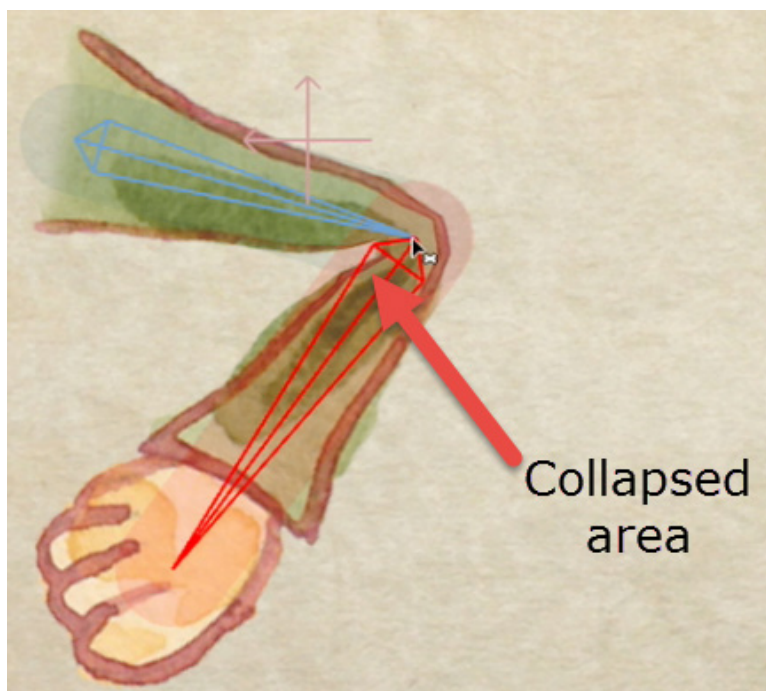
This command works on a pair of selected bones (for example, bones for the upper and lower arms, or upper and lower legs). The two bones also have to have a parent-child relationship, and start out in close to a straight line.

 *For more information about using bone pairs and smooth bending, see "Tutorial 3.6: Enhanced Bone Features (Pro Only)" on page 140 in your Moho Tutorial Manual.*



Two bones (a parent and its child) are arranged in a straight line.

Applying this command on a pair of selected bones helps prevent a bend from collapsing when the child bone is bent. It is ideal for use with elbow or knee bends in a character.

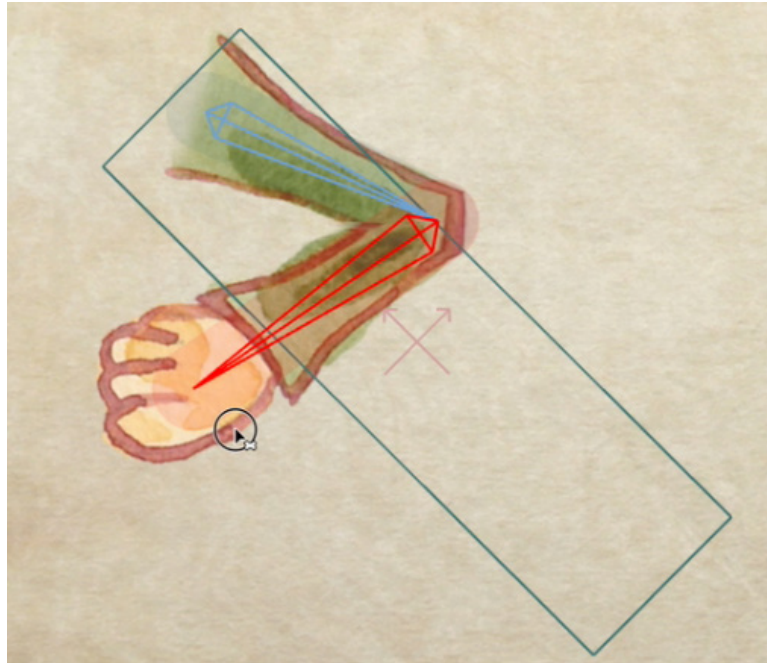


Before applying Elbow binding, the joint collapses when it is bent.

If you are using vector shapes, the collapsing can be remedied, in part, by using Smart Bones (discussed in ["Smart Bones \(Pro Only\)" on page 103](#)). However, Smart Bones only work on vector shapes. Elbow binding, on the other hand, works with either vector shapes (, or with scanned or imported images.

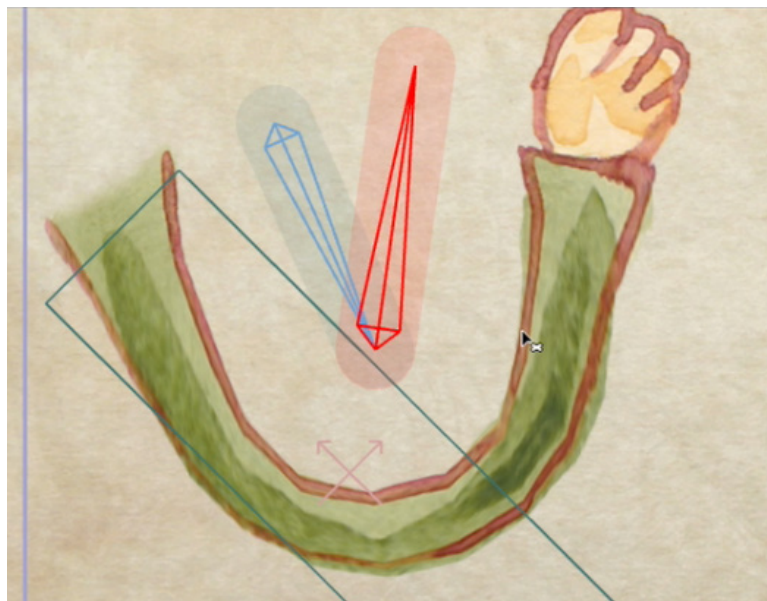
To use this command, go to the Layers Window and select the layer that is controlled by the two bones. Then use the Select Bones tool to select two bones (the upper and lower arm bones in the case of this example). Next, select the layer that is controlled by the bone, and choose **Bone > Create Smooth Joint for Bone Pair**.

After you apply the command, you will notice an improvement in the elbow joint when you rotate the lower arm bone. There is a nice smooth bend around the joint, and it pinches together on the inside.



After you apply Elbow binding, the joint bends more smoothly.

If you offset the bone and place it to the side of the object, the bend will be amplified. This is an easy way to create cartoon characters with rubbery arms.



You can offset the bone from the artwork to amplify the bend effect.

Use All Bones for Flexi-Binding

Reassigns the selected layer in the Layers Window so that it is controlled by all bones in the bone group, rather than by selected bones that were previously assigned with the **Use Selected Bones for Flexi-Binding** command.

Reset All Bone Rigging

Choose **Bone > Reset All Bone Rigging** to reset all bone rigging (including point binding, smooth joints, image warping) on the selected layer back to the defaults.

Hide Selected Bones

Select the bone or bones that you want to hide, and choose **Bone > Hide Selected Bones**. The bones and their associated keyframes will be hidden.

Hide/Show Shy Bones (Pro Only)

The Select Bones tool provides an option to identify a bone as a “shy bone.” Shy bones can be displayed or hidden as needed to reduce workspace clutter. Toggle this command on or off to show or hide all bones marked as “shy.” For more information, see [“Select Bone” on page 82](#).

Hide Controlled Bones

Hides any bones that are set up to have their angle or position controlled by another bone. These types of bones are often not animated by the user (their animation is “automatic” through the control feature), and hiding them can clear up some of the clutter in the workspace. This function is not available when the time is set to frame 0.

Show All Bones

Use the **Bone > Show All Bones** command to redisplay bones that have previously been hidden with the Hide Selected Bones command.

Track Bone to Video

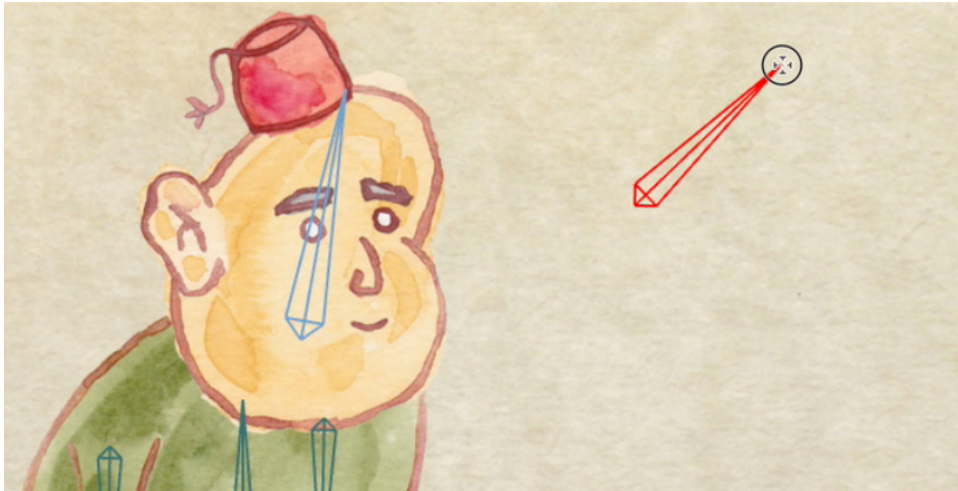
Allows you to link a bone to the tracking points that you defined with the Video Tracking tool. For a description of how to use this tool, see [“Video Tracking” on page 148](#).

Make Smart Bone Dial (Pro Only)

The Create Smart Bone Dial command is an easier and more convenient way to set up smart bones. Smart bone creation involves several steps. You create a bone, give it a name, and set up actions and restraints for it. This command simplifies the process.

When you want to use the Create Smart Bone dial to set up your smart bones, the process is as follows:

1. Create the bone that you want to use as your smart bone control dial.



Create your control bone.

2. Choose **Bone > Make Smart Bone Dial**.
3. The Create Smart Dial dialog appears, with the following settings:
 - **Name:** Assign a name that is descriptive of what the dial controls. For example, if you are creating a dial that gives your character an angry expression, name the bone Angry.
 - **Minimum Angle:** Enter the value that represents the minimum setting of the bone. You can use negative values to create the opposite state (for example, you can enter a value of -90 to create an expression that looks less angry, or happy).
 - **Maximum Angle:** Enter the value that represents the maximum setting of the bone. For example, you can enter a value of 90 to represent the maximum strength of the Angry expression.
 - **Duration (Frames):** Enter the number of frames over which you want the smart bone to travel from its minimum to maximum values. A higher number of frames creates a smoother range of motion.
 - **Separate actions for positive and negative angles:** When this option is checked, Moho creates a smart bone dial that works in both positive and negative angles. The neutral position will be “zero.” Uncheck this option to create a smart bone dial that works only in positive angles.

Create Smart Dial

Name

B1

Minimum angle

-90

Maximum angle

90

Duration (frames)

100

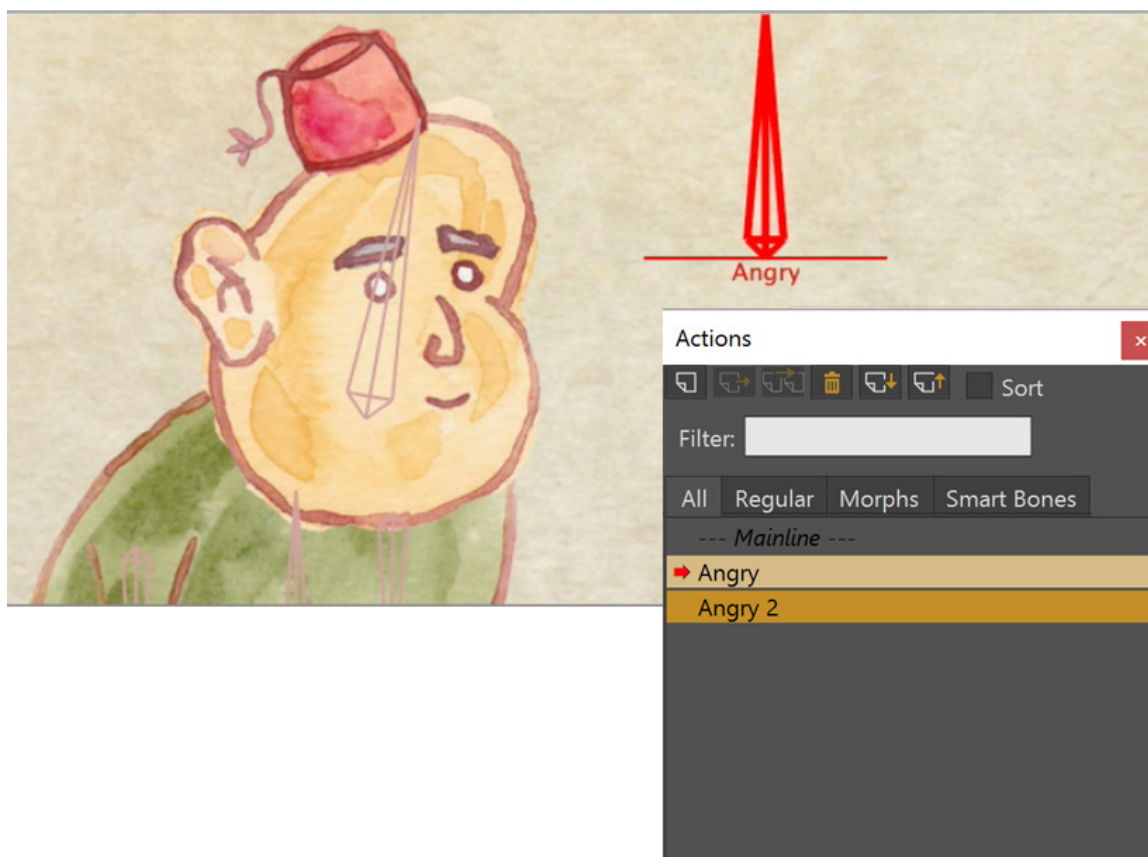
☒ Separate actions for positive and negative angles

OK

Cancel

Enter your settings in the Create Smart Dial dialog.

- Click **OK**. A bone appears on the screen, labeled with the name that you assigned in the Create Smart Dial dialog. The Actions window opens to display the associated action(s). Two actions will appear if you checked the Separate actions for positive and negative angles.



The control dial and the associated actions appear in the window.

The rest of the process is similar to that described in “[Smart Bones \(Pro Only\)](#)” on [page 103](#). Scrub the timeline to the minimum setting and change the scene to the way you want it to appear when the bone is at its minimum value. Then scrub the timeline to the maximum setting (90) and change the scene to the way you want it to appear when the bone is at its maximum value.



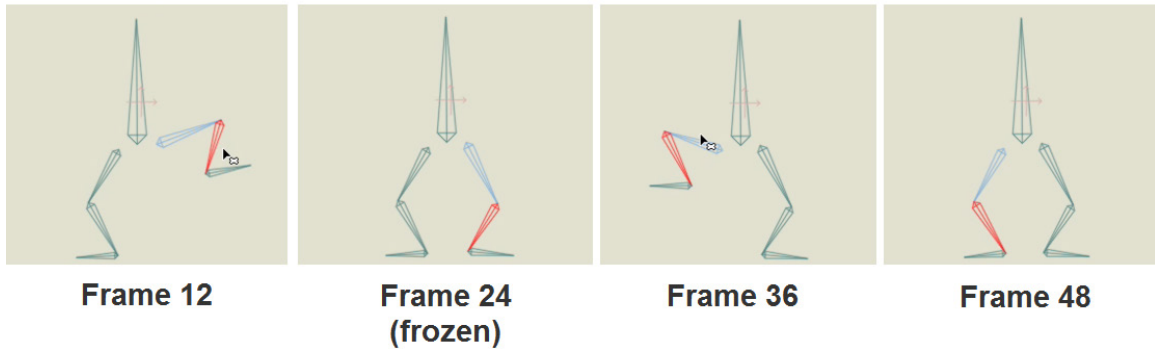
Modify the scene for the minimum and maximum dial settings.

Freeze Pose

Keyframing can be tricky sometimes for new users of Moho, or for those who are new to animation. For example, let's say you move a left foot up on frame 12, and then down again at frame 24. At frame 36, you want the right foot to move up, and then down again at frame 48.

The problem is, the right foot will start to move up at frame 0, and then be fully up at frame 36. In reality, you want the right foot to move up from frame 24 through 36, and not from frame 0 through 36.

To accomplish this, you choose the **Bone > Freeze Pose** command at Frame 24. This sets a keyframe for every part in your animated character or object so that you are assured that the pose you want to use is correct for that portion of your animation. Then you set the keyframe that moves the right foot up at frame 36, and down again at frame 48.



Freezing a pose

Freeze Selected Bones

Sets a keyframe for all currently selected bones.

Freeze Visible Bones

Sets a keyframe for all bones that are currently visible in the project.

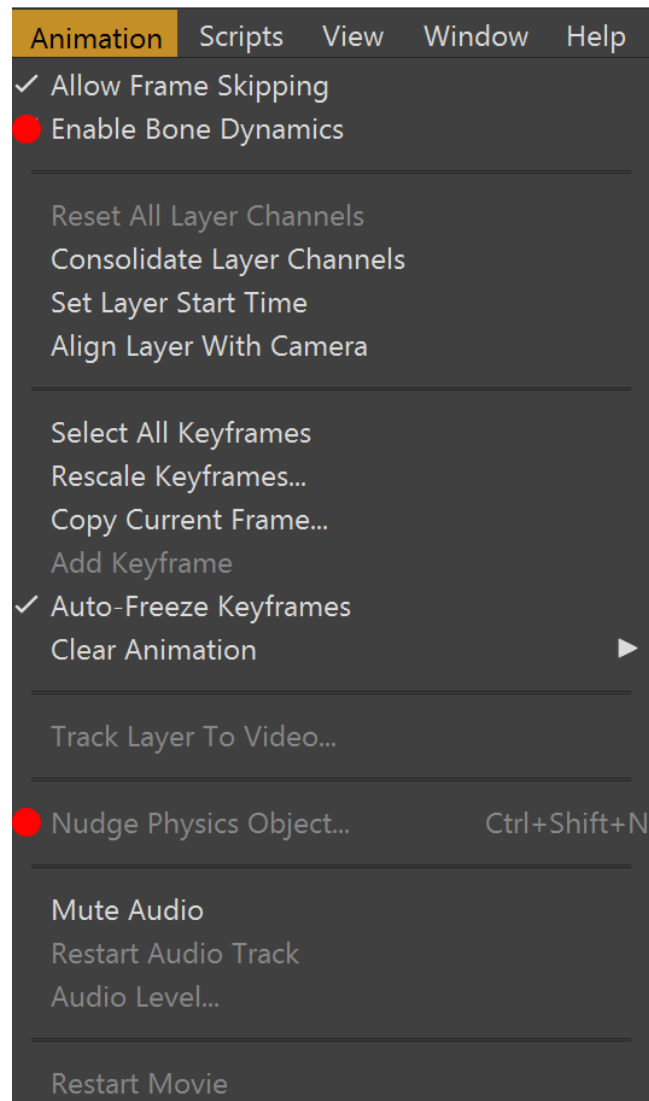
Reset Bone

Moves the selected bone back to its original position, adding a new keyframe for it at the current time.

Reset All Bones

Same as above, but moves all bones in the layer back to their original positions, not just the selected one.

Chapter 22: Animation Menu



Animation Menu (Moho Pro shown)

Allow Frame Skipping

Normally when playing back an animation, Moho will display each frame one at a time. Depending on the complexity of your animation, the display quality settings, and the speed of your computer, the animation may play back slower than its specified speed. Select this command to force the animation to play back at actual speed. In order to accomplish this, Moho may have to skip some frames to keep up to speed, so the animation will play back at the correct overall speed, but may not appear as smooth. The best way to see the animation at final speed and quality is of course to use the Export Animation command in the File menu.

Enable Bone Dynamics (Pro Only)

Use the **Animation > Enable Bone Dynamics** command to preview bone dynamics on the canvas. Playback of bone dynamics is very accurate in Moho, but it can also cause animations to run slower as the more accurate dynamics are calculated.

When this option is unchecked, animation playback is faster, but will not preview the automatic bone dynamics animation. The dynamics will still appear in final renderings.

For more information about bone dynamics, refer to “**Tutorial 3.3: Bone Dynamics**” on page 120 in your **Moho Tutorial Manual**.

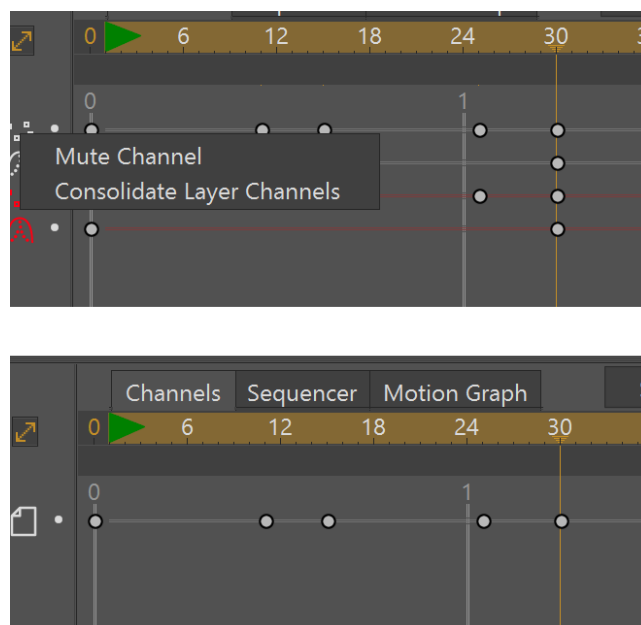
Reset All Layer Channels

Resets all channels in the current layer to their initial values, adding a new keyframe at the current time.

Consolidate Layer Channels

This command is similar to the **Consolidate timeline channels** preference (see “**General Tab**” on page 435) except that it allows you to consolidate the channels of individual layers in the timeline.

You can also right-click on a layer channel icon at the left side of the timeline to either consolidate or un-consolidate that layer channel.



Timeline layer channels can be un-consolidated (top) or consolidated (bottom).

Set Layer Start Time

Offsets the start of an animation within a layer to the current selected frame.

Align Layer with Camera

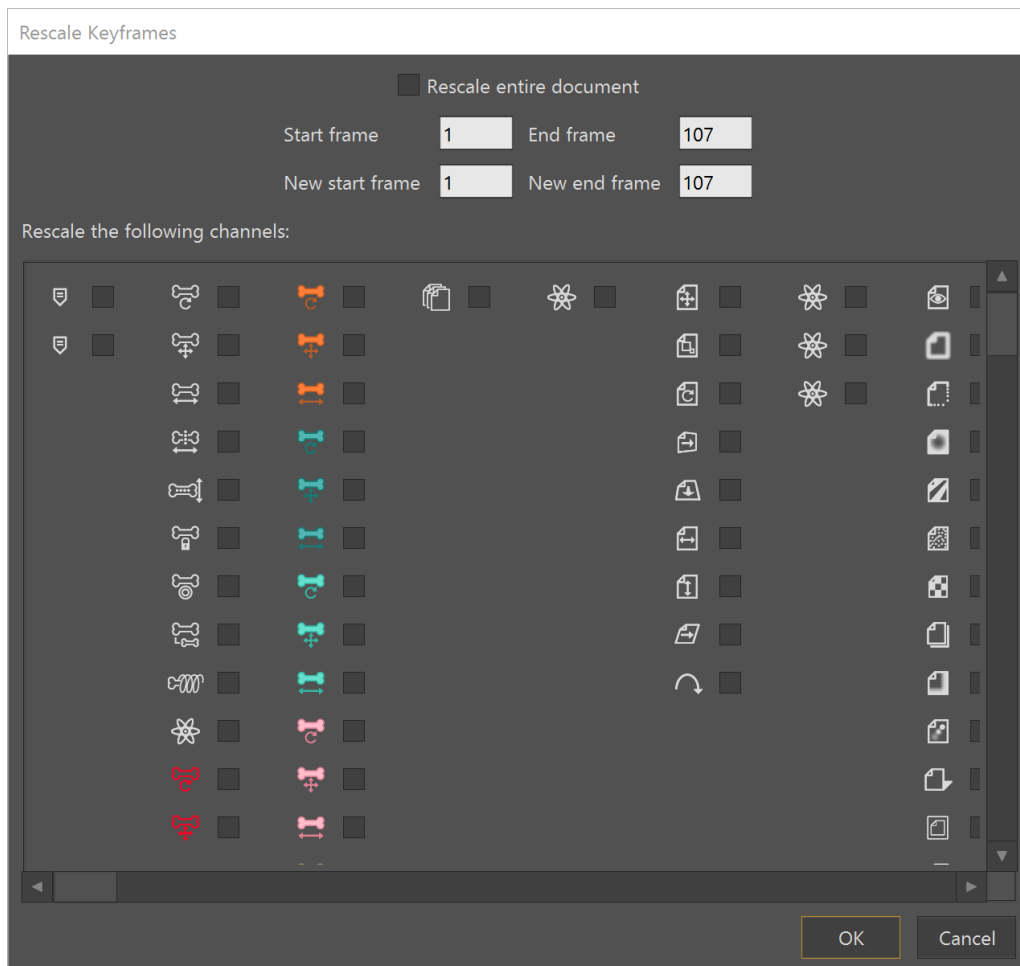
Allows you to rotate the selected layer to face the camera.

Select All Keyframes

Selects all the keyframes in the current layer. This is useful if you want to move all the animation in a layer forward or backward.

Rescale Keyframes...

With this command you can rescale a group of keyframes so that a portion of your animation takes more or less time.



The Rescale Keyframes dialog.

Options included in this dialog are:

- **Rescale entire document:** Check this option to rescale all frames in the document.
- **Start Frame:** Enter the existing frame number at which to start scaling.

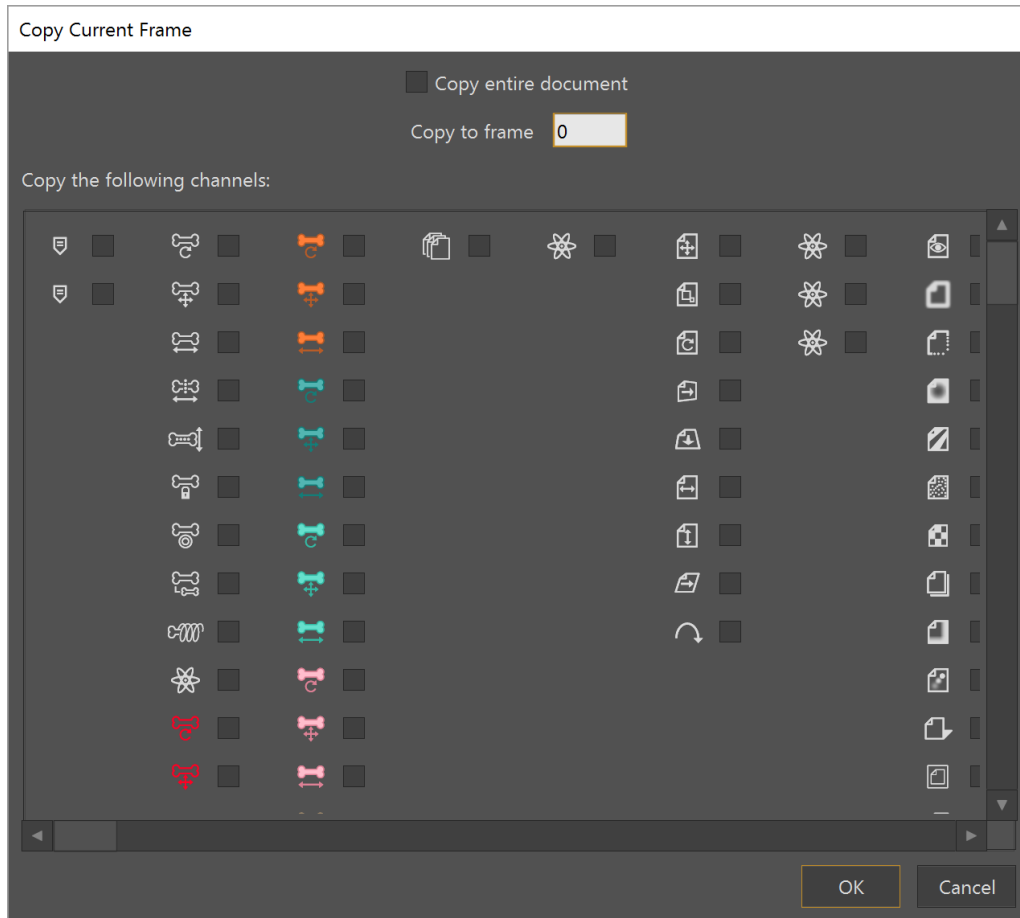
- **End Frame:** Enter the existing frame number at which to end the scaling.
- **New Start Frame:** Enter the new target frame number for the start of the scaling.
- **New End Frame:** Enter the new target frame for the end of the scaling.
- **Rescale the following channels:** Check or uncheck the channels that you want to include or exclude from the scaling operation. The icons representing the various animation channels are described in the Timeline Window section.

Examples:

- To reduce the amount of time the animation takes (in other words, to speed it up), you could set the start frame (and new start frame) to 30, the end frame to 60, and the new end frame to 45. ($45 - 30 = 15$, which is half as long as $60 - 30 = 30$)
- You can shift a section of your animation by changing the start time. For example, to shift the range of keyframes between 30 and 60, you could set the start frame to 30, the end frame to 60, the new start frame to 90, and the new end frame to 120. The duration will be the same ($120 - 90 = 60 - 30$), but the animation will take place between frames 90 and 120, instead of 30 and 60. You can rescale a portion of the entire document by clicking the "Rescale entire document" checkbox.
- To rescale the current layer, select the animation channels that you want to be affected. For example, you may want to rescale the bone animation, but leave the layer rotation alone.

Copy Current Frame...

With this command you can copy values from the current frame in the timeline to any other frame in your animation. For example, if you position some objects in a way that you really like at frame 243, you can use this command to copy that position back to frame 0, to make it the starting position as well.



The Copy Current Frame dialog.


Add Keyframe

This command adds a keyframe for all channels in your project, at the currently selected frame.

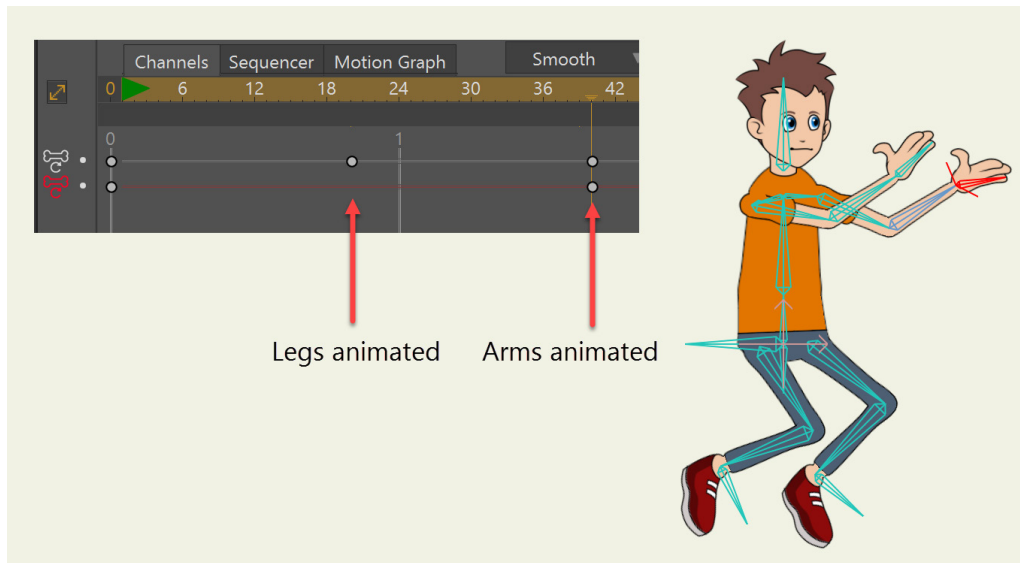
Auto-Freeze Keyframes

The **Animation > Auto Freeze Keyframes** command serves as a toggle. When Auto Freeze Keyframes is enabled, all bones in a character will get a keyframe when any part is adjusted. The Auto Freeze keyframes command is helpful when you are animating a character or object and you want to ensure that poses are in a specific state in certain frames in your animation,

 You can also check the **Auto Freeze Keys** checkbox above the timeline to automatically freeze keyframes.

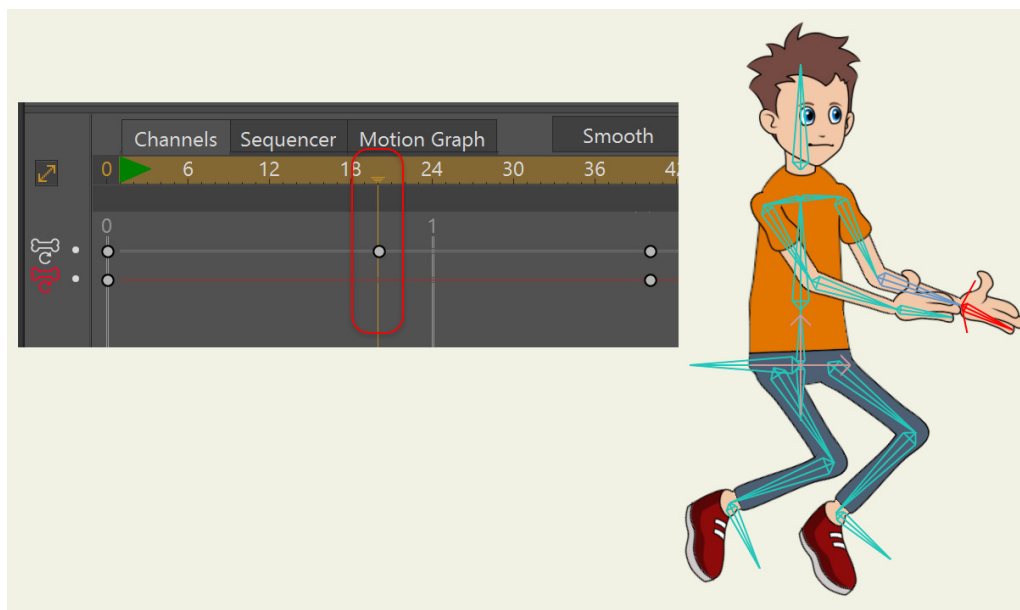
 The Auto-Freeze Keyframes option is disabled when you are editing a smart bone action.

As an example, assume that you add keyframes to frame 20 that move the legs of a character. Then you move ahead to frame 40 and move the arms.



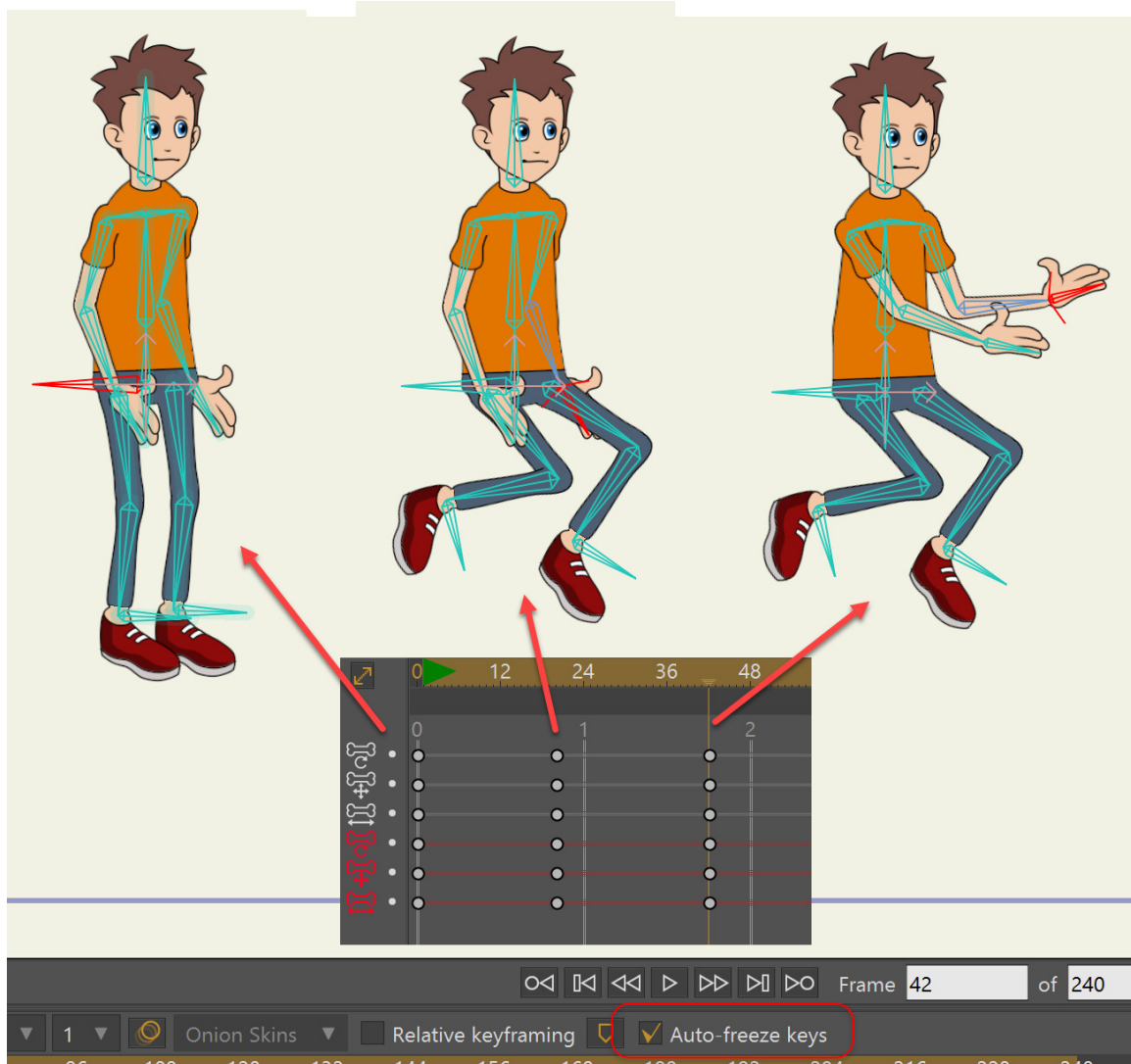
Legs animated at frame 20, arms animated at frame 40.

When you play the animation back from the beginning, you notice that both the arms and legs begin to animate, and that the arms are in a midway position at frame 20. The reason that this happens is because there is no keyframe for the arms at frame 20, so Moho starts interpolating the animation at frame 0.



When played back, arms are at mid-position at frame 20.

If you animate the character when the Auto-freeze keys option is enabled in the timeline, or when the Animation > Auto Freeze Keyframe is enabled, Moho will add keyframes for each bone in the character, thereby “freezing” the pose at any keyframe that a bone is moved. Now when you play the animation back, the legs will move from frames 0 through 20, and the arms will move from frames 21 through 40.



Auto Freeze Keyframes freezes poses for all bones in the character.

Clear Animation

Several commands allow you to clear keyframes from a single layer, or from all the layers in your project. Use the **Animation > Clear Animation** commands as follows:

- **From Layer:** Clears all animation keyframes from the current layer. A warning appears to notify you that animation will also be deleted from sublayers and asks if you want to continue. Choose **Yes** to clear the sublayers, **No** to keep keyframes in the sublayers, or **Cancel** to exit the dialog without making changes.
- **From Layer After Current Frame:** Clears keyframes from the currently selected layer, beginning with the frame after the currently selected frame and including all keyframes to the end.

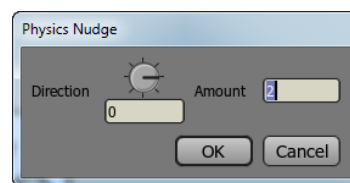
- **From Layer Before Current Frame:** Clears keyframes from the currently selected layer, beginning with the frame before the currently selected frame and including all keyframes to the beginning.
- **From Layer At Current Frame:** Clears the keyframes on the currently selected layer, only at the current frame.
- **From Document:** Clears all animation keyframes from the entire document.
- **From Document After Current Frame:** Clears keyframes from the entire document, beginning with the frame after the currently selected frame and including all keyframes to the end.
- **From Document Before Current Frame:** Clears keyframes from the entire document, beginning with the frame before the currently selected frame and including all keyframes to the beginning.
- **From Document At Current Frame:** Clears the keyframes in the entire document, only at the current frame.

Track Layer to Video

This command allows you to link a layer to tracking points that have been set up with the video tracking tool. For a complete description of the process, refer to ["Video Tracking" on page 148](#).

Nudge Physics Object (Pro Only)

A nudge is an instantaneous force that affects a physics object in small or large amounts, depending on the setting in the Physics Nudge dialog. It can be a large force, but after the nudge keyframe, the object will start falling, or bouncing, or whatever the situation requires. It won't keep going in the nudge direction forever.



The Physics Nudge dialog.

For example, assume that when you play your animation back you see a red ball roll down and bounce to a stop against a block. You can position the timeline shortly after it stops, and then apply a large nudge (such as 10) that causes the ball to fly off again to the left. Smaller nudge values cause objects to wobble.

Mute Audio

Mutes the soundtrack when playing back your project in Moho, but the soundtrack is still a part of the project. Just un-mute it to hear it again.

Restart Audio Track

Starts the audio track in the selected track over again from the beginning. This allows you to add repeats in the audio track.

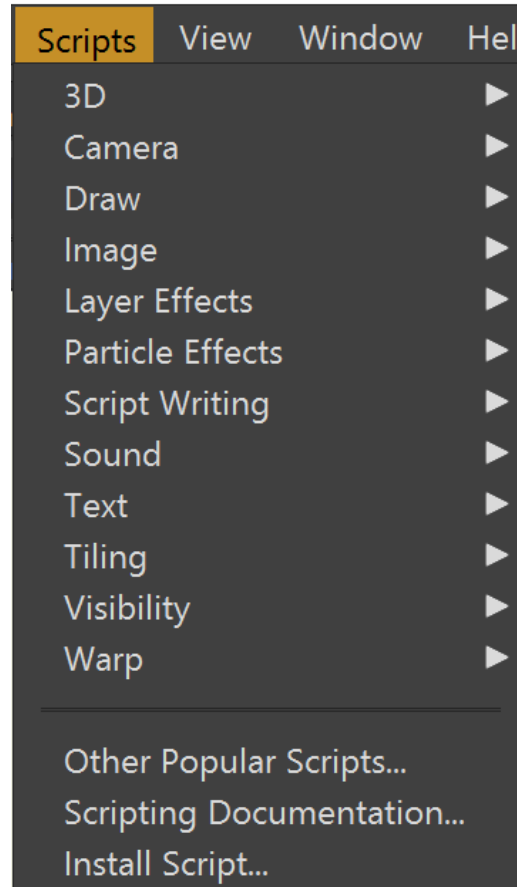
Audio Level

Opens a dialog that allows you to enter a numerical value for the audio level.

Restart Movie

Starts the video in the selected track over again from the beginning, allowing you to add repeats in the video track.

Chapter 23: Scripts Menu (Pro Only)



Scripts Menu

The Scripts menu contains commands that are provided by script files or plug-ins. Moho includes several scripts for a variety of different tasks, and you can also download more scripts written by other Moho users. These scripts are all written in the Lua programming language - if you're interested in creating your own scripts, feel free to examine the scripts in the scripts/menu sub-folder in the Moho program folder.

The scripts in this menu are divided into several sub-menus, according to their function:

3D

The scripts in this menu are used to create or manipulate 3D models.

Auto-Scale

When you import a 3D OBJ file into your scene, it may be way out of scale with the Moho scene. For example, a building may be so large that the Moho camera is inside it, or off to one side, and you don't really see anything on import. This script centers the object and scales it to an appropriate size for the default Moho camera.

Cube

Creates a new 3D layer that contains a simple cube. The color of the cube is determined by the current fill and line colors.

Rotate X

Rotates the current 3D layer 90 degrees around the X axis. This can be useful when importing a 3D model if the model's "up" direction is not the same as Moho's - just use this command (and the other rotate commands) to align the model properly.

Rotate Y

Rotates the current 3D layer 90 degrees around the Y axis.

Rotate Z

Rotates the current 3D layer 90 degrees around the Z axis.

Torus

Creates a new 3D layer that contains a simple torus (donut). The color of the torus is determined by the current fill and line colors.

Camera

These scripts are used to move the camera around and to create camera-related effects.

Handheld Camera

Adds noisy interpolation to the camera animation channels to simulate a handheld camera.

Orbit Camera...

Adds animation to the camera to cause it to rotate around the current scene. You can specify how long this should take, how far out the camera should be, and the direction of rotation.

Draw

These scripts can be used to create vector objects in Moho.

Animated Strokes

Animates the existing stroke around an object, along a specified number of frames.

Apply Sketchy Effect

Applies a sketchy effect to the outline of the shape.

Auto Weld

Finds vector points that are near each other and welds them together. Only operates on selected points. This can be useful if you have accidental gaps in a drawing, or sometimes when working with imported Adobe Illustrator files.

Erase All Vectors in Group

Erases the contents of all vector layers in a selected group.

Gear

Automatically generates gear shapes. You can specify the number of cogs and the inner radius. You can also create tapered or non-tapered cogs, and choose an option to create the gear in a new layer.

Polygon...

Draws a polygon shape in either the current vector layer, or a new layer. Uses the current fill and line colors to color the polygon.

Random Point Colors

Assigns random points colors to all vector objects.

Remove Bad Fills

This script fixes "leaky" fill shapes.

Remove Sketchy Effect

Removes the sketchy effect from a project.

Simplify Curve

Reduces the number of points in a curve by removing points which are calculated to be “unnecessary” to maintain the shape of the object. This makes it easier to edit your shapes later.

Split Curve

Automatically inserts points into selected curve segments, allowing you to modify existing shapes.

Star...

Draws a star shape in either the current vector layer, or a new layer. Uses the current fill and line colors to color the star.

Toggle Legacy Curves

Turns on old style curves, which are less smooth than the new curve style. However, this is beneficial for use with files created in older versions of Anime Studio.

Zig Zag

Creates zig-zagged shading between two selected curves. You can control the number of spikes, curviness, and randomness.

Image

These scripts can be used to process image layers.

Fisheye

Turns a fisheye image into a curved, wide-angle surface that can be panned around with the camera tools.

Spherical Panorama

Converts a spherical panorama image into a 3D sphere that can be viewed from any angle with the camera tools.

Layer Effects

These scripts can be used to generate special layer effects.

Layer Trail...

Creates an animated trail effect that follows the origin point of the current layer.

Magic Lines

Allows you to create a number of curves and apply this script to create an effect. For example, you can use the Freehand tool to draw several curves that represent smoke or swirly magic lines, and then run the script to create a smoky or magical effect.

Perspective Shadow...

Automatically creates a pseudo-3D shadow effect for the current layer.

RT: Break Apart Shapes

Offers a number of different options in how you can break apart the shapes on a layer. You can put each shape in its own layer and group them together or put all shapes in one layer creating separate geometry for each shape. Additional options allow you to select filled shapes only, and to name layers according to group names or shape names. This script is very useful when working with physics.

Particle Effects

These scripts can be used to create particle effects like smoke, fire, or rain. Many of these effects can be time-consuming to render, so be aware of that if you plan to use several of them in a single animation. Also, even though they can be exported to Flash, these effects can be too complex for the Flash player to play at full speed. Plus, without the blur effects these scripts use, they won't look very good in Flash. These effects are really useful only if you plan to export to a movie or still image format, not Flash.

Energy Cloud...

Creates a blobby glowing cloud effect.

Explosion...

Creates an explosion effect. The explosion starts at the current frame, and will fade to a smoke cloud over time.

Rain

Inserts a falling rain effect.

Smoke...

Inserts a plume or cloud of smoke.

Snow

Creates a falling snow effect.

Sparkles...

Inserts a cluster of spiraling sparkles. This effect is very effective if you bind it to another moving object - for example, the end of a magic wand.

Script Writing

This menu contain utility scripts that can be used as examples for writing your own scripts. If you don't plan to write your own scripts, you can completely ignore this menu.

Alert Test

Demonstrates how a script can use an alert box to provide some information to the user.

Automation Test

Shows how you can write a script that will open or save a document, create a new document, and render a document. The script opens all documents in a given directory and renders a frame for each one.

Error Test

This script intentionally creates a runtime error. The purpose is to show how the Lua Console appears to display the error. When you write your own scripts, the console window will be very helpful when tracking down errors.

List Channels

Shows how a script can iterate through all of the animation channels in a layer. You can access every animateable parameter in the layer.


Load Data File...

This script is a demonstration of how a Lua script can read data from an external file. It doesn't do anything useful itself, but it could be used as a starting point if you wanted to write a script to import some kind of custom data.

Print Moho API

Prints out all functions, constants, and global variables that Moho provides through its scripting interface. This is not meant to be the documentation for Moho's scripting interface, but some script writers may find it useful.

The **Resources > Support > Extra Files** folder in your Moho Pro installation folder contains Lua scripting documentation that you might find useful.


 Moho merges user scripts and factory scripts internally at runtime. If you name a user script in the same corresponding folder (tools, utility, etc) with the same name as a factory script in the corresponding location, the user script will be preferred over the factory script. User scripts that do not replace factory scripts are loaded after factory scripts, as previously supported, unless a different order is specified in the active `_tool_list.txt` file for tool scripts.

The `_tool_list.txt` factory default file now begins with a line that is similar to this:

```
/* anime_version 9010000 (9.1.0 rev 0) */
```

If you have a `_tool_list.txt` file in the user scripts/tools location that begins with this line, and the version number is the same or higher than the factory default version, your user `_tool_list.txt` will be used instead of the factory file.

If the version is missing or lesser than the factory default, the factory default will be used and a copy of the factory default will be saved to the user folder with the name `_reference_tool_list.txt`.

 The `_reference_tool_list.txt` file is not for editing. It is a reference to use when updating your custom `_tool_list.txt` for the current version. This allows new tools and other changes to be accounted for when you make your customizations. When the factory defaults version changes, a new copy of this file will be saved for you to reference.

Print Globals

Prints out all global variables currently defined in Lua.

Print Test

A simple example that shows how you can print output in a Lua script. The printed output will appear in the Lua Console window. Printing data in the console window is not generally useful when your script is delivered to regular Moho users, but can be very helpful when writing a script to track down bugs.

Sound

The scripts in this menu use sound to control some part of an animation.

Bone Audio Wiggle...

This script uses the volume of a sound file that you select to animate the angle of the currently selected bone. Use this script to make a character or object move in sync with a sound.

Layer Audio Wiggle...

Use this script to make a layer move in sync with a sound.

Text

Allows you to add credits or spinning text to your projects.

Credits

Allows you to select a text file that contains your credits. You can specify font, duration for each screen, delay between screens, and number of frames for fade.

Number Sequence

Adds a sequence of numbers based on the number of frames in your animation.

Spinning Text

Creates 2D or 3D spinning text. Several settings provide control over length, rotation, translation, opacity, and scale. Some presets are provided.

Tiling

These two scripts allow you to create a repeating texture pattern to fill the workspace. These tiled surfaces can be animated.

Visibility

These scripts affect the visibility of a layer - for example, causing it to fade in and out.

Collapse Layers

Allows you to animate the collapsing or uncollapsing of layers contained in a group layer.

Fade...

Causes the current layer to fade in or out over a specified number of frames. If you want a layer to appear or disappear suddenly, it is better to change the value of the layer's visibility channel. However, this script should be used when you want a layer to appear or disappear more gradually.

Unroll Shapes

If you have a vector layer that contains several shapes, you can run this script to "unroll" or expand the shapes out from nothing in a cascade. Unroll Shapes can also be used in combination with Elastic or Bounce interpolation for interesting effects.

Wavy Fade...

This script combines the Fade effect above with the Wavy effect below. It can only be used with vector layers.

Warp

This set of scripts is used to distort the contents of a vector layer, applying various animated warping effects.

Black Hole...

Causes the selected points in a vector layer to swirl around in an inward spiral motion towards the origin point of the layer.

Wavy...

Causes the selected points in a vector layer to move in a wavy or underwater style.

Other Popular Scripts

Opens your web browser to www.animestudioscripts.com, where you can download popular scripts written by other members of the Moho user community.

Scripting Documentation


Opens your web browser to www.animestudioscripting.com, where you can view the latest scripting documentation.


Install Script

The Install Script command can be used to automatically install user scripts. The script folder must be laid out with the following hierarchy in order to install:

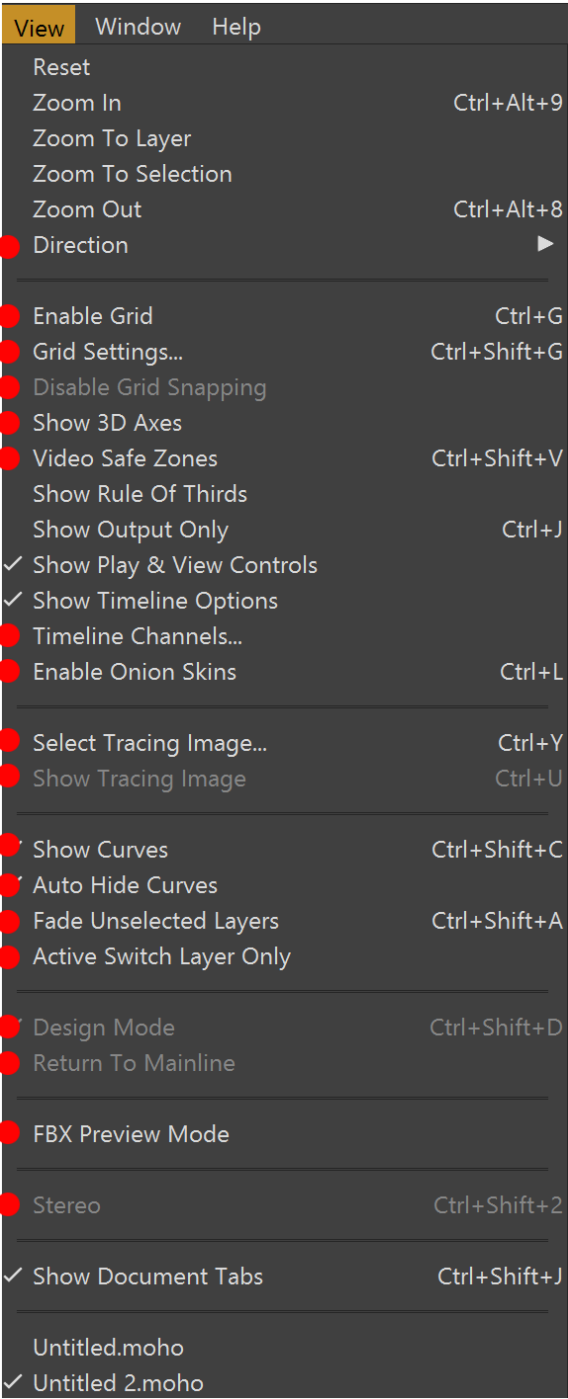
My Script Folder

menu
tool
ScriptResources
utility

 The items in the folder should reflect the location in the scripts folder (found in your user content folder). Script writers should adapt their script distribution to this hierarchy so that the script will install through this feature.

 If you replace an existing item with the **Install Script** command, the existing items will be moved to a scripts subfolder named **Uninstalled Items x-x-x** where **x** is the date. If you perform multiple installations that replace existing items on the same day, each of the uninstalled items folders generated after the first will also have a number appended to the folder name, starting at 1 and incrementing per folder.

Chapter 24: View Menu



View Menu (Pro-only features marked)

Reset

Resets the view of the working area to the starting pan and zoom values. Use this command when you want to jump back to the original view of the project.

Zoom In

Use the **View > Zoom In** command, or the keyboard shortcut **Command/Ctrl = (equal sign)** to zoom in closer to the elements in your scene.

Zoom to Layer

Zooms the workspace view to fit all contents of the current layer. The existing Shift+Home shortcut will continue to work independently of this menu item.

Zoom to Selection

Zooms the workspace view to fit selected items. The existing Alt+Home shortcut will continue to work independently of this menu item.

Zoom Out

Use the **View > Zoom Out** command, or the keyboard shortcut **Command/Ctrl - (minus sign)** to zoom out farther from the elements in your scene.

Direction (Pro Only)

This sub-menu lets you select a direction to view your scene from. The default view is through the camera - however, sometimes when you're working on a scene with a 3D layout, you may want to view the scene from a different point of view. Options are Camera, Front, Top, Right, Back, Bottom, and Left.

Enable Grid (Pro Only)

Toggles display of the grid on and off. A checkmark appears beside the command when the grid is displayed.

Grid Settings (Pro Only)

Displays the Grid Settings dialog, which allows you to set the number of pixels between each grid space. Default is 20 pixels.

Enable Grid Snapping (Pro Only)

When the grid is turned on, control points will snap to the nearest grid intersection as you draw them and move them around. Check this menu command to enable grid snapping. When unchecked, you can use the grid as a visual guide, without it interfering in your drawing.

Show 3D Axes (Pro Only)

Toggles the display of the 3D Axes on and off in the document window.

Video Safe Zones (Pro Only)

This command turns on the display of NTSC “safe zones”. When creating output for video, it is important to keep important action and titles within the safe zones, because most televisions cut off some portion of the outside of the picture. (The inner rectangle is the safe zone for titles, and the outer one for important action.)

Show Rule Of Thirds

This command will toggle a change in the display to show the output area split into thirds.

Show Output Only

This command will hide all artwork that lies outside the final output rectangle. This makes it easy to visualize the final staging for your shot. Of course, it’s hard to edit what you can’t see, so be sure to turn this option off when you need to edit an object that lies outside the visible area of the project.

Open documents also appear as a list at the bottom of the View menu. Select a document in the list at it will appear in the view port area.

The following shortcuts allow you to cycle through open documents:

- To switch to the next open document, press **Ctrl Tab** (Windows) or **Alt Tab** (Mac).
- To switch to the previous open document, press **Ctrl Shift Tab** (Windows) or **Alt Shift Tab** (Mac).

Show Play & View Controls

Toggles the display of the play controls and other toolbar settings that appear above the timeline.

Show Timeline Options

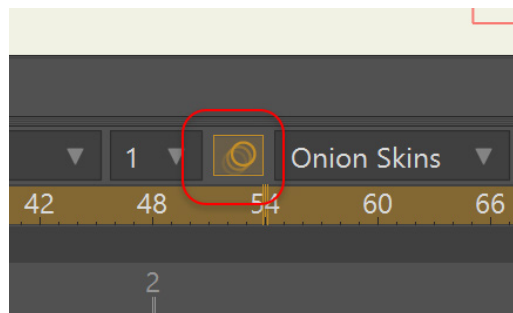
Toggles the display of the timeline options toolbar (the area between the Play and View controls and the timeline ruler).

Timeline Channels (Pro Only)

Reintroduced the timeline channel dialog for giving users control over which channels to show in the timeline.

Enable Onion Skins (Pro Only)

Choose this command to toggle the visibility of onion skins. Alternatively, you can click the Enable Onion Skins button in the timeline toolbar.



Enable Onion Skins

Select Tracing Image (Pro Only)

Use this command to select a tracing image to display in Moho's editing view. This image will not appear in your final output - it's just used as a tracing guide to help you draw your artwork in Moho.

Show Tracing Image (Pro Only)

Use this command to show or hide the tracing image that you have added to the scene using the **Select Tracing Image** command.

Show Curves (Pro Only)

Use this command to globally show or hide the curves in your scene.

Auto Hide Curves (Pro Only)

When checked, Moho will automatically hide curves when you use drawing tools that do not affect curves. This helps reduce onscreen clutter while you draw. Uncheck this option if you prefer to display curves at all times.

Fade Unselected Layers (Pro Only)

This option allows you to easily identify the layers and objects that you are working on, without having to turn other layers off. When this option is off, all layers in the current project will be displayed normally. When this option is turned on, any layers or children of layers that are not selected will be grayed out.

Active Switch Layer (Pro Only)

When this command is enabled, Moho will display both the active child as well as the selected layer in a switch group.



You can Alt-click the child of a switch layer in the Layers Window to activate it.

Design Mode (Pro Only)

Returns the project to Frame 0, where you can add new layers, draw vector shapes, change bone rigging, and so on. Moho will remember the frame that you were previously on before choosing the command. If you choose the command again after adding the desired elements at Frame 0, you will return to the frame that was current before you applied the command the first time.

Return to Mainline (Pro Only)

If you have the Actions window closed, allows you to return to the mainline faster.

FBX Preview Mode (Pro Only)

The **View > FBX Preview Mode** command allows you to preview your Moho project before you use the **File > FBX Export** command to export to another 2D or 3D application that supports the FBX format (such as Unity or Autodesk products).

It is important to note that the FBX file format does not support all of the features found in Moho, such as point animation, curvatures, point bindings, and other similar features. Any features that are supported in Moho but not supported in FBX format will not be exported.

While working in FBX Preview mode, you can play back or scrub through your project to view the animation as it will appear in other applications that support FBX file format. You may notice that some parts are left behind when the character animates, or that things are not bending and stretching as they should. This gives you the opportunity to make modifications that will help improve performance in other applications. When you turn FBX Preview mode off after making changes (such as changing point binding to flexi-binding), the project will play back using the original methods, but the changes that you made while working in FBX preview mode will be carried over.

The following general comments address Moho features that are not compatible with FBX format:

- Vector layers will be exported as though they are images.
- Remember that when designing a project for FBX output, everything is about flexi-binding. Other binding methods will produce undesirable results in FBX format.

- Characters that use features like point binding, point bending, curvatures, and other similar features will not move in the same way when exported as an FBX file and imported into another application. You will need to modify the characters using some of the following recommendations.
- If a character uses point binding methods to link bones to vector layers, use the **Bone > Use Selected Bones for Flexi-Binding** command to remove the point binding. Select only the bones that you want to use to animate a selected body part, and then apply the command. Repeat this for any body part that uses point binding. Make sure to preview again in FBX Preview Mode to see the result of the change.
- Use the Bone Strength tool to verify bone strengths for each of the body parts to make sure they are not being under- or over-affected. Adjust bone strengths as needed before exporting the project.
- Bone scaling and stretching is not supported in FBX format.

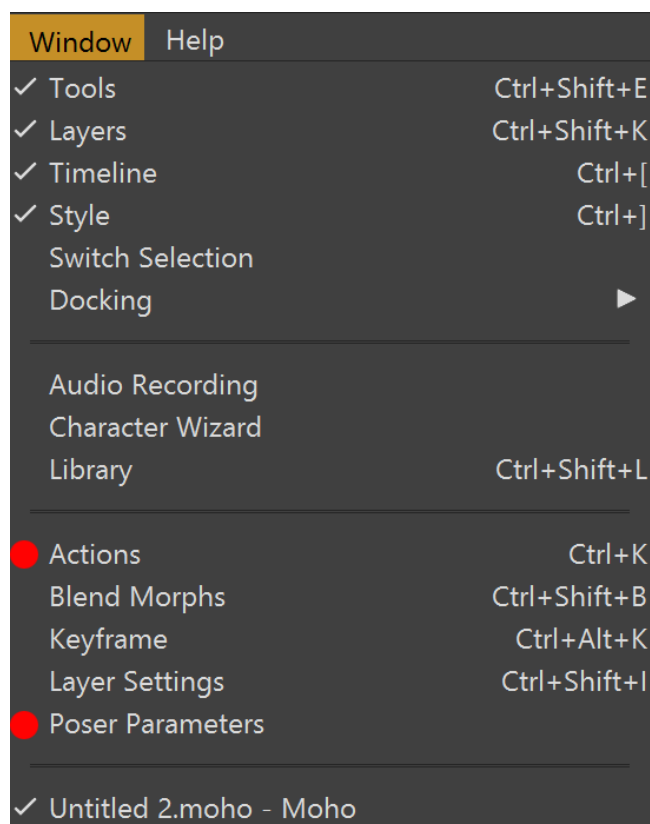
Stereo (Pro Only)

If **Enable Stereo (Red/Blue)Rendering** is enabled in the Project Settings dialog (see [“Project Settings...” on page 385](#)), this command makes it easier to preview and reposition your 3D objects for stereo rendering.

Show Document Tabs

Open documents appear as tabs in the main window. You can show or hide the document tabs with the **View > Show Document Tabs** command, or by using the shortcut **Command/Ctrl Shift J**.

Chapter 25: Window Menu



Window Menu

Tools

Shows/hides the Tools window. The Tools window is shown by default when you start Moho. Tools are discussed in the section beginning with “[Moho Tools](#)” on page 31.

Layers

Shows/hides the Layers Window. The Layers Window is shown by default when you start Moho. See “[Chapter 10: Layers Window](#)” on page 165.

Timeline

Shows/hides the Timeline window. The Timeline window is shown by default when you start Moho. See “[Chapter 16: The Timeline Window](#)” on page 332.

Style

Shows/hides the Style window. The Style window is shown by default when you start Moho. See “[Chapter 13: Style Window](#)” on page 256.

Switch Selection

Choose **Window > Switch Selection** to open the Switch Selection window. This window provides a preview of switch layers that can be added to the timeline. For more information, see [“Using the Switch Selection Window” on page 193.](#)

Docking

Use the **Window > Docking** commands, or their equivalent shortcuts, to dock or undock the Tools, Layer, Timeline, or Style windows. When undocked, you can move them to another location or to a second monitor.


The docked window size and floating window size are maintained independently so that each can be adjusted to suit its content.


Actions (Pro Only)

Shows/hides the Actions window. The Actions window is hidden by default when you start Moho. See [“Actions Window \(Pro Only\)” on page 366.](#)

Blend Morphs


You can use the **Window > Blend Morphs** command to blend poses (or **morph targets**) together to create a combination pose or morph. This feature in Moho is very easy to use.

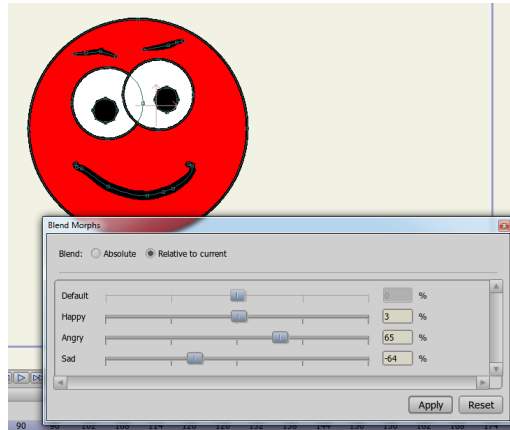
 *Moho Debut does not allow you to create actions for blending, however you will be able to blend poses contained in content that is created by others. When you first create a character, you'll notice that the **Window > Blend Morphs** command may not be available. This is because you need to use a character that has morph targets that you can use for blending.*

 *Moho Pro allows you to both create and blend poses. See [“Creating Morphs \(Pro Only\)” on page 370.](#)*

To blend your morphs, begin by moving to the frame at which you want the new morph to appear.

Next, choose the **Window > Blend Morphs** command. The Blend Morphs dialog appears. The sliders in this dialog are named the same as the morphs you created in the Actions window. Adjust the sliders until you get a combination of the morphs that you want to keep. Then click OK to set the new combination.


 *The Default slider is associated with the default state of the object at Frame 0. To blend the other morphs with this default state, check the **Relative Blend** option.*



Use the Blend Morphs dialog to combine your morphs together in any combination of values.

You can then advance to other frames in your timeline, and use the Blend Morphs command to create new combinations throughout the timeline. As you scrub through the timeline, you should then see morphs blend from one to the other.

You can select which animation channels to copy to a new frame, or you can copy everything in the document by selecting the “Copy entire document” checkbox. There doesn't need to be a keyframe at the current frame in order to copy the current value. This command will copy the current value, whether it is a keyframe or an interpolated in-between value.

 *An important note about bones: if you position a skeleton system during your animation, and try to copy that pose back to frame 0, the bones themselves will take on that pose at frame 0, but anything bound to the bones (points in vector layers, warped images, other sub-layers) will not take on that pose. This is because frame 0 is a setup frame - bones are set up at frame 0, but they have no influence over other objects at frame 0. If you're trying to copy a pose back to frame 0 in order to set up an initial pose, consider copying it back to frame 1 instead - frame 1 is actually the beginning of the animation, and the bones will influence other objects starting at frame 1.*

Keyframe

Use the **Window > Keyframe** command to apply changes to a selected group of keyframes. For more information about the Keyframe dialog, see “[Editing Keyframe Settings](#)” on page 353.

Layer Settings

Opens the Layer Settings dialog, discussed in “[Chapter 12: Layer Settings](#)” on page 205.

Poser Parameters (Pro Only)

Opens the Poser Parameters dialog, which allows you to rotate or scale Poser objects that are imported into your scene. For more information, see [“Chapter 8: Special Tools” on page 142](#).

Library

Displays the Library window, which is discussed in [“Chapter 14: The Library Window” on page 289](#).

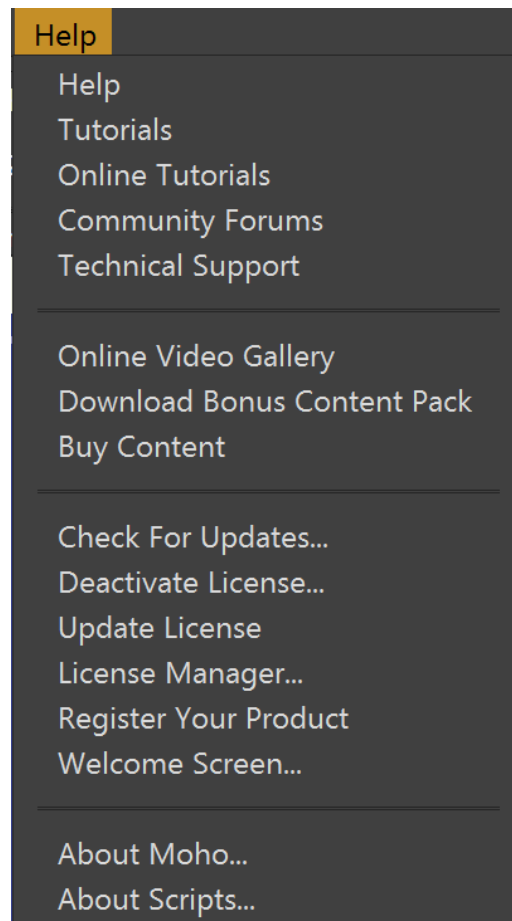
Audio Recording

Displays the Audio Recording window, which is discussed in [“Audio Recording” on page 365](#).

Character Wizard

Displays the Character Wizard, described in [“Chapter 15: The Character Wizard” on page 304](#).

Chapter 26: Help Menu



Help Menu

Help

Opens this document, the Moho User's Manual.

Tutorials

Opens the PDF version of the Moho Tutorial Manual, which is installed on your hard disk.

Online Tutorials

Opens a web browser with Moho online tutorials. Internet connection will be required.

Community Forums

Opens your web browser to the Lost Marble forum, where you can communicate with your peers and ask for help on any topic related to Moho and animation. The forum is extremely large with over ten thousand registered members.

Technical Support

Opens your web browser to the Lost Marble website where you can access FAQ's, see answers to common issues, get help from a customer service representative etc.

Online Video Gallery

Opens your browser to a page that displays some of the animations that have been created with Moho. This is a great place to get inspired and see what others have created with Moho.

Download Bonus Content Pack

Navigates to the Bonus Content Pack page on Content Paradise. You will need a Content Paradise account and a valid Moho serial number to obtain the content.

Buy Content

Help speed up your animation workflow with ready to use content. Buy content from Content Paradise. Internet connection will be required.

Upgrade to Professional Version (Debut Only)

Upgrade from Moho to Moho Professional. Internet connection will be required. To see the differences in the two products, see ["Product Comparison"](#) on page 359.

Check For Updates

Check to see if there are any updates for Moho. Internet connection will be required.

Deactivate License

Choose this command to deactivate the license before you uninstall Moho, or if you want to activate the license on another computer.

Update License

If you have previously licensed Moho with a Moho Debut license and have since acquired a Pro license, you can use this command to update your local license from Moho Debut to Moho Pro. A Moho Pro serial number is required. After entering your new serial number you will be prompted to restart the application.

License Manager

Opens your browser to a page where you can manage your Moho and other Lost Marble product activations.

Register Your Product

Register your product to receive information on updates and upgrades. Internet connection will be required.

Welcome Screen

Opens the Welcome Screen.

About Moho

Displays some information about your Moho installation, including which version of Moho you're running.

About Scripts

Displays some information about all the scripts currently loaded by Moho. All of Moho tools, and all the entries in the Scripts menu are implemented in a scripting language called Lua. Although some programming/scripting experience is required, Moho users are welcome to write their own scripts to extend Moho's built-in features.

Chapter 27: Moho 13.5 New Features

Animating foreshortening and complex actions are easier than ever!

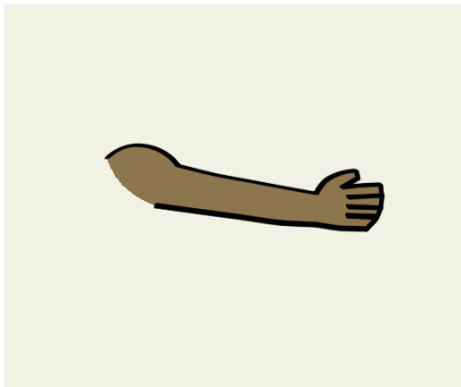
Inspired by Da Vinci's Vitruvian Man drawing, Vitruvian Bones (or V-bones) is a new and powerful way to rig your characters. The intuitive V-bones system allows you to alternate different drawings and sets of bones in one single layer. For instance, you can have different sets of heads, each with its own controllers. Or just draw the same limb in different perspectives and Vitruvian bones will allow you to group and animate them on the fly just by switching from one to the next. V-bones can be applied to any part of the body. You can even switch between entirely different bodies, all in the same bone layer! This unique approach to Vitruvian bones makes it easier to have a rigged character with the appeal of traditional animation.

Create a Vitruvian Group

To understand the basics. Let's create a simple Vitruvian Group in an empty file.

First, be sure to be in frame 0.

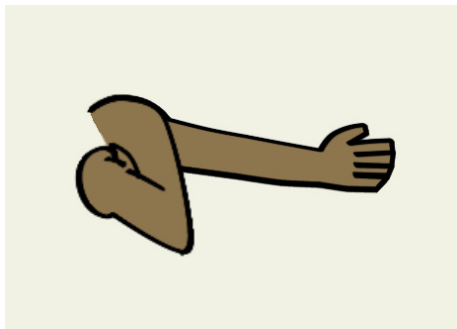
Change the name of the empty vector layer in the project to 'Arm 1' and use the drawing tools to create an arm.



Now create a second vector layer, name it 'Arm 2' and draw the same arm, but in a different pose.

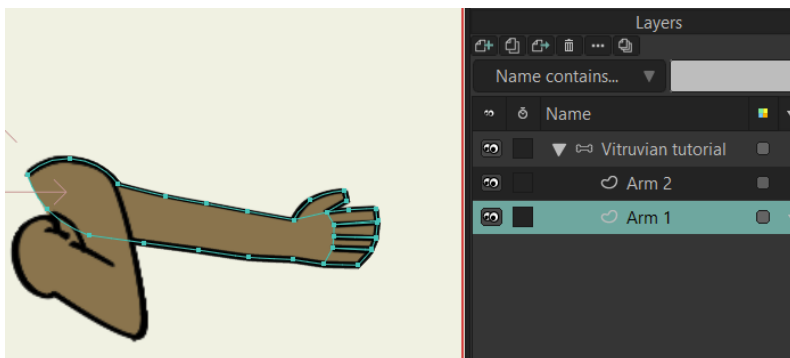


So now you have two arms, each one in its own vector layer.



Go to the Layers window, create a Bone layer and drag both arms inside of it.

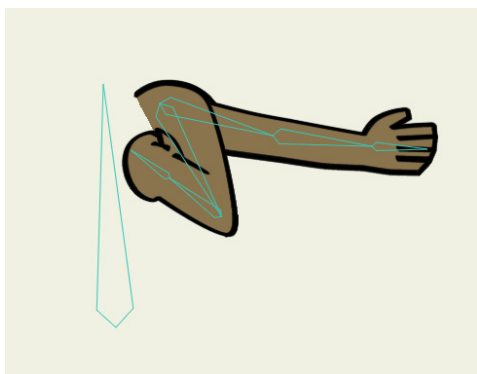
Your layers should look similar to this:



Select the Bone layer and then the Add Bones tool (A) and create one bone for the body and then bones for each arm.

Even when we will see only one arm at the time, just rig your character as it has two arms.

You need to be sure both arms are children of the main body bone:



Once you have your bones created, Moho needs to know what bones should move and bend each arm. This step is not always necessary when you are creating a rig, but it's crucial for Vitruvian bones to work.

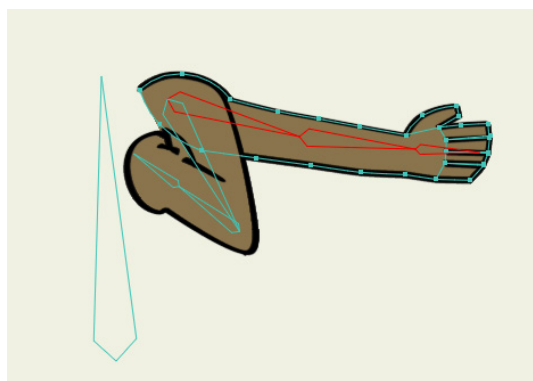
To give the software this information we will use the selective Flexi-Binding option. Luckily, it's a simple and quick process.

Select the 'Arm 1' vector layer.

Now use the Select Bone tool and select the three bones related to that arm.

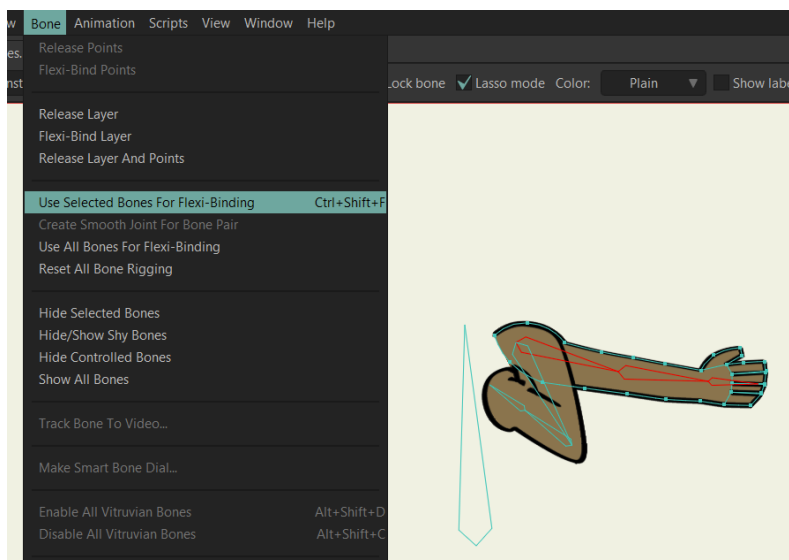
You can use the Rectangle selection, lasso mode or hold Shift + clicking to add bones to the selection.

Hold Ctrl and click over a bone if you need to remove it from the selection.

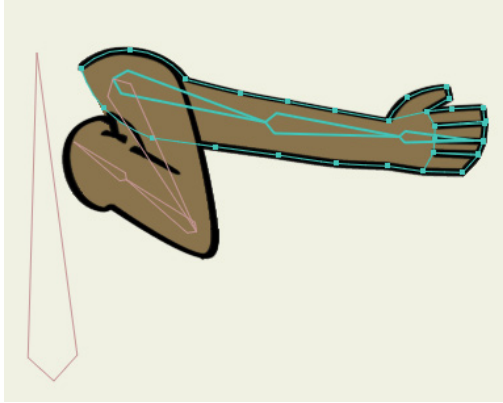


So now you have the 'Arm 1' layer selected and also the bones that should move that layer.

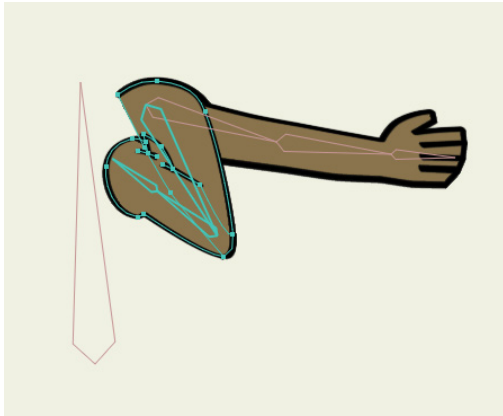
Go to the Bone menu and click on 'Use selected bones for Flexi-Binding' (or simply press Ctrl+Shift+F in Windows or Cmd+Shift+F in macOS)



These bones will look bold everytime that vector layer is selected. This means that these bones are the only ones that will move that specific layer.



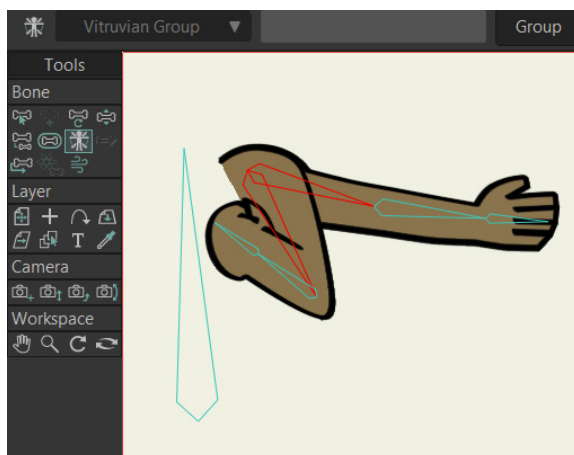
Now select the 'Arm 2' layer and repeat the same process: Select the bones and go to Bone -> Use Selected Bones for Flexi-Binding



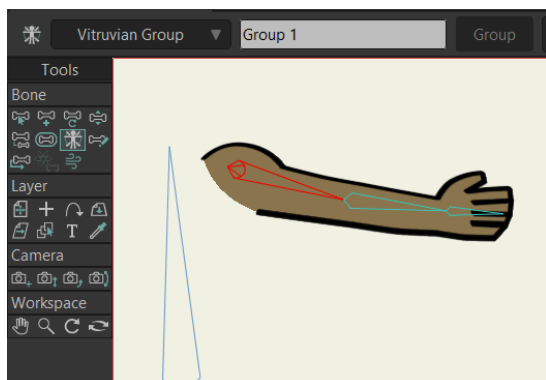
In this exercise, we are only creating two different arms, but you can repeat the same process for as many limbs as you'd like to have in your character.

Now go to the Tools bar and use the Vitruvian Bones tool. This tool works very similar to the Select Bone tool, but also allows to create Vitruvian Groups.

To do it, simply select the first bone of each arm

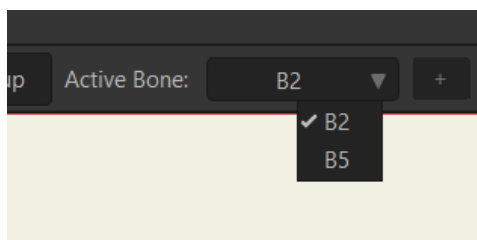


And then click on the Group button

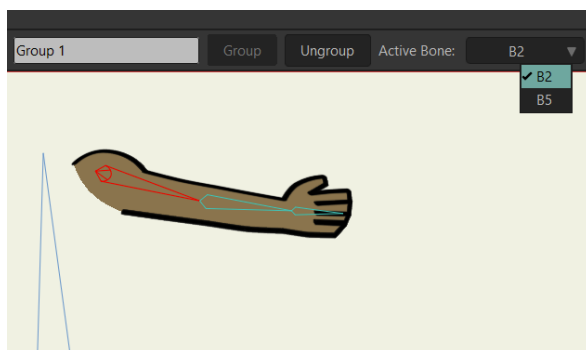


You will notice one arm will disappear and the other one will have a special design. This design means this is a Vitruvian Bone.

To test it, simply select any bone from the arm and then go to the Active Bone menu in the Vitruvian Bones toolbar



This menu shows you the names of the bones (in this case they have the default names, but you can rename the bones if you want). Depending on which one you select, that arm will appear on the screen.



Tip:

You can also change the Active Bone by simply pressing Alt+D or Alt+C as many times as you need.

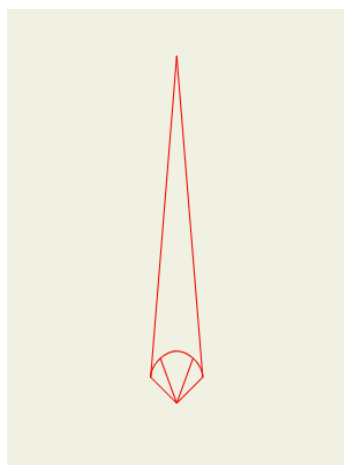
This method is much quicker and works without the need of using the Vitruvian Bone tool.

As far as one of the bones of the arm is selected, you will be able to use it.

(And, unrelated to this section, this shortcut also work with Switch Layers)

As you can see, the design of a Vitruvian Bone looks different to the rest of bones, with a semi-circle and two lines at the bottom.

This design will help animators know when they have the option to animate Vitruvian Bones.

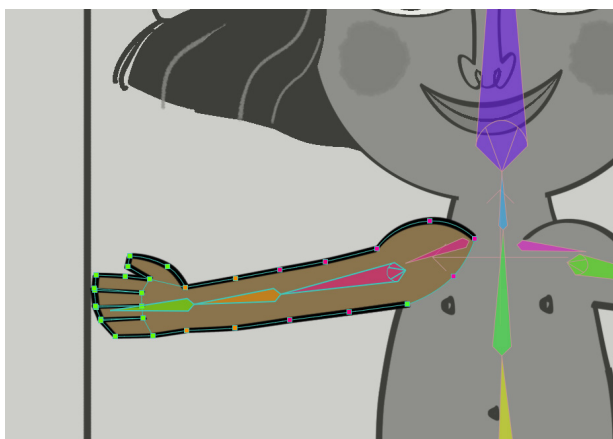


Rigging Vitruvian Bones

Although Vitruvian Bones need to be set up with the 'Use Selected Bones For Flexi-Binding' menu in order to work correctly, you are not limited to that option.

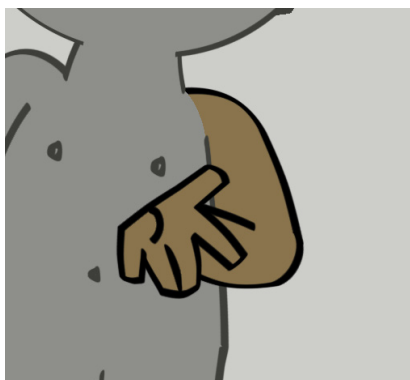
After you use that menu, you can still Bind points or Entire layers to specific bones, create Smart bones for joints or control Levers and use any tool you would normally use for rigging a character.

As you can see here, this character is using Point Binding for the arm:



Also, Vitruvian bones are not limited to one layer. You can attach as many layers as you want to Vitruvian Bones and they can be anywhere inside of the Bone layer.

So, for instance, an arm can be split in two layers: Arm and Forearm. Then the arm can be behind the body layer and the forearm in front of it, as you can see here:



Animating Vitruvian Bones

Basic concepts of the timeline:

To animate with Vitruvian Bones, it's very important to understand some basic concepts of Moho's timeline:

For most of the channels, there's a white and a red channel.

The red channel only shows the keyframes of the element you have selected at the moment.

The white channel shows you keyframes of any of the elements that have movement in the selected layer.

So, as a summary:

The **red channel** works to modify and re-time **specific movement**

The **white channel** is useful to modify and re-time all the elements at once.

Animating with Vitruvian Bones

When you start animating Vitruvian Bones, you will notice some new channels appearing in the timeline. These are special channels and behave a bit different from the rest.

First, you will notice the **Vitruvian Bones** channels. These channels will appear every time you change the Active Bone on a Vitruvian Bones Group (by using the tool menu or the Alt+D and Alt+C shortcuts):



Vitruvian Bones

Every time you change the Active Bone of any Vitruvian Group during your animation, this channel will show you a Keyframe at that frame.



Selected Vitruvian Bones

This channel is very similar to the previous one, but it only shows the keyframes of the Vitruvian Group selected at that moment.

If you select a bone that is part of a Vitruvian Group, this channel will show keyframes every time you change the Active Bone of that specific Vitruvian Group.

You also will see the **Vitruvian Bones Consolidated channels**:



Vitruvian Bones Consolidated

This channel shows a general summary of every Vitruvian bone animated.

If any of the Vitruvian Bones in the Bone layer has a keyframe (it can be in Rotation, Scale, Translation, Flip or any bone animation channel), a keyframe will also appear in the Vitruvian Bones Consolidated channel.

This channel is very important, because it shows the entire animation in the timeline, even for bones that are not visible at the time.

This allows to modify and re-time an entire animation easily.



Selected Vitruvian Bones Consolidated

This channel is very similar to the previous one, but it only shows the keyframes of the Vitruvian Group selected at that moment.

If you select a bone that is part of a Vitruvian Group, this channel will show keyframes in the frames where any of the bones of that group has keyframes.

This channel is especially useful if you want to modify the animation in a specific group. For instance, all your animation is working fine, but the left Arm is moving too slowly. Then you can modify the keyframes of this channel to adjust the timing of the entire group at once.

Look at this example:



The **Vitruvian Bones Consolidated** channel shows there's animation at frames 6, 12 and 18. This is a general summary that shows that in frames 6, 12 and 18 the Vitruvian Bones are animated.



The **Vitruvian Bones** channel shows that one or more Vitruvian **Active Bones** have been changed in frames 6 and 18.



The **Selected Vitruvian Bones Consolidated** channel shows that the bone selected (right arm of the character) is part of a Vitruvian Group and that that group has keyframes in frames 6 and 12. This Vitruvian arm is not moving at frame 18, so there's no keyframe there.



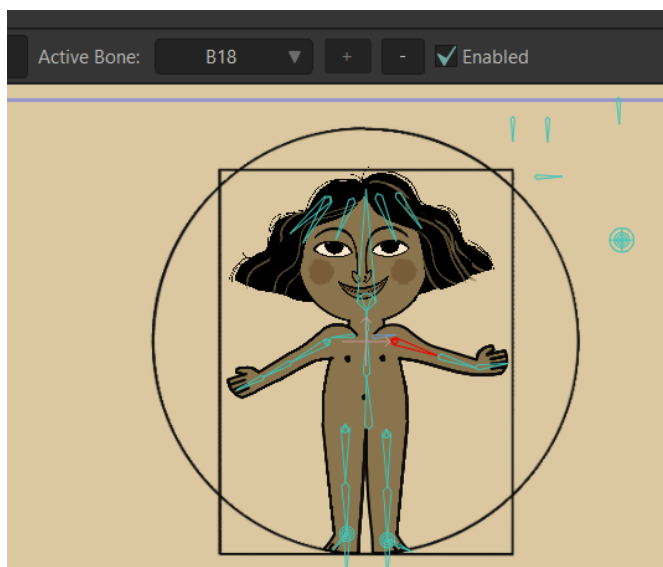
The **Selected Vitruvian Bones** channel shows that the bone selected (right arm of the character) is part of a Vitruvian Group and that specific group has changed the Active Bone only in frame 6.

Disabling Vitruvian Bones Groups

If you want to see and edit all the bones and content from a Vitruvian group, you can temporarily disable that group.

This option is very useful to make changes on the overall design, add Smart Bones or make adjustments on the animation.

Just use the **Vitruvian Bones Tool**, select one bone from the Vitruvian Group you want to disable and uncheck the Enabled box in the toolbar



Disabled

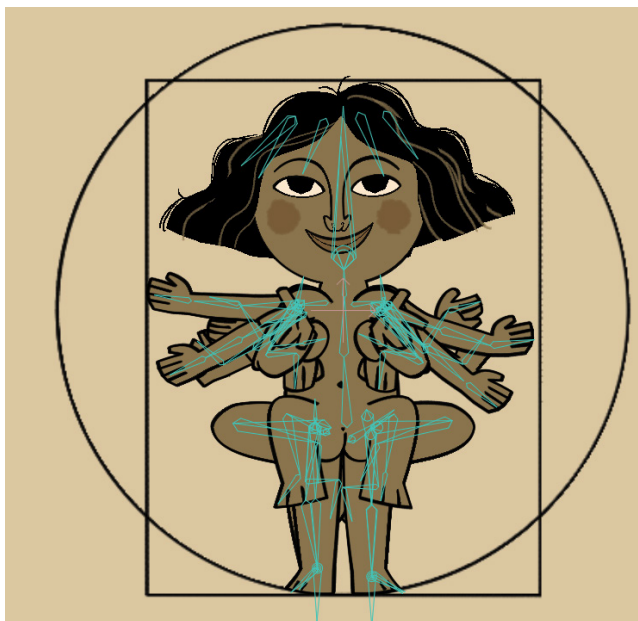


You can also Disable or Enable every Vitruvian Group from a character by going to the menu

Bone -> Disable All Vitruvian Bones

Bone -> Enable All Vitruvian Bones

All Vitruvian Bones Disabled:

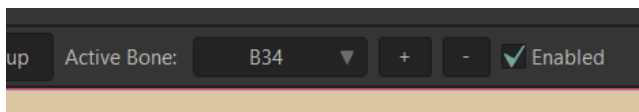


Adding and Removing Bones from a Vitruvian Group

If you want to Add a bone chain to an already created Vitruvian Group,

- Use the Vitruvian Bone tool
- Select one of the main bones from the Vitruvian Group you want to edit

- Holding shift, add the chain of bones you want to add to the selection
- Press the + button to add the chain to the Vitruvian Group



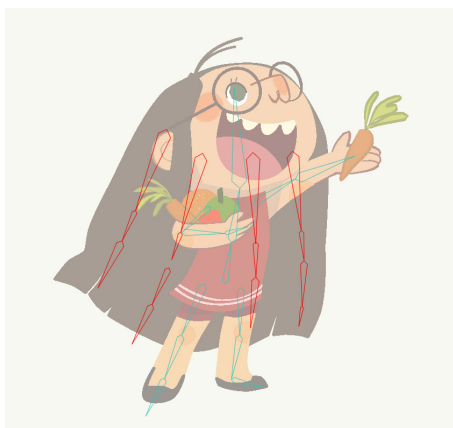
- If you want to remove a chain of bones from a Vitruvian Group
- Use Vitruvian Bones tool
- Select the main bone of the chain you want to remove from the group
- Press the - button

Wind Dynamics

Wind is the newest addition to the powerful and easy to use Physics toolset Moho offers. Take absolute control over the strength, direction and turbulence of wind and make your scenes come alive in minutes. Give your backgrounds and characters new life with Wind Dynamics!

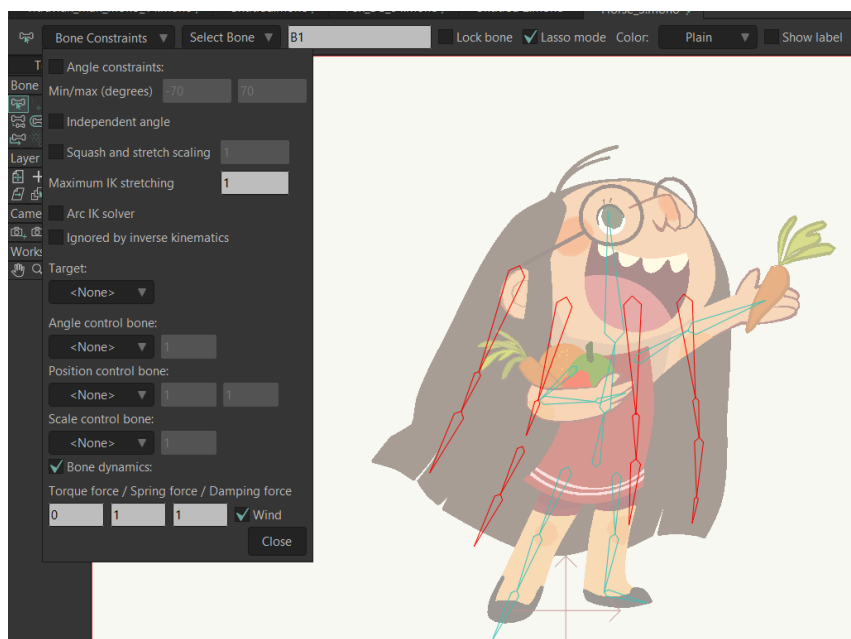
To use wind, you must select a **Bone layer** and be sure you are at frame 0.

Use the Select Bone tool (B) and select one or more bones you want to react with Wind



In this case, we want the hair to automatically move with the wind, so we select all the bones related to the hair

Now in the Select Bone toolbar, open the Bone Constraints window and activate both **Bone Dynamics** and **Wind**

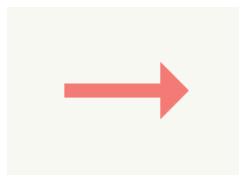


Now the bones are ready to receive the wind.

Press Close in the Bone Constraints Window and now select the **Wind Tool**

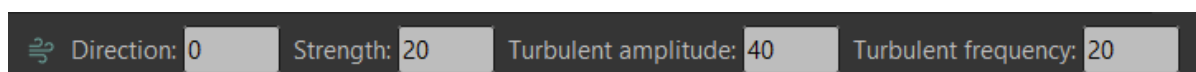


A red Arrow will appear over the layer



This arrow shows how the wind is moving in real time and makes it easier to know what values to choose next.

Wind Values



With the Wind tool you can edit these four values

- **Direction:** This shows the direction of the Wind in degrees. A value of 0 means the wind will be fully horizontal and pointing to the right. Making the number smaller or bigger, will make the wind rotate clockwise or counterclockwise.
- **Strength:** This value shows how strong the wind is. A value of 0 means no wind at all and 100 is the maximum amount.

When you modify this value, you will see the Red Arrow becomes shorter or longer, depending on the number.

- **Turbulent amplitude** and **Turbulent frequency**: These two values are related to each other and they modify and animate the angle and strength of the wind to give the sensation of turbulence.

Without turbulence, the bones reacting to the wind can look unnatural, because their movement will be very flat, with no small variations.

A higher value for **Turbulent amplitude** means the angle and strength of the wind will change more dramatically during the animation.

A higher value for **Turbulent frequency** means those changes in angle and strength will occur more often, so the wind can jump from very strong to very weak in a few frames. And the same will happen with its angle.

Using right click or the mouse wheel to modify the values

You can edit **these and any numeric values** in Moho by using the mouse wheel or pointing the cursor over the number and **drag right click** to the left or right.

Holding Shift or Ctrl (Cmd in macOS) while doing it, you can make the change of values bigger or smaller.

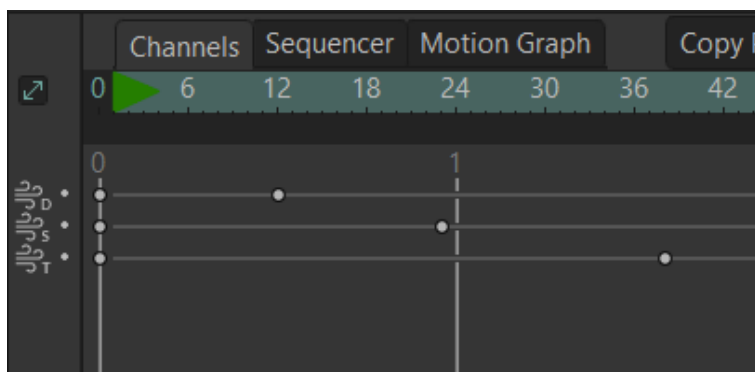
Testing Wind in real time

To check how the Wind is affecting your characters, background elements or props, you can simply hit play in the timeline and then modify the wind values using the technique explained above.

Moho will show you in real time how the new values are affecting the bones with Wind Dynamics applied.

The red arrow will also be updated automatically, making easier the Wind adjustments.

Animating Wind

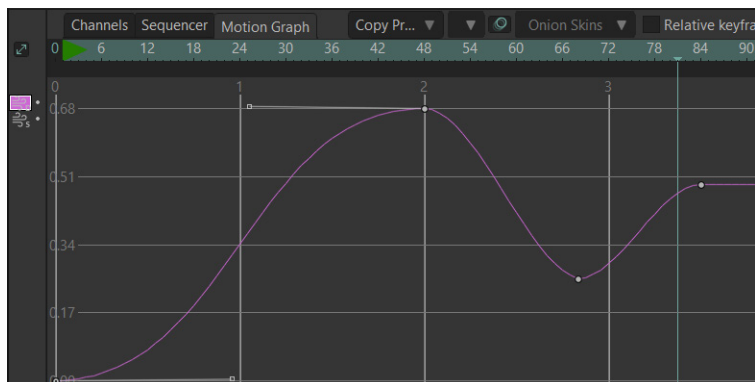


There are three new channels for Wind:

- Wind Direction
- Wind Strength
- Wind Turbulence

If you modify these values at any frame, a keyframe will be created there.

The values for Wind Direction and Wind Strength can be edited in the Motion Graph



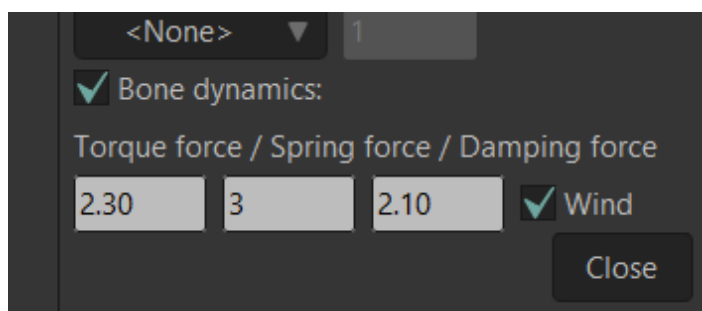
You can also copy and paste Wind keyframes between different bone layers.

Bones properties

The Dynamics properties for each bone can also be modified.

If you use the Select Bone tool and select one or more bones, you can open the Bone Constraints window and change the values there too.

Depending on the values you pick for Torque, Spring and Damping, the reaction of the bone to the wind will be different



- **Torque Force:** Defines how big will be the movement
- **Spring Force:** Defines how much the movement will bounce. The smaller the value, the softer the movement will be
- **Damping Force:** Defines how long it will take to the bone to go back to its initial angle. The bigger the value, the less time it will take.

Perspective warp and Quad warp

Animate backgrounds, props and characters in perspective with the new Perspective Mesh.

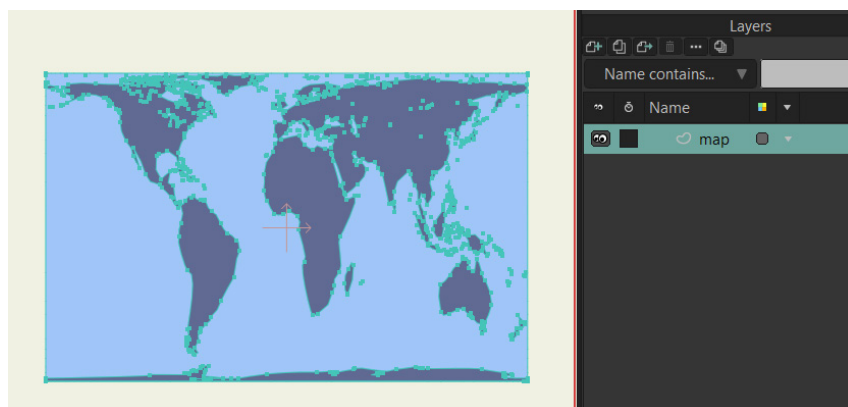
Just create a shape with four points, attach it to any image or vector layer and animate it.

This simple but powerful mesh can be used in combination with triangular meshes, making Moho more flexible than ever.

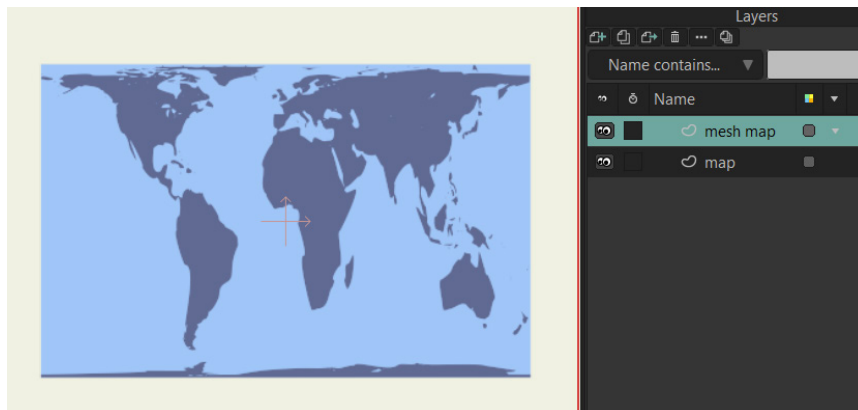
Creating a True Perspective Mesh

With Moho, you can create Meshes of 4 points and use them to animate any vector or image in true perspective.

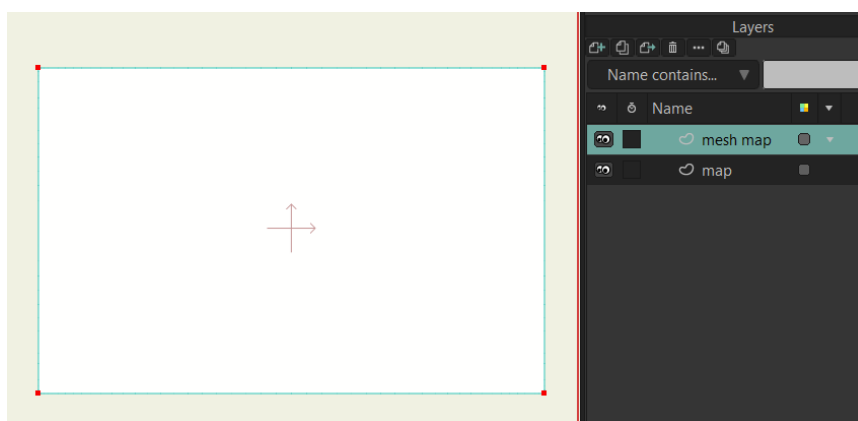
The process to do this is very simple. Let's say you have a vector layer with a map:



To create a Perspective mesh, create a new Vector Layer and call it 'mesh map'



In the 'mesh map' layer, draw and fill a rectangle covering the entire map

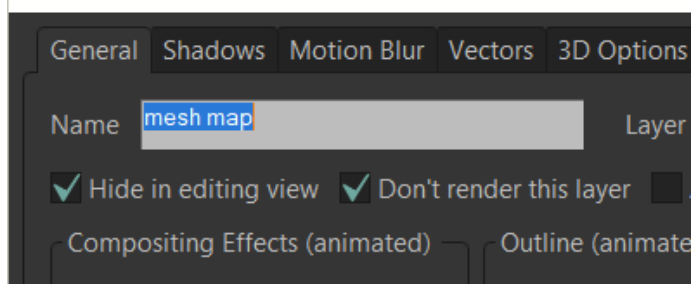


Now, since we don't want to see the rectangle, but only use it as a Mesh, go to the Layers window and double click the 'mesh map' layer to open its properties.

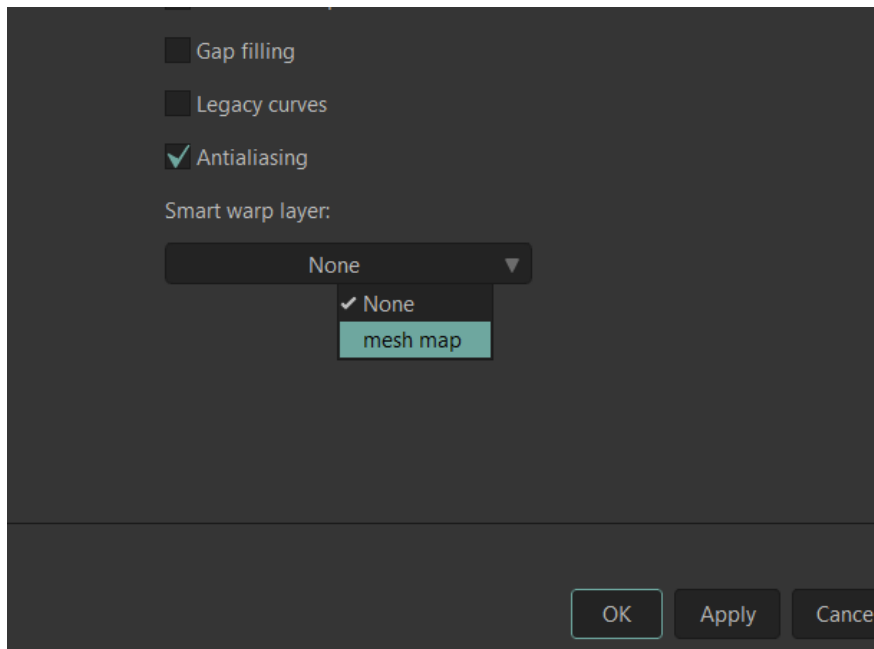
Then check **Hide in editing view** and **Don't render this layer** and click OK.

The rectangle will become invisible.

Layer Settings



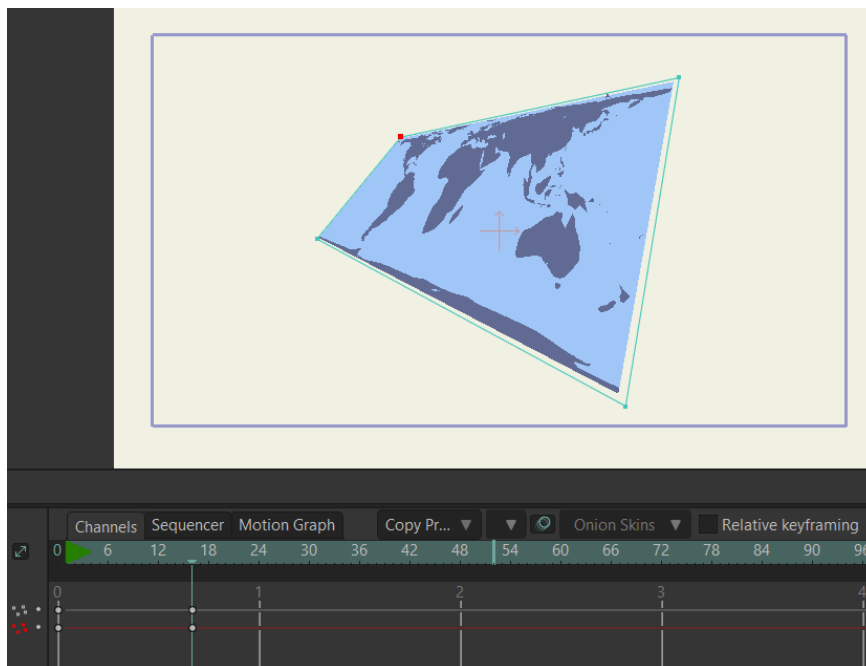
Open the Layer properties of the 'map' layer, go to the Vectors tab, select 'mesh map' as Smart warp layer and click OK.



You are done!

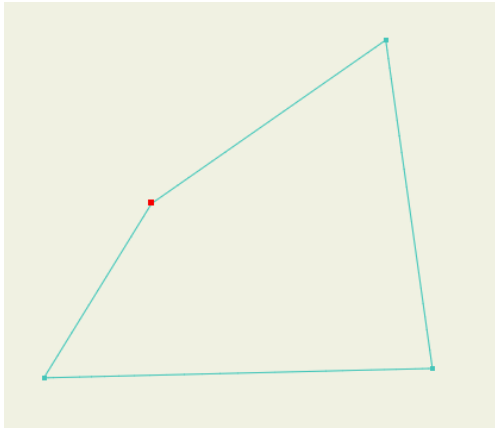
Now to test the mesh, go to any frame different to frame 0 and use the Translate points tool to move the points in the mesh map layer.

You will see how the perspective changes while you move them.

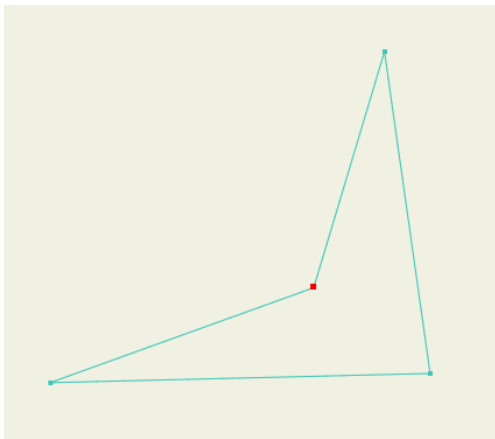


Tip: Perspective mesh only works if the shape of the mesh is valid. That the mesh won't work if you fold it over itself.

For instance. This shape will work well, because it's a valid perspective



This shape instead is illegal, because it doesn't follow the logic of perspective, so it won't work

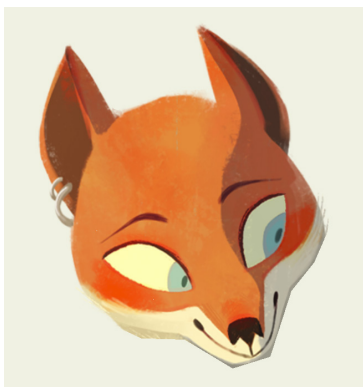


Quad warp

Quad warp works in a similar way to the perspective mesh, but it works to create better characters expressions, head turns, 3D effect or any modification over a vector or bitmap character.

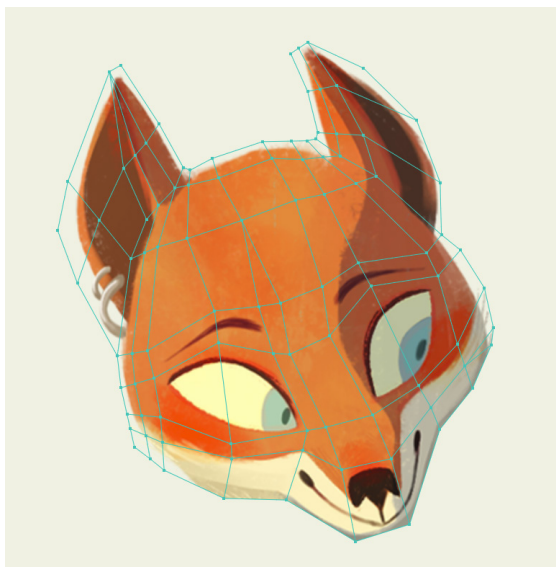
Again, to create a Quad warp mesh is very simple.

Let's create a mesh for this character



First, create a vector layer and call it 'mesh fox'

Now use the Add Points tool to create draw a mesh over it



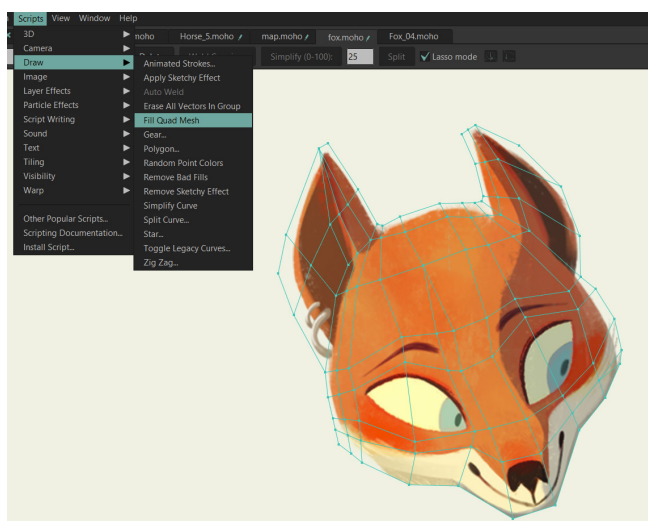
To make the mesh you need to consider this

- The mesh must be bigger than the content. Otherwise, anything that is not inside of the mesh won't work well or won't be shown in the animation
- The mesh must be created using shapes of 3 or 4 points

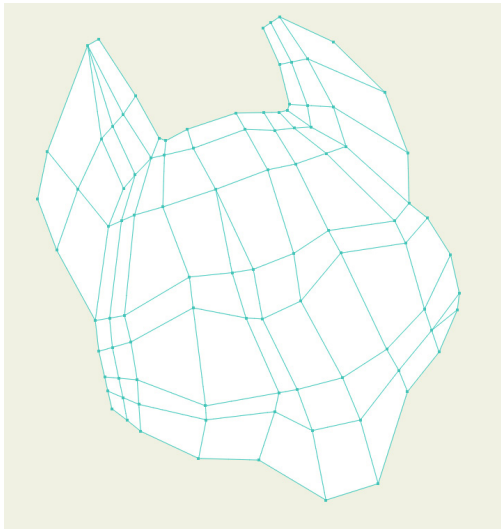
Once you have your mesh done, you need to paint every single shape there. But don't worry, we have a script that does it automatically!

This script was generously donated by the Moho beta user Paul Cheshire (thanks again, Paul!)

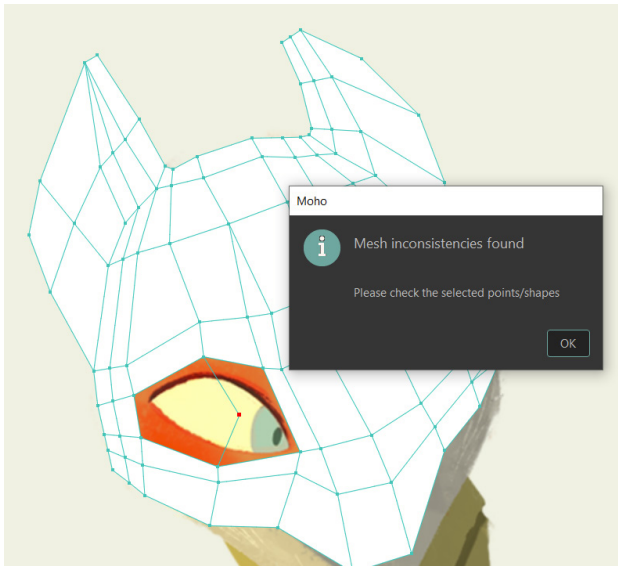
So, be sure you have the 'mesh fox' layer selected and go to the Menu
Script -> Draw -> Fill Quad Mesh



The script will automatically create a shape for every quad and triangle in the mesh.



If there's any issue with the mesh, you will get an error message and will be able to see where the issue is:

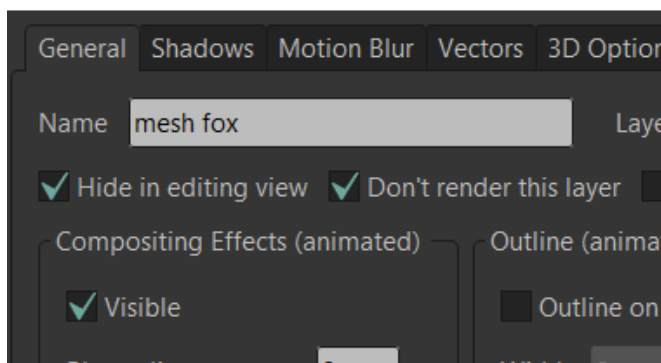


In this case, there's a point in the eye that invalidates that part of the mesh, because it has 5 points instead of 4.

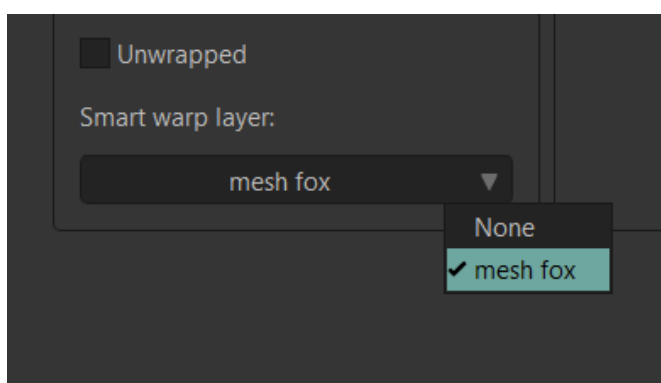
To fix it, simply remove the point and run the script again.

Once the mesh is ready, you need to open the Properties of the 'mesh fox' layer, check **Hide in editing view** and **Don't render this layer** and click OK.

Layer Settings



Now open the Properties of the image layer of the head, go to the Image tab, select 'mesh fox' as its smart warp layer and click OK.



Now the head is ready to be animated!

Some tips about rigging characters with meshes:

- You can assign the same mesh to as many layers as you want.
- You can even assign a mesh to another mesh, so you can have two or more levels of movement
- If a bone is moving a mesh and also an image/vector controlled by it, be sure to use the Bind Layer tool to bind both layers to the same bone. Doing this can avoid problems like having a layer moving twice as fast, which happens because the layer is moved in the same direction by both the bone and the mesh layer.

Animating Quad warp meshes

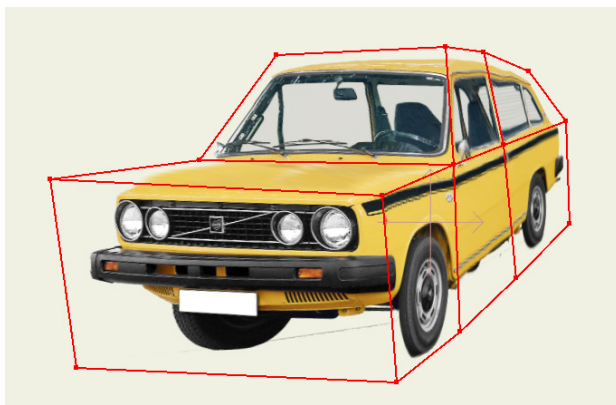
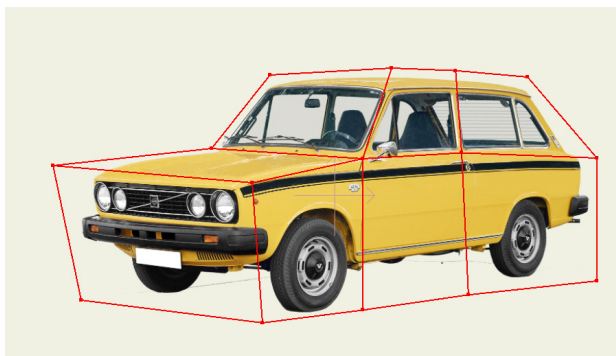


Once you have everything setup, animating quad meshes is very simple. Just use the Translate Points tool (T) to move the points of the mesh.

You can also use the Magnet Tool (X) to nudge several points at the same time.

To modify the size of the magnet, just hold Alt in the keyboard and drag the mouse or pen left or right.

You can also try simpler meshes for objects and characters



Appendix

Appendix A: Product Comparison

The differences between Moho Debut and Pro

Feature Comparisons

Feature	Moho Debut	Moho Pro
Realistic Motion Blur	No	Yes
Bone Rigging	Yes	Yes
Smart Bones	No	Yes
Frame-by-Frame Animation	No	Yes
Animation Length	2 minutes (3000 frames)	Unlimited
Motion Tracking	3 points	Unlimited
Audio Tracks	2 tracks	Unlimited
Video Tracks	1 track	Unlimited
Physics	No	Yes
Poser scene import	No	Yes
Layers	Yes	Yes
3D layer and object support	No	Yes
Layer Referencing	No	Yes
Animated Shape Ordering	No	Yes
Morph targets	Read Only	Read and create
Automatic image tracing	Black and white only	Black and white, color, and edges
Particles	Read only	Read and Create
Import Photoshop Files	Yes (1)	Yes (2)
Real-time media connection	No	Yes
Patch Layers	Read only	Read and create
3D Video rendering	No	Yes
Global Rendering Styles	No	Yes
Scripting	No	Yes
Layer Outline	Yes	Yes
64-bit Architecture	No	Yes
GPU Acceleration	No	Yes
Wacom Multi-Touch Support	Yes	Yes
Character Wizard	Yes	Yes
Render Cache	Yes	Yes
Separate Moho Exporter Process	No	Yes
Separate Render Process	No	Yes
Preview Animation	No	Yes
Multiple Document Support (Tabs)	Yes	Yes

Keyboard Shortcut Editor	Yes	Yes
Automatic Update Checking	Yes	Yes
Activation, Serialization, and License Management	Yes	Yes

(1) Layered using Moho script

(2) Import directly through File menu.

Usability Features

Feature	Moho Debut	Moho Pro
New Graphics User Interface	X	X
New Library	X	X
Absolute and relative path file handling		X
XMP metadata for projects and assets		X
Personalized templates for workspaces		X

Window Menu

Feature	Moho Debut	Moho Pro
Tools	X	X
Beginner Mode Tools	X	
Layers	X	X
Timeline	X	X
Style	X	X
Actions		X
Library	X	X
Audio Recording	X	X
Poser Parameters		X
Character Wizard	X	X (1)

(1) Character Wizard in Pro lets you use and create reusable actions that can be applied to any character created with the Wizard.

Vector Drawing Features

Feature	Moho Debut	Moho Pro
Bezier Handles for Vectors	View only	View and edit
Improved Freehand, Blob Brush, and Paint Bucket	X	X
Smart Warp for Images and Vectors		X
Text	X	X
Select Points	X	X
Transform Points (Translate, Scale, and Rotate)	X	X
Add Point	X	X

Hide/Show Points	X	X
Delete Edge	X	X
Curvature	X	X
Freehand	X	X
Color Points	X	X
Multi-brushes	X	X
Blob Brush	X	X
Eraser	X	X
Point Reduction	X	X
Rectangle	X	X
Oval	X	X
Arrow	X	X
Shear Points X		X
Shear Points Y		X
Perspective Points H		X
Perspective Points V		X
Bend Points H		X
Bend Points V		X
Noise		X
Magnet		X
Snap to Grid		X
Reset Line Width		X
Random Line Width		X
Variable Width Curve	X	X

Vector Modifiers

Feature	Moho Debut	Moho Pro
Peak	X	X
Smooth	X	X
Flip Points Horizontally	X	X
Flip Points Vertically	X	X

Fill Features

Feature	Moho Debut	Moho Pro
Select Shape	X	X
Select Multiple Shapes	X	X
Create Shape	X	X
Paint Bucket	X	X
Delete Shape	X	X
Line Width	X	X
Hide Edge	X	X
Stroke Exposure		X

Curve Profile		X
Texture Transparency		X

Fill Modifiers

Feature	Moho Debut	Moho Pro
Lower Shape	X	X
Raise Shape	X	X
Color Points	X	X

Bone Features

Feature	Moho Debut	Moho Pro
Pin Bones	X	X
Auto-Freeze Pose	X	X
Auto-colored bones while doing Point Binding	X	X
More bone and layer colors	X	X
Ignore IK constraint		X
Select Bone	X	X
Transform Bone Tool (Translate, Scale, and Rotate)	X	X
Add Bone	X	X
Hide/Show Bones	X	X
Reparent Bone	X	X
Bone Strength	X	X
Manipulate Bones	X	X
Bind Layer	X	X
Bind Points	X	X
Offset Bone	X	X
Bone Physics		X
Bone Constraints		X
Smart Bones		X
Smart Bones Setup		X
Color Bones	X	X
Bone Labels		X
Nested Layer Controls	X	X
Animated Bone Targets		X
Animated Bone Parenting		X
Bone Flipping		X

Layer Features

Feature	Moho Debut	Moho Pro
Select Switch window	X	X

New Layers window	X	X
Filters for easy Layer Search		X
Set Origin	X	X
Transform Layer	X	X
Switch Layer	X	X
Rotate Layer X		X
Rotate Layer Y		X
Shear Layer X		X
Shear Layer Y		X
Particle Layer		X
Follow Path	X	X
Poser		X (1)
Image Masking	X	X
Video Tracking	X (2)	X
Audio Layers	X (3)	X
Vector Shape Selector	X	X
Undo/Redo Layers	X	X
Layer Comps		X
Layer Colors	X	X
Flexi Binding	X	X
Depth Shifting		X
Fade Unselected Layers		X
Multiple Layer Editing	X	X
Colorize Layer	X	X
Frame-By-Frame Animation		X
Layer Referencing		X
Animated Shape Ordering		X
Group with Selection Layers		X
Normalize Layer Scale		X

(1) Requires Poser 7 or newer

(2) Limited to 3 tracking points

(3) Limited to 2 audio layers

Layer Modifiers

Feature	Moho Debut	Moho Pro
Flip Layer Horizontally	X	X
Flip Layer Vertically	X	X

Layer Types

Feature	Moho Debut	Moho Pro
Vector	X	X

Image	X	X
Bone	X	X
Switch	X	X
Group		X
Group with Selection		X
Particle		X
3D		X
Physics (Layer property)		X
Note		X
Audio	X	X
2D to 3D Layer Conversion		X
Patch		X
Text	X	X

Camera Features

Feature	Moho Debut	Moho Pro
Track Camera	X	X
Zoom Camera	X	X
Roll Camera	X	X
Pan/Tilt Camera		X
Orbit Workspace		X
Depth of Field		X

Workspace Features

Feature	Moho Debut	Moho Pro
Pan Workspace	X	X
Zoom Workspace	X	X
Rotate Workspace		X
Orbit Workspace		X

Timeline Features

Feature	Moho Debut	Moho Pro
Edit Multiple Layers		X
Mute channels		X
Keyframes	X	X
Playback Controls	X	X
Animation Channels	X	X
Hide/Show Channels	X	X
Ruler	X	X
Onionskins		X

Graph Mode		X
Smooth Interpolation		X
Linear Interpolation		X
Ease In/Out Interpolation		X
Bezier Interpolation		X
Step Interpolation		X
Noisy Interpolation		X
Bounce Interpolation		X
Elastic Interpolation		X
Stagger Interpolation		X
Sequencer	X	X
Keyframe Hold Duration	X	X
Colored Keyframes	X	X

Action Features

Feature	Moho Debut	Moho Pro
Store Reusable Animation		X
Edit Reusable Animation		X
Delete Reusable Animation		X

Style Features

Feature	Moho Debut	Moho Pro
Save Style		X
Pattern Brush	X (1)	X
Blur	X	X
Threshold	X	X

(1) Pro version contains more brushes

Preferences

Feature	Moho Debut	Moho Pro
Options	X	X
Editor Colors	X	X
GUI Colors	X	X
GUI Color Themes	X	X

Project Settings

Feature	Moho Debut	Moho Pro
Save Project Settings	X	X

Edit Dimensions	X	X
Background Color	X	X
Depth of Field		X
3D Camera		X
Stereo Rendering		X
Sort Layers by Depth	X	X
Sort by True Distance	X	X
Noise Grain		X
Up to 120 Frames/Second Maximum	X	X
Maximum export size (pixels)	900 x 900	9000 x 9000
Maximum number of frames	3000	Unlimited

Content

Feature	Moho Debut	Moho Pro
Built in Content	X	X
Third Party Content	X	X
3D Object		X
Character Wizard	X	X

Scripts

Feature	Moho Debut	Moho Pro
3D		X
Camera		X
Draw		X
Image Sequences		X
Layer Effects		X
Particle Effects		X
Sound		X
Warp		X
Visibility		X
Script Writing		X

View

Feature	Moho Debut	Moho Pro
Grid		X
Adjust Grid Size		X
Side by Side View		X
Over Under View		X
Four-Way View		X
Display Quality		X

Advanced Current Layer View		X
-----------------------------	--	---

Import/Export

Feature	Moho Debut	Moho Pro
Export Queue		X
Actions		Import/Export
2D FORMATS		
JPEG	Import/Export	Import/Export
BMP	Import/Export	Import/Export
PSD	X (1)	X (2)
PSD (Layered)		Export
PNG	Import/Export	Import/Export
TGA	Import/Export	Import/Export
EPS, AI, Tracing Image		Import
Batch Image		Export
Vector Export		X
3D FORMATS		
OBJ		X
Poser Files and Scenes (Poser 7 and newer)		X
SOUND FORMATS		
WAV (Windows & Mac)	X	X
AIFF (Windows & Mac)	X	X
MP3 (Windows & Mac)	X	X
M4A (MPEG-4)	X	X
MOVIE FORMATS		
SWF(4)	Export	Export
MOV (Mac and Windows) (5)	Import/Export	Import/Export
AVI (3)	Import/Export	Import/Export
MP4	Import/Export	Import/Export
Sequential JPEG		Export
Sequential BMP		Export
Sequential PSD		Export
Sequential PNG		Export
Sequential TGA		Export
Batch Movie Export		Export
TV FORMATS		
NTSC Format	Export	Export
PAL	Export	Export
HD movies		Export
MOHO FORMAT		
MOHO File Format	X	X
JSON-Based File Format	X	X

MotionArtist File Support	X	X
---------------------------	---	---

(1) Layered using Moho script.

(2) Directly through File menu.

(3) AVI Import works on Windows, and on Macintosh systems depending on codecs. If you can play the AVI file in QuickTime on a Mac, you should be able to import it into Moho.

(4) SWF: Vector animations only; image layers can be used as long as they are not warped by bones. See ["Exporting Flash" on page 414 for more information.](#)

(5) MOV: If you are using a 64-bit Windows operating system, you will need to use the 32-bit version of Moho Pro to export in MOV format.

Upload Features

Feature	Moho Debut	Moho Pro
Upload to Facebook®	X	X
Upload to YouTube™	X	X

Optimization Features

Feature	Moho Debut	Moho Pro
Document Gathering		X
64-bit Architecture		X
GPU Acceleration		X
Render Cache	X	X
Separate Moho Exporter Process		X
Separate Render Process		X
Preview Animation		X
Multiple Document Support (Tabs)	X	X
Keyboard Shortcut Editor	X	X
Automatic Update Checking	X	X
Activation, Serialization, and License Management	X	X

Appendix B: Technical Support

User Manual

The first source of help when using Moho is the manual that you are reading now. We have also included a Tutorial Manual that you can view by choosing **Help > Tutorials** from the Moho menus. If you're just getting started and need some basic tips on how to use Moho, begin with **"Quick Start" on page 2 in your Moho Tutorial Manual.**

For more in-depth instructions on using Moho, the sections **"Moho Windows" on page 158** and **"Moho Menus" on page 375** go into great detail about performing specific tasks in Moho and what all the user interface elements are used for, respectively.

Moho on the Web

Another good source is the Lost Marble web site at <http://mohoanimation.com>. There you will find product information and a variety of tutorials. We plan to keep this updated with questions and answers and new sample files.

To view in-depth product descriptions, online video gallery, and more, visit <http://mohoanimation.com>.

Moho Discussion Forum

Share tips and tricks with other Moho users on the online discussion forum: <http://www.lostmarble.com/forum/>. Lost Marble staff members also participate in this online group, and are happy to share techniques and answer questions. News about the latest Moho updates is first posted to the online forum.

Email Support

You can also get your questions answered by email. If you have a question, feature request, or would like to report a bug, contact us at support@lostmarble.com. Please provide us with as much detail about your problem as possible, so that we can understand exactly what's happening and more quickly come up with a solution for you.

Appendix C: Acknowledgements

Moho Development Team

Development

Mike Clifton	Eric Long
Erik Martin	Mitch Jones
David Swan	

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Technical Support

John Csaky	Matt Ko
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Technology and Content

The following companies and individuals provided technology or content used in Moho.

- Víctor Paredes: <https://www.youtube.com/tazatriste>
- Charles Kenway (Studio: Square Brush): <http://squarebrush.com/>
- DK Toons <http://www.contentparadise.com/Search.aspx?searchText=DKToons>
- ToonProps <http://www.toonprops.com>
- Vernon Zehr <http://www.hubumedia.com>

- Alexander Roach (Rudiger): <http://www.contentparadise.com/Search.aspx?searchText=Rudiger>
- David Sandberg: <http://www.animestudioscripts.com>
- Cartoon Solutions <http://www.cartoonsolutions.com>
- Anti-Grain Geometry <http://www.antigrain.com> Copyright © 2002-2004 Maxim Shemanarev (McSeem).
- FreeType <http://www.freetype.org> Portions of this software are copyright © 1996-2002 The FreeType Project. All rights reserved.
- libjpeg <http://www.iijg.org> This software is based in part on the work of the Independent JPEG Group. Copyright © 1991-1998, Thomas G. Lane.
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- libsndfile <http://www.mega-nerd.com/libsndfile/> Copyright © 1999-2005 Erik de Castro Lopo.
- Lua <http://www.lua.org> Copyright © 2004 Tecgraf, PUC-Rio.
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- libvorbis <http://www.vorbis.com/> Copyright © 2002-2008 Xiph.org Foundation
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- libcurl <http://curl.haxx.se/libcurl/> Copyright © 1996-2007 Daniel Stenberg, <daniel@haxx.se>.
- Sparkle <http://sparkle-project.org/> Copyright © 2006 Andy Matuschak
- WinSparkle <http://winsparkle.org> Copyright © 2009-2013 Vaclav Slavik
- XMP Toolkit <http://www.adobe.com/devnet/xmp.html> Copyright (c) 1999-2014, Adobe Systems Incorporated

Appendix D: Moho Shortcuts

How to Work Quickly in Moho

Once you've been using Moho for a while, you'll probably want to find ways to speed up certain operations. Luckily, Moho provides several shortcuts for common operations, such as activating tools, navigating the workspace, and entering data.

Menu Shortcuts

File Menu

Windows	Mac	Command
Ctrl N	Cmd N	File > New
Ctrl O	Cmd O	File > Open
Ctrl W	Cmd W	File > Close
Alt Ctrl W	Alt Cmd W	File > Close All
Ctrl S	Cmd S	File > Save
Ctrl Shift S	Shift Cmd S	File > Save As
Ctrl Alt Shift S	Alt Shift_Cmd S	File > Save All
Shift Ctrl P	Shift Cmd P	File > Project Settings
Shift Ctrl M	Shift Cmd M	File > Refresh Media
Ctrl R	Cmd R	File > Preview
Ctrl Shift R	Shift Cmd R	File > Preview Animation
Ctrl E	Cmd E	File > Export Animation
Alt Ctrl E	Alt Cmd E	File > Export Animation with Previous Settings
Ctrl B	Cmd B	File > Moho Exporter
Ctrl Q	Cmd Q	File > Quit
Shift Ctrl Y	Shift Cmd Y	File > Import

Edit Menu

Windows	Mac	Command
Ctrl Z	Cmd Z	Edit > Undo
Shift Ctrl Z	Shift Cmd Z	Edit > Redo
Ctrl X	Cmd X	Edit > Cut
Ctrl C	Cmd C	Edit > Copy
Ctrl V	Cmd V	Edit > Paste
Ctrl A	Cmd A	Edit > Select All
Ctrl I	Cmd I	Edit > Select Inverse

Draw Menu

Windows	Mac	Command
Ctrl T	Cmd T	Draw > Insert Text

Ctrl Alt L	Cmd Alt L
Ctrl D	Cmd D
Ctrl P	Cmd P
Ctrl M	Cmd M
Shift Ctrl H	Shift Cmd H
Shift Ctrl U	Shift Cmd U
Ctrl F	Cmd F

Draw > Reset Line Width
 Draw > Random Line Width
 Draw > Peak
 Draw > Smooth
 Draw > Hide Shape
 Draw > Show All Shapes
 Draw > Freeze Points

Bone Menu

Windows	Mac
Ctrl Shift F	Shift Cmd F
Ctrl F	Cmd F

Command
 Bone > Use Selected Bones
 for Flexi-Binding
 Bone > Freeze Pose

Animation Menu

Windows	Mac
Ctrl Shift N Object	Shift Cmd N

Command
 Animation > Nudge Physics

View Menu

Ctrl Alt 9	Cmd =
Ctrl Alt 8	Cmd -
Ctrl G	Cmd G
Shift Ctrl G	Shift Cmd G
Shift Ctrl V	Shift Cmd V
Ctrl J	Cmd J
Ctrl L	Cmd L
Ctrl Y	Cmd Y
Ctrl U	Cmd U
Shift Ctrl C	Shift Cmd C
Shift Ctrl A	Shift Cmd A
Shift Ctrl D	Shift Cmd D
Shift Ctrl 2	Shift Cmd 2
Shift Ctrl J	Shift Cmd J

View > Zoom In
 View > Zoom Out
 View > Enable Grid
 View > Grid Settings
 View > Video Safe Zones
 View > Show Output Only
 View > Enable Onion Skins
 View > Select Tracing Image
 View > Show Tracing Image
 View > Show Curves
 View > Fade Unselected Layers
 View > Design Mode
 View > Stereo
 View > Show Document Tabs

Window Menu

Ctrl Shift E	Shift Cmd E
Ctrl Shift K	Shift Cmd K
Ctrl [Cmd [
Ctrl]	Cmd]
Ctrl K	Cmd K
Shift Ctrl L	Shift Cmd L
Shift Ctrl B	Shift Cmd B
Shift Ctrl I	Shift Cmd I
Ctrl Alt E	Cmd Alt E

Window > Tools
 Window > Layers
 Window > Timeline
 Window > Style
 Window > Actions
 Window > Library
 Window > Blend Morphs
 Window > Layer Settings
 Window > Keyframe

Alt Shift Ctrl E	Alt Shift Cmd E	Window > Docking > Tools
Alt Shift Ctrl K	Alt Shift Cmd K	Window > Docking > Layers
Alt Shift Ctrl T	Alt Shift Cmd T	Window > Docking > Timeline
Alt Shift Ctrl Y	Alt Shift Cmd Y	Window > Docking > Style

Keyboard Shortcuts

Many tools and features in Moho can be accessed quickly by pressing a single key. These shortcuts make working with Moho much faster than the regular method of moving the mouse to a toolbar and clicking a button, and are worth learning to reduce your drawing and animation time. However, all these features are also available through standard user interface elements (buttons and menus), so learning these shortcuts isn't a requirement to using Moho.



These shortcuts are not the same as “menu shortcuts” listed above.

Main Window

Windows	Mac	Action
Alt Shift Ctrl E	Alt Shift Cmd E	Dock/Undock Tools Palette
Alt Shift Ctrl K	Alt Shift Cmd K	Dock/Undock Layers Window
Ctrl [Cmd [Open/Close Timeline
Ctrl]	Cmd]	Open/Close Style Window
Alt Shift Ctrl L	Alt Shift Cmd L	Reload Tools and Brushes
Shift Z	Shift Z	Activate Previous Tool
F5	F5	New Frame
F6	F6	Duplicate Frame
Shift F5	Shift F5	Delete Frame

Main/Current Editing View

Windows	Mac	Action
Alt Shift {	Alt Shift {	Rotate View Left
Alt Shift }	Alt Shift }	Rotate View Right

Layers Window

Alt D	Alt D	Activate Previous Switch Layer Child
Alt C	Alt C	Activate Next Switch Layer Child

Style Window

Windows	Mac	Action
]]	Decrease Line Width
[[Increase Line Width

Timeline Shortcuts

Windows	Mac	Action
Ctrl 1	Cmd 1	Set Interpolation Linear
Ctrl 2	Cmd 2	Set Interpolation Smooth
Ctrl 3	Cmd 3	Set Interpolation Ease In/Out
Ctrl 4	Cmd 4	Set Interpolation Ease In
Ctrl 5	Cmd 5	Set Interpolation Ease Out
Ctrl 6	Cmd 6	Set Interpolation Bezier
Ctrl 7	Cmd 7	Set Interpolation Step
Ctrl 8	Cmd 8	Set Interpolation Noisy
Ctrl 9	Cmd 9	Set Interpolation Cycle
Shift {	Shift {	Previous Selected Key
Shift }	Shift }	Next Selected Key
Alt Shift +(plus)	Alt Shift +(plus)	Zoom In
Alt Shift _	Alt Shift _	Zoom Out
Alt Shift A	Alt Shift =	Pan Up
Alt Shift Z	Alt Shift -	Pan Down
Alt Shift X	Shift ~	Auto Zoom

Classic vs New Shortcut Bindings

There is a preference in the Tools tab of the Preferences dialog that allows you to choose between classic key binding or new key binding. For further information on this setting, see [“Tools Tab” on page 442](#).

Depending on your setting, the following shortcuts will be affected:


Classic Binding	New Binding	Operation
Spacebar	Enter/Return	Weld Points
Spacebar	Enter/Return	Create Shape
Spacebar	Enter/Return	Bind Points to Bone
Enter/Return	Escape	Deselect points/bones/keyframes
Spacebar	Spacebar	Toggle Playback*
Home/Esc	Home	Reset View*
Home/Esc+Shift	Home+Shift	Zoom to Layer Contents*
Home/Esc+Alt	Home+Alt	Zoom to Selected Points*
Tab	Tab	Select Connected Points*
Hold spacebar while dragging mouse		Pan workspace*

Tool Shortcuts

Many of the keyboard shortcuts in Moho are used to activate a tool in a toolbar. If you want to know whether a tool has a shortcut, hold the mouse over the tool, and watch the tooltip that appears. If the tooltip has a single letter at the end (ex: “Transform Points (T)”), then that key can be used as a shortcut to activate the tool.



The keyboard shortcut of Shift-Z toggles between the currently selected tool and the previous tool selection.

 *Moho auto-reverts to the previous tool selection when a shortcut for a different tool is selected and held for two or more seconds, or if held and a mouse click occurs on the canvas before the shortcut is released.*



Press the T key to activate the Transform Points tool.

Draw Tools

Tool Shortcut	Tool
G	Select Points
T	Transform Points
A	Add Point
F	Freehand
J	Blob Brush
S	Draw Shape
E	Eraser
R	Point Reduction
D	Delete Edge
C	Curvature
X	Magnet
N	Noise

Fill Tools

Tool Shortcut	Tool
Q	Select Shape
U	Create Shape
P	Paint Bucket
W	Line Width
H	Hide Edge
K	Color Points

Special Tools

Tool Shortcut	Tool
C	Crop
A	Video Tracking

Bone Tools

Tool Shortcut	Tool
B	Select Bone
T	Transform Bone
A	Add Bone
P	Reparent Bone
S	Bone Strength

Z	Manipulate Bones
I	Bind Points

Layer Tools

Tool Shortcut	Tool
M	Transform Layer
O	Set Origin
L	Eyedropper

Camera Tools

Tool Shortcut	Tool
4	Track Camera
5	Zoom Camera
6	Roll Camera
7	Pan/Tilt Camera

Workspace Tools

Tool Shortcut	Tool
8	Rotate Workspace
9	Orbit Workspace

Common Shortcuts

Some keyboard shortcuts work all the time, and some only apply in while using certain tools in Moho: the sections below lists all the shortcuts and when they can be used.

The following keyboard shortcuts can be used at any time:

Keyboard Shortcut	Function
Escape	Automatically adjust the view to see everything in the active layer - hold the shift key to zoom in on the currently selected points
Home	Reset the view to see the overall project
Enter/Return	De-select all points
Tab	Select all points that are connected to the current selection
Left Arrow	Step back one frame in the timeline - hold shift to rewind
Right Arrow	Step forward one frame in the timeline - hold shift to advance to end of animation
[(left bracket)	Decreases the line width setting in the Style window
] (right bracket)	Increases the line width setting in the Style window

Working with Vector Layers

Keyboard Shortcut	Function
Delete/Backspace	Delete the currently selected points

Spacebar

Weld two points together - usually used with the Translate or Add Point tools

Working with Fill Tools

Keyboard Shortcut

Delete/Backspace

Spacebar

Up Arrow

Down Arrow

Function

Delete the selected shape

Define a shape based on current selection

Raise selected shape up one level - hold shift to raise to top

Lower selected shape down one level - hold shift to lower to bottom

Working with Bone Tools

Keyboard Shortcut

Delete/Backspace

Spacebar

Up Arrow

Down Arrow

Function

Delete the selected bone (and any child bones)

Bind points to selected bone

Select parent of current bone

Select child of current bone (only works if current bone has just one child)

Working with the Timeline Window

Keyboard Shortcut

Alt/Option+Left Arrow

Alt/Option+Right Arrow

Alt/Option+Backspace

Alt/Option+C

Alt/Option+V

Spacebar

Page Up

Page Down

End

Ctrl/Cmd+Mouse Scroll wheel Zooms in/out from timeline

Function

Previous Keyframe

Next Keyframe

Delete the selected keyframe(s)

Copy the selected keyframe(s)

Paste the previously copied keyframe(s)

Play/stop the animation

When in graph mode, zoom in on the timeline - hold shift to move the graph up

When in graph mode, zoom out from the timeline - hold shift to move the graph down

When in graph mode, auto-zoom the timeline, based on the active animation channel

Working in the Layers Window

Keyboard Shortcut

Alt Click

Alt+D

Alt+C

Function

Alt-Click the child of a switch layer to activate it.

When a switch layer is selected, this shortcut activates the previous switch layer.

When a switch layer is selected, this shortcut activates the next switch layer.

Mouse Shortcuts

There are a few shortcuts that take advantage of the mouse, making work in Moho more convenient once you learn them.

Workspace Navigation

The right mouse button can be used to navigate the main Moho workspace.

To pan the workspace, click and drag with the right mouse button.



If you hold down the spacebar while you click and drag any tool with the mouse, it will let you pan the workspace. This is similar to the panning navigation in Photoshop and other graphics applications.

- **To zoom the workspace**, hold the shift key while dragging left or right with the right mouse button. You can also zoom the workspace by rolling the mouse wheel back and forth over the workspace.
- **To rotate the workspace**, hold down the control key while dragging with the right mouse button.
- **To fit the view to a selected layer**, select the layer that you want to view in the Layers Window. Then press the **Esc** key to fit the selected layer into the view.

Timeline Scrubbing

To scrub the timeline in small increments, press Alt and roll the mouse wheel back and forth.

Numeric Fields and Angle Knobs

An easy way to make small adjustments in numeric text fields and angle knobs is to hold the mouse over the control and spin the mouse wheel back and forth. Of course, you can still enter values into a text field by typing them, but this method lets you make small adjustments and view the changes immediately.

- On a Windows PC, when using the mouse wheel to modify the value in a text field, holding the **Ctrl** key halves the increment, holding **Shift** doubles the increment.
- On a Macintosh, when using the mouse wheel to modify the value in a text field, holding the **Cmd** key halves the increment, holding **Alt** doubles the increment.


This feature may seem cute but unimportant. However, it's actually very useful when working with the tool info panels in Moho. By using the mouse wheel, you can see your changes take effect immediately. If you enter the number by hand, the change won't take effect until you press tab or enter. An especially helpful place to use this feature is when setting bone angle constraints - these numbers can be tricky to figure out, but spinning the mouse wheel you can see exactly what's happening.

Finally, you can adjust the value of a text field by dragging in it side-to-side with the right mouse button. With a regular mouse, the mouse wheel is probably more convenient, but this feature was added specifically for animators working with tablets. A drawing pen usually has no mouse wheel, so right-dragging allows you to adjust the value of a text field without having to switch back to the keyboard.

Multi-touch Support

Certain tools support Wacom multi-touch tablets and allow you to use multi-touch gestures to perform tasks in Moho. Red screen dots on screen identify the location of your fingers on the tablet. The following general notes apply to multi-touch features:

 Use the Multitouch checkbox (located above the Timeline on the left side) to enable or disable Multitouch support.

 If you experience problems accessing Wacom touch support, you should make sure you have the latest drivers installed, and restart Moho or your computer if needed.

If the currently selected tool does not support multi-touch, then the multi-touch events will be used to navigate the workspace.

- Multi-touch events can be used for workspace navigation, regardless of whether or not the current tool supports multi-touch events. Hold down the spacebar while using the multi-touch tablet to use it for workspace navigation.
- Multi-touch support is accessible through scripting, allowing users to write their own multi-touch scripts.
- Smoothing and zooming support has been enhanced to support multi-touch actions, and should also work better with the touch ring on Wacom tablets.

The following tables outline the tools that offer this support.

Draw Tools

Draw tools that support multi-touch actions are Transform Points, Select Points, Freehand, and Draw Shape.

Multi-touch Action	Function
One-finger gesture	Translates selected points
Two-finger gesture	Scales or rotates selected points
More than two fingers	Behaves similarly to two-finger gestures

Layer Tools

The Transform Layer tool supports multi-touch actions.

Multi-touch Action	Function
One-finger gesture	Translates selected layer
Two-finger gesture	Scales or rotates selected layer
More than two fingers	Behaves similarly to two-finger gestures
Four-finger drag	Allows you to rotate an object in 3D

Camera Tools

Camera tools that support multi-touch actions are Track Camera, Roll Camera, and Zoom Camera, and Pan Camera.

Multi-touch Action	Function
One-finger gesture	Tracks or Pans/Tilts camera
Two-finger gesture	Rolls or zooms camera
More than two fingers	Behaves similarly to two-finger gesture

Workspace Tools

Workspace tools that support multi-touch actions are Pan canvas, Scale canvas, and Rotate canvas.

Multi-touch Action	Function
One-finger gesture	Pans the canvas
Two-finger gesture	Scales or rotates the canvas
More than two fingers	Behaves similarly to two-finger gestures
Five fingers down on tablet	Resets the canvas

Other Actions

Multi-touch Action	Function
Two-finger double-tap	Resets whatever property you are currently editing

Appendix E: Media Support

Format	Preset	Video Codec	Audio Codec	Resolution	Comments
Image Sequence	JPEG	n/a	n/a	n/a	
	BMP	n/a	n/a	n/a	
	Targa	n/a	n/a	n/a	
	PNG	n/a	n/a	n/a	
	PSD	n/a	n/a	n/a	
M4V	Apple M4V (H.264-AAC)	H.264	AAC		
MP4	MP4 (H.264-AAC)	H.264	AAC		
AVI (Windows Only)	AVI (MJPEG)				
	AVI Movie (DV)			720x 480	
	AVI Movie (Uncompressed)				
AVI (Video for Windows) (Windows Only)	AVI Movie				
QuickTime (Macintosh Only)	QuickTime (H.264-AAC)				
	QuickTime (H.264-PCM)				
	QuickTime (JPEG-AAC)				
	QuickTime (ProRes 422-AAC)				
	QuickTime (ProRes 4444-AAC)				Supports exporting of frames that have Alpha channels
	QuickTime (ProRes 4444-ALAC)				Supports exporting of frames that have Alpha channels
	QuickTime (PNG-AAC)				Supports exporting of frames that have Alpha channels
Legacy QuickTime	QuickTime Movie				
Flash	Flash (SWF)				

Writing Your Own Presets

Some third-party video editing and playing software installs codecs that are not furnished with Windows. Moho does not prompt you to choose a third-party codec when you choose AVI as an output format.

When you create a User Content folder, a Media Preset folder is created within it, based on the plugins that are supported for your product/platform. You can locate your own custom preset XML files in this folder to add them to the application.

You have the ability to add your own presets in the **<User Content Library>\Media Presets** folder. Depending on the platform there should be two subfolders within the Media Presets folder. Those folders are used to differentiate the media libraries that are used to create video exports. On Windows the two folders are named:

- P1_MPMediaFoundation
- P2_MPDirectShow

On Mac the folders are:

- P1_MPAVFoundation
- P2_MPQuickTime

Preset files are XML files that define the output format, video codec, and audio codec of the output. The supported values for format and codec are dependent on the media library for the platform. While AV Foundation on the Mac may support exporting to the QuickTime ProRes codec, Media Foundation and DirectShow on Windows cannot. See online documentation for those media libraries to get an understanding of what export formats and codecs are possible.

The preset files are in the same format the application uses for presets. You can see example preset files by navigating to where Moho is installed and opening the files in a text editor. That is probably the best way to get an understanding of how preset files work. On Windows, the application preset files are located here:

- <Install Folder>\Media Plugins\P1_MPMediaFoundation
- <Install Folder>\Media Plugins\P2_MPQuickTime

On Mac, you would need to open the application bundle (Show Package Contents) and navigate to one of these two folder locations:

- Moho Pro.app\Contents\PlugIns\P1_MPAVFoundation.pmp\Contents\Resources
- Moho Pro.app\Contents\PlugIns\P2_MPQuickTime.pmp\Contents\Resources

You can view the XML files in your favorite text editor. To get your feet wet, what you may want to do is copy one of the preset files from the install folder or application bundle into the similar folder in the User Content Library folder. So for example if the preset file is named MP4.xml in the P1_MPMediaFoundation folder, you'll want to name it something like My MP4.xml in the analogous <User Content Library>\Media Presets\P1_MPMediaFoundation folder. In the Export Animation or Moho Exporter dialog, you'll now see a menu item in the Format dropdown that says **My MP4** with the same presets that are in the MP4 format. You can then tailor the presets to how you like.

One thing to keep in mind if you do keep a name of the XML the same as an existing preset file name (including application preset names), any presets that are defined there will be grouped with those same presets in the user interface. As an example, let's say you create a My MP4.xml file in the P1_MPMediaFoundation folder and then create a My MP4.xml file with different configured presets in the P2_MPDirectShow folder. In the Export Animation or Moho Exporter dialogs, all the

presets across both media libraries will be grouped in the My MP4 Format drop down item.



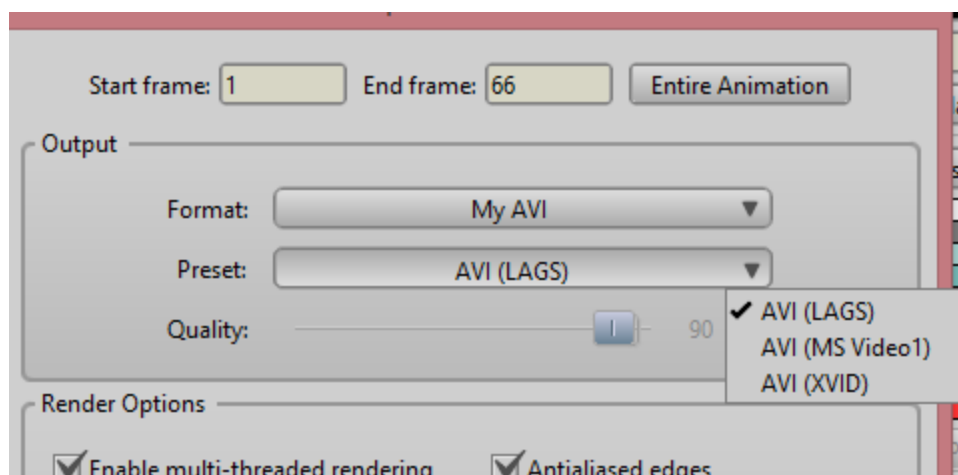
Please don't ever directly modify the preset files in the install folder or application bundle. Use the user content library location. There are a couple reasons for this. The preset files will get wiped out if the software is ever upgraded. On Mac, modifying the files will break code signing of the application and will cause internal application issues with the Content Library.

The attributes for the MediaPlugin element in the XML file are as follows:

- **name:** The name of the preset as you want it to appear on the Format menu in the Movie Settings dialog (as shown in the following figure).
- **extensions:** The file extension(s) that are used with the preset.
- **showUI:** Displays the UI available for the codec.
- **video element:** Describes the parameters that will apply to the output video. It has the following optional attributes.
 - **codec:** The name of the video codec that will be used to compress the video
 - **framerate:** The number of frames per second, of the video you will create.
- **audio element:** Describes the parameters that will apply to the output audio. It has the following optional attributes:
 - **codec:** The name of the audio codec that will be used to compress the audio
 - **samplerate:** The sample rate for the audio (higher sample rates are higher quality)
 - **channels:** The number of channels in the audio file (1 for mono, 2 for stereo)

To create your own media presets, you will need to use a text or web page editor to create a file with an XML extension. The format of the XML file should be similar to the following:

```
<?xml version="1.0" encoding="utf-8"?>
<Presets>
  <MediaPreset name="AVI (LAGS)" extensions="avi" showUI="true">
    <video codec="Lagarith Lossless Codec" framerate="30"/>
    <audio codec="pcm" samplerate="44100" channels="2"/>
  </MediaPreset>
  <MediaPreset name="AVI (MS Video1)" extensions="avi">
    <video codec="MSVC" framerate="30"/>
    <audio codec="pcm" samplerate="44100" channels="2"/>
  </MediaPreset>
  <MediaPreset name="AVI (XVID)" extensions="avi">
    <video codec="XVID" framerate="30"/>
    <audio codec="pcm" samplerate="44100" channels="2"/>
  </MediaPreset>
</Presets>
```



Additional presets added in the Movie Settings dialog.

Appendix F: Moho Document File Format

Introduction

With Anime Studio 11.0, the product team released a brand new document file format. The older .anime format was replaced with a new JSON-based format (file extension: .anime). Using a standard format like JSON made it easier to maintain a format that is both backward and forward compatible as newer versions of Moho are released. It can do that because the JSON format can organize data in a specific yet flexible hierarchy. This hierarchy can allow us to add, and in some cases delete data values without breaking the file format.

In order for the document to save space on user's storage devices, the document format is also compressed in a container using the Zip file format. Since JSON is a text based format, Zip dramatically reduces its size on disk.

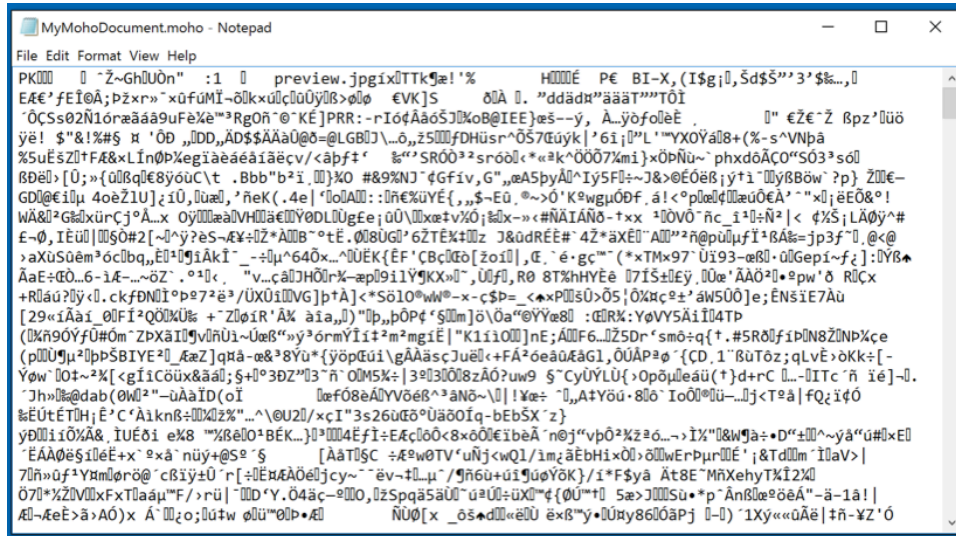
One of the reasons we picked both JSON and Zip is they are both popular and widely used. That makes it easier for users to be able to use third party libraries and scripting languages to manage and manipulate the document if they feel inclined. For example, the scripting language Python has both JSON parsing and Zip compression decompression built-in. Using a small bit of scripting, it is quite easy to open, query, modify, and save an existing document. We'll show an example of this later in the document.

In Moho 12, we changed the document file extension from .anime to .moho to keep with the renaming of the application from Anime Studio to Moho. This file extension change was mostly for cosmetic and branding reasons. Internally, the .moho file format works exactly as the .anime file format.

One note about the pre-11.0 document format. Moho will continue to read the old format for the foreseeable future. We realize there is a lot of content out there. While the old format is considered deprecated, the application should continue to read and convert documents as old as Anime Studio 6.

Document Overview

If you were to try to open up a .moho file in a text editor or hex editor, you most likely wouldn't understand what you were looking at. This is because the .moho format is using the Zip compressed file format as a container for the real data of the document.



Moho file is in compressed format.

Zip Container

Zip compression shrinks down the size of the data by looking for duplicated items in the document and replacing it with binary data that is significantly smaller than the original information. Since JSON is a text based format, the amount of compression we get is rather dramatic. We've seen a document data reduce in size on disk from 250 MB down to about 4 MB!

If you were to rename your **MyMohoDocument.moho** file to **MyMohoDocument.zip**, you could expand the .anime file using any Zip decompression tool (eg Stuffit, WinZip, WinRAR, etc). One or two files should be created.

- **Project.mohoproj** is the main project. It defines all the main data about your Moho document including layers and styles. The whole next section will be about describing this document.
- **preview.jpg** is the project thumbnail image (optional). It is created from the project canvas when the document is saved. This file is used by the thumbnail previewer on Windows and the QuickLook plugin on Mac. The reason the thumbnail is optionally in the archive is the image file will not be created if thumbnail creation is disabled in the Documents preferences. (See "Document thumbnail preview size")

JSON Project Document (Project.mohoproj)

In order to understand how the Moho project document works, it is necessary to review some of the basics of JSON. Below is an example of the first lines of the project document. This document has been beautified to add whitespace and color.



```
{
  "mime_type": "application/x-vnd.lm_mohodoc",
  "version": 1021,
  "major_version": 1,
  "rev_version": 0,
  "comment": "Created in Moho version 12.0, Copyright © 1999–2016 Smith Micro Software, Inc.",
  "created_date": "Fri Jan 22 17:59:49 2016",
  "project_data": {
    "width": 852,
    "height": 480,
    "start_frame": 1,
    "end_frame": 48,
    "fps": 24,
    "back_color": {
      "r": 234,
      "g": 234,
      "b": 234,
      "a": 255
    },
    "noise_grain": 0,
    "pixelation": 0,
    "antialiasing": true,
    "depth_sort": false,
    "distance_sort": false,
    "depth_of_field": false,
    "focus_distance": 2,
    "focus_range": 1,
    "focus_blur": 0.050625,
    "global_render_style_fill_style": 0,
    "global_render_style_line_style": 0,
    "global_render_style_layer_style": 0,
    "global_render_style_minimize_randomness": true,
    "stereo_mode": 0,
    "stereo_separation": -1,
    "extra_swf_frame": false,
    "color_palette": "Basic Colors.png",
    "soundtrack": ""
  },
  "styles": [],
  "layercomps": [
    {
      "name": "All",
      "uuid": "B85FA8AD-2C81-43C4-89E5-3B86138CAC40",
      "layer_ids": [
        "11A8AB8B-F7A6-4E78-987C-F08F546E95EF",
        "1D2E9DFB-29DD-495D-912D-5FFDEBE6BC9E",
        "75BAC57E-C083-470F-B812-09CF8F2AE032"
      ]
    }
  ]
}
```

The beginning of a project document.

JSON is a key-value based hierarchical file format. This means that you associate data values from the document by using a specific key. If you want to reference a particular bit of information in the document, you just have to search for its key. (In the screenshot above, the keys are in blue.) If you would like to find in the document what date the document was created, you'd just search the JSON for the “created_date” key. The data value would be the time stamp. Key-value pairs together are considered “properties” of the format.

JSON Key/Value

“created_date”: “Fri Jan 22 17:59:49 2016”

The hierarchical part of JSON means that you can associate one or more pieces of document data by making it be a “parent” or “child” of that data. For example, Moho uses layers to define objects on the canvas (eg Vector, Image, Switch, etc). A vector layer may be described by many properties such as points, lines, curves. Those drawing types are in turn are described by even deeper properties such as their location on the canvas and how they can be animated. The JSON file format keeps track of all those properties by establishing a parent/child relationship between them. For example, this is a pseudo-hierarchical representation for a line in a vector layer:

All Layers > Vector Layer > Line > Line Properties

With JSON, you can also group related data into objects and lists. Objects use { } syntax and lists use [] syntax. An object groups properties together that are related into a unified concept. For example, if you wanted to define a background color based on it's RGBA values, you may want to define it this way:

Background Color Object

```
"back_color": {  
  "r": 234,  
  "g": 234,  
  "b": 234,  
  "a": 255  
},
```

From the definition it becomes clear which properties are considered red, green, blue, or alpha by looking at its keys.

A list describes properties, objects, or even other lists that are usually the same type. The advantage of lists is that they are not fixed sizes. So you can define as many items as you need. Here is how you may want to define a list of layer comps:

Layer Comps Defined in a List

```
"layercomps": ["Background", "Character 1", "Character 2", ... ]
```

(Note that the example above isn't exactly how layer comps are defined in the .moho file format. Properties were removed for brevity.)

Objects and lists are what make JSON a really powerful part of the format because to add new data, you just have to add a new property or object. Parsers that read and understand JSON typically ignore information they don't understand. So let's say we add in Moho 15.0 a new property with a key of "my_new_animation_feature". When Moho 13.5.0 opens that file, it just ignores that feature. This is good news if the new feature was not an integral feature of the document. If it is an important feature, you will have to use Moho 15.0 to make use of it.

XMP Sidecar document file

Starting in Moho 13.5.0, there is a new sidecar document file that is optionally created. This document is a XMP file, which is an Adobe document standard for storing metadata. XMP was chosen because it is supported by applications like Adobe Bridge.

The XMP sidecar file is not always created whenever you save a Moho project document. It is only created if you go into the Moho's project settings and set tags or a comment for the project. Subsequent saves of the project document will then save the .xmp file.

Document Structure

Now that we have JSON basics under control, let's start going through some of the guts of the format. Within the JSON document there are a number of different sections:

- Document Header

- Camera Movements and Timeline Markers
- Styles
- Layer Comps
- Layer Definitions
- Document View State

Each section mostly correlates to the old .anme format. The big difference is that in the old format not all items used a key to define its value. On the surface, that means that the new JSON file format is a bit bigger and a bit more verbose than the old format. The positive is it typically makes it much more easier to find the data values you are looking for.

For those who wish to understand more about each of the document sections, they will be described in more detail below.

Document Header

The document header contains general or project-wide information about the document. It lives at the very top of the document. In the example below you can see that the header includes version information, a creation date, as well as a comment the application writes.

There are three versions specified in the header:

- major_version
- version
- rev_version

Moho can use each of these version numbers in different ways. "major_version" is the major document version. We hope this never happens, but if we have to change the file format so radically so that old versions of our software can't read it, this number will increase. "version" is the document version. It is used mostly to let the application know that this document is newer or older than what the current application can open. If the version number is newer, a warning will be given to the user that the document has been created with a newer version of the document. Finally, rev_version is just a revision number. This revision number is used mostly for internal purposes.

The "project_data" object contains properties that are specific to this project. Most of these properties come directly from the Project Settings dialog (File>Project Settings) in the application.

- width/height The project width and height in pixels (eg 720p or 480p) of the export
- start_frame/end_frame The starting and ending frame of the animation
- fps frames per second of the animation
- back_color background color of the canvas
- depth_of_field/focus_distance/focus_range/focus_blur depth of field properties

Document Header

```
"mime_type": "application/xvnd.lm_mohodoc",
"version": 1038,
"major_version": 1,
"rev_version": 0,
"comment": "Created in Moho version 12.0, Copyright © 19992016 Lost
Marble Software, Inc.",
"created_date": "Fri Jul 22 17:59:49 2016",
"project_data": {
  "width": 852,
  "height": 480,
  "start_frame": 1,
  "end_frame": 48,
  "fps": 24,
  "back_color": {
    "r": 234,
    "g": 234,
    "b": 234,
    "a": 255
  },
  "noise_grain": 0,
  "pixelation": 0,
  "antialiasing": true,
  "depth_sort": false,
  "distance_sort": false,
  "depth_of_field": false,
  "focus_distance": 2,
  "focus_range": 1,
  "focus_blur": 0.050625,
  "global_render_style_fill_style": 0,
  "global_render_style_line_style": 0,
  "global_render_style_layer_style": 0,
  "global_render_style_minimize_randomness": true,
  "stereo_mode": 0,
  "stereo_separation": 1,
  "extra_swf_frame": false,
  "color_palette": "Basic Colors.png",
  "soundtrack": ""
}
```

Styles

All the global styles of the document are defined in this section. For each style there is a:

- name
- unique identifier
- line and fill color
- brush name
- brush properties

Styles

```

"styles": [
  {
    "type": "Style",
    "name": "Dragon_Tongue_Shading",
    "uuid": "0ff99f9b-299b-4497-9f73-6c38dda5e952",
    "define_fill_color": true,
    "fill_color": { ... }
    "define_line_width": true,
    "line_width": 0.001389,
    "define_line_col": true,
    "line_color": { ... }
    "line_caps": 1,
    "brush_name": "Brush504.png",
    "brush_align": false,
    "brush_jitter": 6.283185,
    "brush_spacing": 0,
    "brush_angle_drift": 0,
    "brush_randomize": false,
    "brush_merged_alpha": false,
    "brush_tint": true
  },
  {
    "type": "Style",
    "name": "Dragon_Wing_Dark",
    ...
  }
]

```

Layer Comps

Layer comps are used to focus on certain layers when composing or rendering. You can manage the creation, deletion, or updating of layer comps in the Layers Window.

Layer comps in the document are defined by three items:

- Name
- Unique identifier (UUID)
- A list of layer IDs

Layer Comps

```

"layercomps": [
  {
    "name": "Background",
    "uuid": "B85FA8AD-2CB1-43C4-89E5-3B86138CAC40",
    "layer_ids": [
      "DE907C68-CD6C-4353-A5C7-4D416E208BA7"
    ]
  },
  {

```

```

    "name": "Character 1",
    "uuid": "ABC86A51-B354-43E9-9D2C-5064D8DAD0B0",
    "layer_ids": [
      "11A8AB8B-F7A6-4E7B-987C-F08F546E95EF",
      "75BAC57E-C083-470F-B812-09CF8F2AE032",
      "DE907C68-CD6C-4353-A5C7-4D416E208BA7"
    ]
  },
  ...
],

```

The "layer_ids" key specifies a list of layer IDs that are UUIDs. In the layers section of the document, each layer has a unique layer ID.

Camera Movements and Timeline Markers

Camera movements and timeline markers are defined in the "animated_values" object.

Camera Movements and Timeline Markers

```

"animated_values": {
  "camera_track": { ... },
  "camera_zoom": { ... },
  "camera_roll": { ... },
  "camera_pan_tilt": { ... },
  "timeline_markers": { ... }
},

```

Layer Definitions

The layers section of the document is undoubtedly the largest section of any .moho document. Quite simply, it defines all of the layers and their attributes. Here are the current layer types:

- Vector Layer (aka Mesh Layer)
- Image Layer (includes image and movie types)
- Audio Layer
- Group Layer
- Switch Layer
- Bone Layer
- Particle Layer
- Note Layer
- Text Layer
- Patch Layer
- Poser Layer (aka Mesh 3D Layer)

Each of the layers in the Project.mohoproj JSON file will have numerous properties associated with it. In fact it is too many to name in this document. There are some common properties like type, name, and unique ID, but then there will also be a number of layer specific properties. For example, an image layer requires that there be a path to the image file (eg MyPhoto.png).

Layers

```
"layers": [  
  {  
    "type": "ImageLayer",  
    "name": "Background",  
    ...  
  },  
  {  
    "type": "MeshLayer", "name": "Character 1",  
    ...  
  },  
  ...  
]
```

Document View State (Optional)

In Anime Studio 11, a checkbox was added in the Documents Preferences to save the document view state within the document. Enabling "Save and restore view settings in the document" will add a new "documentviewstate" object. Documents that don't save the view state, will just use the default values when they are opened.

An example view state property that can be saved with the document happens when you select View->Show Rule of Thirds in the main menu. Each time you open that document, the canvas will show the Rule of Thirds grid.

Document View State

```
"documentviewstate": {  
  "DocState_viewportSetting": 1,  
  "DocState_gridOn": false,  
  "DocState_gridStyle": 0,  
  "DocState_gridSize": 20,  
  "DocState_gridSnappingOn": true,  
  "DocState_showOutputOnly": false,  
  "DocState_showVideoSafeZones": false,  
  "DocState_showRuleOfThirds": true,  
  "DocState_viewPortLeftWidthPct": 1,  
  "DocState_viewPortTopWidthPct": 1,  
  "DocState_zoom0": 0.9,  
  "DocState_viewOffset0": { ... },  
  "DocState_rotation0": 0,  
  "DocState_stereo0": false,  
  "DocState_enableOutsideView0": false,  
  "DocState_outsideViewPitch0": 0,  
  "DocState_outsideViewYaw0": 0,  
  "DocState_outsideViewRadius0": 0,  
  "DocState_outsideViewAttn0": { ... },  
}
```

```
...
"DocState_playStart": -1,
"DocState_playEnd": -1
}
```

Tips

Finding the Old Format within the New Format

The old .anme document format that was used in Anime Studio 10 and earlier was a custom format. While the format was text based, there were some format issues that made it difficult to add new properties without breaking the format. Since you just had to drag and drop a .anme file into a text editor, it was relatively trivial to make changes if you knew some basics about the format. The good news is that the new document format tries to mimic the sections of the old format. There was a Document Header, Layer Comp, Style, and Layer section to the document. If you have an older pre-11.0 .anme file, opened it Moho 13.5, converted the document to .moho and then compared the documents side-by-side, a lot would match up. The main big difference is every property now must have a key associated with values. That means that it should be easier to find a certain value in the document if you know it's key. So if you want to change a value of an Image Layer, all you'd need to do is search for "ImageLayer" in the JSON file. Find the specific image layer if there is more than one. Then you just find the property that you want to change. For example, if you wanted to enable the Toon Effect on that image layer, you'd continue your search and look for the key "toon_effect".

The keys may make the file format be more verbose looking, but the few times we have had to open up a document to check out a property, we find it easier to really drill down into what specific properties are.

There are two areas where it will actually be easier to understand in the new format than the old format.

1. Finding specific layers
2. Finding type information about that layer.

In the old format, layers were defined by an ID number. You'd used to have to search through the file and where a new layer was starting you had to know that a Image Layer started with 2 and then you could search for this:

```
layer_type 2
{
...
}
```

Here were all the ID numbers:

- Vector Layer = 1
- Image Layer = 2
- Group Layer = 3
- Bone Layer = 4

- Switch Layer = 5
- Particle Layer = 6
- Note Layer = 7
- Poser/3D Layer = 8
- Audio Layer = 9
- Patch Layer = 10
- Text Layer = 11

In the new format each layer has a “type” key that has one of the following values:

- Vector Layer = “MeshLayer”
- Image Layer = “ImageLayer”
- Group Layer = “GroupLayer”
- Bone Layer = “BoneLayer”
- Switch Layer = “SwitchLayer”
- Particle Layer = “ParticleLayer”
- Note Layer = “NoteLayer”
- Poser/3D Layer = “Mesh3DLayer”
- Audio Layer = “AudioLayer”
- Patch Layer = “PatchLayer”
- Text Layer = “TextLayer”

No more searching by layer ID. Once you are in the JSON object for the layer, you then just navigate down to set its property. This should be relatively easy for top level properties of the layer (eg “name”, “path”). Note that most of the layers make use of complex properties. For example, a vector layer may be made up 100s of shapes. Those shapes may have 100s of points. Editing one of these points may be extremely difficult using just the document file.

Editing the New Format with a Text Editor

1. Copy the Moho document from **MyMohoDocument.moho** to a new file named **MyMohoDocument.zip**.
2. Expand the .zip file using a decompression tool like StuffIt, WinZip, WinRAR, or the Zip mechanism built into your machine.
3. There should be two files that are expanded: **Project.mohoproj** and **preview.jpg**
4. Beautify the **Project.mohoproj** file. (See below)
5. Open the **Project.mohoproj** file in a text editor.
6. Make your edits to the text file

7. Zip the **Project.mohoproj** using a compression tool like above. Make sure to choose the .zip format, not 7z or RAR.
8. Name the archive **MyModifiedMohoDocument.zip**
9. Once zipped, rename the document to **MyModifiedMohoDocument.moho**.
10. Try and open in Moho.

In step 4 you will most likely need to “beautify” or “pretty” up the **Project.mohoproj** file before it is edited in the Text Editor. In order to save space on the user’s computer, the Project.mohoproj file had all unnecessary whitespace characters (spaces, tabs, new lines) removed by Moho when saved. Beautifying means that you are adding all that back in just so that it will be easy to edit. There are a number of tools that will do this for you. In the section below, there will be links to beautifiers. The sample code provided below also show how to beautify programmatically.

There is no need to remove all of the whitespace/newline characters after making your edits in step 6. The next time that the document is saved, the whitespace will again be removed.

In step 7, it is not necessary to Zip the preview.jpg file. This is purely optional. The thumbnail preview will be regenerated the next time the document is saved.

Also in step 7, keep in mind that some Zip tools use their own Zip format for compression (eg WinZip). Make sure you specify in the application preferences the most “portable” version of the .zip format. That is usually LZ compression.

Editing the New Format with a Scripting Tool

Editing the new document format with a scripting tool follows the same general path as manually editing from the section previous. The difference is you can automate the Zip compression/decompression as well as the browsing/editing of the JSON. At the bottom of this document there are two Python scripts that you can use as an example. Other scripting languages have support for Zip and JSON, either through builtin support or by using a library.

Scripting Pseudo Code

```
// Unzip the .moho file
...

// Open the Project.mohoproj file
...

// Use the JSON parser to look for 1 or more keys
...

// Print/Edit the values for the key(s)
...

// Close the Project.mohoproj file
...

// Zip the Project.mohoproj back to the original .moho file
...
```

Tools for Beautifying JSON

With Moho removing all of the whitespace and newline characters from the document, it will be necessary to beautify the text to make it easier to search for keys and values. Here are a list of tools we use within Lost Marble to help beautify.

- [JQ](#) JSON Query Utility Commandline tool for Mac or Windows
- [BBEdit or TextWrangler JSON Text Filter Beautifier](#) (Mac only)
- [JS Beautifier](#) (Web)
- [JSON Beautifier & Formatter](#) (Web)
- [JSON Beautifier](#) (Web)

Recommended JSON Editors

JSON editors can help you visualize a JSON file by syntax coloring and collapsing lists and objects.

- [JSON Editor Online](#) (Web)
- [Notepad++](#) with [JSTool](#) plugin (Windows)
- [Xcode](#) (Mac)
- [BBEdit or TextWrangler](#) (Mac)

Keep in mind that JSON is just text. So it can be opened with your favorite text editor. It might not have syntax coloring, but it can get the job done.

Python Scripts

Below are two Python 2.x scripts. The first one just extracts 1 or more .moho files to JSON. MyMohoDocument.moho become MyMohoDocument.json.

Extract to JSON

```
#!/usr/bin/env python
"""Extract To JSON - Takes 1 or more .moho file and converts it to
JSON
    extract_to_json.py <.moho files>
"""
import os
import os.path
import json
import shut
import sys
import zipfile

def ExtractToJSON(mohopath, beautify = False):
    if (not os.path.exists(mohopath)):
        print 'ERROR: %s does not exist' % mohopath
        return
```

```
# Get the folder and the file name for the path
folder, mohofilename = os.path.split(mohopath)
print 'Extracting from ' + mohofilename + '...'

# Open the .moho file
with zipfile.ZipFile(mohopath) as zip_file:
    # Iterate over all of the items in the zip file
    for item in zip_file.namelist():
        filename = os.path.basename(item)

        # skip everything except the .mohoproj file, which is JSON
        if filename != 'Project.mohoproj':
            continue

        # Create the extracted .json path name
        filename, ext = os.path.splitext(mohofilename)
        filename += '.json'
        jsonpath = os.path.join(folder, filename)
        # Load the JSON from the zip file and dump it beautified to
the .json path
        source = zip_file.open(item)
        if (beautify):
            json_obj = json.load(source)
            json.dump(json_obj, file(jsonpath, "wb"), sort_
keys=False)
        else:
            shutil.copyfileobj(source, file(jsonpath, "wb"))

def Usage():
    print '%s <.moho files> - Extract .moho to JSON' % os.path.
basename(sys.argv[0])

def perform():
    numArgs = len(sys.argv)
    if numArgs == 1:
        Usage()
        return

    for mohopath in sys.argv[1:]:
        ExtractToJSON(os.path.normpath(mohopath))

if __name__ == '__main__':
    perform()
```

This second script allows you to list, extract or update an existing .moho without even opening the file.

Manipulate a .moho file

```
#!/usr/bin/env python
"""moho_util - Manipulate a .moho file
    Commands are list, extract, and update.
    list prints the paths of image and audio layers.
    extract saves the Project.mohoproj to a desired location.
    update replaces existing paths with the one supplied.
```

```

    moho_util.py -h |command| for help.
"""
import zipfile
import json
import argparse
import os
import sys

def extractProject(mohoFile):
    """Return the Project.mohoproj extracted from a zip file as a
    string."""
    zf = zipfile.ZipFile(mohoFile)
    for filename in [ 'Project.mohoproj' ]:
        data = zf.read(filename)

    return data

def writeProject(mohoFile, projectData):
    """Write data back into Project.mohoproj in a zip file"""
    zf = zipfile.ZipFile(mohoFile, mode="w")
    zf.writestr('Project.mohoproj', projectData)

def printLayerInfo(layer):
    """Print the path of an image or audio layer."""
    if layer.has_key('image_path'):
        print "image:", layer['image_path']

    if layer.has_key('audio_path'):
        print "audio:", layer['audio_path']

def updateLayerInfo(layer, update):
    """Replace the path of an image or audio layer."""
    if layer.has_key('image_path'):
        path = layer['image_path']
        layer['image_path'] = path.replace(update[0], update[1])

    if layer.has_key('audio_path'):
        path = layer['audio_path']
        layer['audio_path'] = path.replace(update[0], update[1])

def isContainerLayer(layer):
    """Return True if the layer is a group or switch layer."""
    type = layer['type']
    return type == "GroupLayer" or type == "SwitchLayer"

def iterateContainerLayer(groupLayer, update=None):
    """Iterate a group or switch layer descending into sub groups
    and updating or printing layers otherwise."""
    for layer in groupLayer:
        if isContainerLayer(layer):
            iterateContainerLayer(layer['layers'], update)
        else:
            if update:

```

```

        updateLayerInfo(layer, update)
    else:
        printLayerInfo(layer)

def iterateLayers(path, update=None):
    """Iterate the root project layers."""
    projectPath = path
    projectData = extractProject(projectPath)

    if len(projectData) > 0:
        jsonData = json.loads(projectData)
        layers = jsonData['layers']
        iterateContainerLayer(layers, update)
        if update:
            writeProject(projectPath, json.dumps(jsonData))
            iterateContainerLayer(layers)

def extractProjectFile(mohoFile, projectFilepath = None):
    """Iterate Project.mohoproj to projectFilePath."""
    jsonData = extractProject(mohoFile)

    if len(jsonData) > 0:
        jsonData = json.loads(jsonData)
        if projectFilepath:
            output = file(projectFilepath, 'wb')
        else:
            output = file('Project.mohoproj', 'wb')

        json.dump(jsonData, output, sort_keys=False, indent=4)
    else:
        parser.error("Project.mohoproj is empty")

def perform():
    parser = argparse.ArgumentParser(description="Open a .moho file
    and print and/or update the paths of image and audio layers")
    subParsers = parser.add_subparsers(help="commands",
    dest="command")
    parser_list = subParsers.add_parser("list", help="list image and
    audio paths in Moho project document (.moho).")
    parser_list.add_argument('path', help="path to Moho project
    document")

    parser_extract = subParsers.add_parser("extract", help="extract
    Project.mohoproj from Moho project document (.moho).")
    parser_extract.add_argument('path', help="path to Moho file")
    parser_extract.add_argument('projectFile', metavar='project
    file', help="path to save Moho project document")
    parser_extract.add_argument('-b', '--beautify', action="store_
    true", help="beautify the project document")

```

```

    parser_update = subParsers.add_parser("update", help="update
image and audio paths in Moho project document (.moho).")
    parser_update.add_argument('existing', help="existing path(s) in
file")
    parser_update.add_argument('new', help="path to replace existing
path(s) with")
    parser_update.add_argument('path', help="path to Moho project
document")

    args = parser.parse_args()

    path = os.path.abspath(args.path)
    if not os.path.exists(path):
        parser.error("%s does not exist." % path)

    if not path.endswith(".moho"):
        parser.error("%s is not a Moho (.moho) project document." %
path)

    updateInfo = None
    if args.command == "update":
        updateInfo = (args.existing, args.new)

    if args.command == "extract":
        extractProjectFile(path, os.path.abspath(args.projectFile))
    else:
        iterateLayers(path, update=updateInfo)

if __name__ == '__main__':
    perform()

```

Appendix G: Command Line Renderer (Pro Only)

Introduction

Starting in 5.1, Anime Studio Pro introduced a command-line interface to its rendering engine. This interface is different than the Export Animation or Moho Exporter renderers in that users can launch renders without needing to interact with application windows or buttons. It is a perfect environment for users who would like to automate the rendering of their Moho projects without the need to do repetitive work of setting up application dialogs.

Usage

To use Moho for command-line rendering, here is an example of the simplest command:

Syntax:

```
Moho Pro x64.exe -r MyScene.moho
```

Explanation:

The command tells Moho to render the file MyScene.moho and to produce a rendered output file in the same folder as the project file (more on that below). It can be used directly from a Windows Command Prompt, OS X Terminal, or integrated into whatever scripting environment you choose (eg. Poser, Ruby, Bash).



Windows and Mac OS X have some specific quirks when using Moho from the command-line. Be sure to read "Platform Notes" on page 577 to learn about your particular platform.

Main Options

The following are the main options for the renderer:

-r or -render

Syntax:

```
-r <moho project file> or -render <moho project file>
```

Explanation:

This is the only required option. It tells Moho to render the given project file and then quit. The Moho project file can be a .moho project or one of the legacy document formats (.anime, .anme, or .moho) back to version 4 of the format.

-f <format>

Syntax:

-f <format>

Explanation:

This tells Moho what format to render the output as. Valid formats are any of the presets specified in the Export Animation dialog. Here are the some examples that work on both Mac and Windows:

- JPEG
- TGA
- BMP
- PNG
- PSD
- QT
- MP4 (H.264-AAC)
- Animated GIF
- SWF (Flash)

The video, Animated GIF, and SWF formats generate a single output file, while the other formats create numbered sequences of still images. If you don't specify a format on the command-line, the default format used will be "MP4 (H.264-AAC)".

-o or -output

Syntax:

-o <output> or -output <output>

Explanation:

Specifies an output file or folder. The output file should include the file extension of the desired output format. If the output format is PNG the output should be named something like MyScene.png.

If you skip this option, the output file will automatically have the same name as the input file, but with an extension matching the format you choose. For example, if you are rendering a file named MyScene.moho to a format of "MP4 (H.264-AAC)", the output will be placed in the same folder as the document file with the name MyScene.mp4.

If a folder is specified instead of a file name, the output will be placed within the folder with a name matching the document file and the appropriate output extension.

`-start <frame number>`

Syntax:

`-start <frame number>`

Explanation:

Specifies the starting frame to render. If omitted, Moho will start rendering at the document's start frame (usually 1).

`-end <frame number>`

Syntax:

`-end <frame number>`

Explanation:

Specifies the last frame to render. If omitted, Moho will render up through the last frame of the document.

`-v or -verbose`

Syntax:

`-v or -verbose`

Explanation:

Runs the rendering job in "verbose" mode. In this mode, Moho will print out the render option values along with messages about its status. This includes an estimate of the time remaining in the rendering job.

`-q or -quiet`

Syntax:

`-q or -quiet`

Explanation:

Runs the renderer in "quiet" mode. "quiet" mode disables all command-line output, both information and errors. "quiet" mode overrides "verbose" mode. This option was introduced in Anime Studio Pro 9.5.

`-log <logfile>`

Syntax:

`-log <logfile>`

Explanation:

Specifies a log file for the render. Information and errors that are normally shown as command-line output are instead logged to the log file. This option was introduced in Anime Studio Pro 9.5.

Render Options

The following options control rendering options, just like you see in the Export Animation or Moho Exporter dialog in Moho Pro. Most of the options can be turned on or off with a value of yes or no. If an option is not specified, the render will perform the default.

-multithread or -multithreaded

Syntax:

```
-multithread <yes|no> or -multithreaded <yes|no>
```

Explanation:

Used to turn on or off multithreaded rendering. If multi-threaded rendering is on, the render will use up to 5 threads (4 image frame threads + 1 movie encoding thread) to render your output files. Set this option to no if you wish to increase the system's performance while a render is taking place. The default is yes.

-halfsize

Syntax:

```
-halfsize <yes|no>
```

Explanation:

Render the output at half size. If the project dimensions of the document is set to 720p (1280x720), the output dimensions of the render would be 640x360 when using this option. This option is useful if you want to get a quick overview of your scene as it will dramatically reduce the time it takes to render. The default is no.

-halffps

Syntax:

```
-halffps <yes|no>
```

Explanation:

Render at half frame rate. If the project frame rate is set to 30 FPS, the output format would be 15 FPS when using this option. The default is no.

`-shapefx`

Syntax:

`-shapefx <yes|no>`

Explanation:

Render shape effects. The default is yes.

`-layerfx`

Syntax:

`-layerfx <yes|no>`

Explanation:

Render layer effects. The default is yes.

`-fewparticles`

Syntax:

`-fewparticles <yes|no>`

Explanation:

Use reduced particles. The default is no.

`-layercomp`

Syntax:

`-layercomp <comp name>`

Explanation:

Render a specific layer comp defined within the document.

If `AllComps` or `AllLayerComps` is specified as the comp name, all layer comps will be exported during one run of the renderer. It is highly recommended that you use either `-addlayercompsuffix` OR `-createfolderforlayercomp` when specifying these comp names, otherwise multiple layer comp exports could overwrite each other.



The recommended way to render all layer comps in Moho 13.5 is `AllComps` or `AllLayerComps`).

This option was introduced in Anime Studio Pro 10.0.

`-aa`

Syntax:

`-aa <yes|no>`

Explanation:

Antialiased edges. The default is yes.

`-extrasmooth`

Syntax:

`-extrasmooth <yes|no>`

Explanation:

Extra-smooth images. The default is no.

`-premultiply`

Syntax:

`-premultiply <yes|no>`

Explanation:

Premultiply alpha. The default is yes.

`-ntscsafe`

Syntax:

`-ntscsafe <yes|no>`

Explanation:

NTSC safe colors. The default is no.

`-variablewidths`

Syntax:

`-variablewidths <yes|no>`

Explanation:

Variable line widths (only applies to SWF format). The default is no.

Examples

Here are a couple of examples exports using the render options:

Syntax:

```
Moho\ x64.exe -r MyScene.moho -o C:\output\preview.mp4 -f "MP4  
(H.264-AAC)" -start 12 -aa no -halfsize yes
```

Explanation:

Reading the options left-to-right, the command above will render (on Windows) the file "MyScene.moho", creating the result "C:\output\preview.mp4", in MP4 format, starting at frame 12 (and continuing to the document's end frame), with no antialiasing and at half the file's normal pixel dimensions.

Syntax:

```
Moho\ x64.exe -r MyScene.moho -start 124 -end 124 -f PNG
```

Explanation:

The command above renders a single frame of the file "MyScene.moho", frame 124 (the start and end frames are the same). The result is in PNG format. Since no output file is specified, the output file will be same as the input file, but with an appropriate extension for the format chosen - in this case the output file would be automatically named "MyScene.png".

Regarding QuickTime: When rendering from the command line, Moho will use the codec and codec settings that you last used in Moho's Export Animation or Moho Exporter dialog. So, to change the QuickTime settings used by the command line mode, you need to render a QuickTime movie (even a short, tiny one) in those dialogs, entering the settings you wish to use.

Other Options

Most of the following options are not directly exposed within the user interface of Moho, but can help organize or change the quality of your rendered output:

-addformatsuffix

Syntax:

```
-addformatsuffix <yes|no>
```

Explanation:

Append the format name to the file name of the output path. This option is not new. It was available in 9.5. I just wanted to point it out here. An example of this is if you specified a format of "MP4 (H.264-AAC)", the output file would be named: MyAnimation-MP4 (H.264-AAC).mp4. The default is no. This option was introduced in Anime Studio Pro 10.0.

-addlayercompsuffix

Syntax:

```
-addlayercompsuffix <yes|no>
```

Explanation:

If -layercomp is specified, adds a layer comp suffix to the rendered file name(s) (e.g. MyScene-LayerCompName.mp4). The default is no. This option was introduced in Anime Studio Pro 11.2.

-createfolderforlayercomps

Syntax:

`-createfolderforlayercomps <yes|no>`

Explanation:

If `-layercomp` is specified, the rendered file(s) will be created in a subfolder of the output path (`-output`) or output folder (`-outfolder`). The subfolder's name will be the layer comp name (e.g. `C:\output\LayerCompName\MyScene.mp4`). The default is no. This option was introduced in Anime Studio Pro 11.2.

-videocodec

Syntax:

`-videocodec <number>`

Explanation:

The number is the fourcc value for the QuickTime codec. This option ONLY works with a format of quicktime (aka qt or mov). Here is a list of FOURCC codes, not all work with QuickTime:

<http://www.fourcc.org/codecs.php>

The FOURCC code must be converted to a 32-bit integer before being passed to the command-line. I'll try and come back to this post and add the common values for the FOURCC codes that QuickTime supports. Also in 10.1, we will see about making `-videocodec` more user friendly so that you can specify something like "H.264" or "Animation" instead of this ugly integer number.



Specifying `-videocodec` does not work with the "QuickTime" presets on Mac. (e.g. "QuickTime (H.264-AAC)")

-quality

Syntax:

`-quality <number>`

Explanation:

The quality of the export. This option ONLY works with a format of quicktime (aka qt or mov). Quality is a number between 0 and 5. The default is 3.

0 = Minimum Quality

1 = Low Quality

2 = Normal Quality

3 = High Quality

4 = Max Quality

5 = Lossless Quality



Specifying -quality does not work with the "QuickTime" presets on Mac. (e.g. "QuickTime (H.264-AAC)")

-depth

Syntax:

`-depth <number>`

Explanation:

The pixel depth of the export. This option ONLY works with a format of quicktime (aka qt or mov). The value defaults to 24, but for some codecs like Animation that support an alpha channel, you can specify a depth of 32.



Specifying -depth does not work with the "QuickTime" presets on Mac. (e.g. "QuickTime (H.264-AAC)")

Examples

Here are a few examples using these options:

Syntax:

```
Moho\ x64.exe -r MyScene.moho -layercomp "AllComps"  
-createfolderforlayercomp yes
```

Explanation:

All defined layer comps in the project file MyScene.moho will be rendered in one pass of the renderer. If the layer comps were named Background, Character 1, Character 2, the output paths will be named this:

Background\MyScene.mp4

Character 1\MyScene.mp4

Character 2\MyScene.mp4

An alternative to -createfolderforlayercomp is -addlayercompsuffix:

Syntax:

```
Moho\ x64.exe -r MyScene.moho -layercomp "AllComps"  
-addlayercompsuffix yes
```

Explanation:

Again, all defined layer comps will be rendered, but instead of separate folders, a suffix will be added to the output files to prevent a name collision. The output paths would be named this:

MyScene-Background.mp4

MyScene-Character 1.mp4

MyScene-Character 2.mp4

And simply:

Syntax:

```
Moho\ x64.exe -r MyScene.moho -layercomp "Character 1"
```

Explanation:

Only the "Character 1" layer comp will be rendered. The name of the output file will be MyScene.mp4 as -addlayercompsuffix and -createfolderforlayercomp was not specified.

Platform Notes

Windows Notes

On Windows, the Moho executable is named **Moho Pro x64.exe** or **Moho Pro Win32.exe**, but you can type in either "Moho\ x64", "Moho\ Win32", "Moho\ x64.exe" or "Moho\ Win32.exe".

Also, Windows GUI programs are normally unable to print output to the command line. So, when running Moho in command-line rendering mode, you will need to use the -log option

If you prefer a UNIX-style command line, try out the free Cygwin tools, which include a bash shell for Windows:

<http://www.cygwin.com/>

Mac Notes

On Mac OS, GUI applications are wrapped up in "bundles". The Moho application you see in the Finder is actually a folder containing lots of little files. What this means is that to run it from the command-line, you need to do things a little differently. Instead of this:

```
Moho\ x64.exe -r MyScene.moho
```

You need to use this command:

```
Moho.app/Contents/MacOS/Moho -r MyScene.moho
```

Or, if the Moho folder is not in your path, use this command (the full path to Moho):

```
/Applications/Moho.app/Contents/MacOS/Moho -r MyScene.moho
```

Other than that, Moho runs very nicely in command-line mode on the Mac.

Index

Symbols

3D Axes	
Showing and hiding	488
3D Conversion Thickness	285
3D Layers	198, 200
3D Shadows	220

A

Acknowledgements	511
Actions	
Creating new	369
Deleting	374
Editing	371
Exporting	367, 369
Importing	367, 369
Using	373
Actions Window	366
Activating Moho	7
Activation	
Automatic	8
Logging	15
Manual	9
Add Bone Tool	90
Add Point Tool	45
Ambient occlusion	209
Analytics information	435
Animated Shape Order	234
Animated Strokes	478
Animation channels	347
Animation Channels	
Muting	363
Animation Menu Commands	467
Add Keyframe	471
Align Layer with Camera	469
Allow Frame Skipping	467
Audio Level	475
Auto-Freeze Keyframes	471
Blend Morphs	493
Clear Animation	473
Consolidate Layer Channels	468
Copy Current Frame	470
Enable Bone Dynamics	468
Mute Audio	474
Nudge Physics Object	474

Rescale Keyframes	469
Reset All Layer Channels	468, 469
Restart Audio Track	475
Restart Movie	475
Select All Keyframes	469
Set Layer Start Time	468
Track Layer to Video	474
Animations	
Exporting	406
Appearance	445
Applied Styles	284
Arc IK Solver	87
Arrows	53
Audio Layers	199
Audio Recording	365
Audio Sync Sources	248
Audio Tab	246
Automatic Update Checking	21
Auto shading	209

B

Background color	386
Beginner Mode	19
Bend Points Tool	61
Bezier curves	34
Bezier Handles	
Fixed	36, 42, 45, 48
Options	45
Resetting	48
Showing	34, 42, 45, 48
Bind Layer Tool	99
Bind Points Tool	100
Bone Constraints	84
Bone flipping	84
Bone Layers	188
Bone Menu Commands	458
Create Smooth Joint for Bone Pair	459
Flexi-Bind Layer	459
Flexi-Bind Points	458
Freeze Pose	465
Freeze Selected Bones	466
Freeze Visible Bones	466
Hide Controlled Bones	462
Hide/Show Shy Bones	462
Make Smart Bone Dial	463
Release Layer	459
Release Layer and Points	459

Release Points	458	Rotating character views	324
Reset All Bone Rigging	462	Shirt	318
Reset All Bones	466	Style Tab	319
Reset Bone	466	Walk Cycles	321
Show All Bones	462	Checker Selection	288
Track Bone to Video	462	Colorizing	212
Use All Bones for Flexi-Binding	462	Color Points	80
Use Selected Bones for Flexi-Binding	459	Color Swatch	285, 286
Bone-Only Channels	350	Command Line Renderer	
Bone Physics Tool	101	-aa	548
Bone Strength Tool	98	-addformatsuffix	550
Bone Tools	82	-addlayercompsuffix	550
Bonus Content	16	-createfolderforlayercomps	551
Downloading	497	-depth	552
Boolean Shapes		-end	546
Creating	37	-extrasmooth	549
Brush angle drift	274	-f	545
Brushes		-fewparticles	548
Saving	276	-halffps	547
Brush Tool	54	-halfsize	547
C		-layercomp	548
Camera Channels	350	-layerfx	548
Camera movements		-log	546
Layers immune to	215	-multithread	547
Camera Tools	138	-multithreaded	547
Character Wizard	304	-ntscsafe	549
Arms	310	-o	545
Body Tab	308	-output	545
Changing character views	305	-premultiply	549
Clothing Tab	317	-q	546
Creating content for	329	-quality	551
Designing actions	327	-quiet	546
Exporting views	307	-r	544
Eyes	313	-render	544
Face Tab	311	-shapefx	548
Head	312	-start	546
Head props	314	-v	546
Legs	309	-variablewidths	549
Making a character walk	322	-verbose	546
Mouth	313	-videocodec	551
Movement Tab	315	Compositing Effects	208
Nose	314	Content Folder	
Pants	318	Creating	16
Presets	305	Content Paradise	16
Proportions	309	Crayon	
Randomizing characters	307	Fill effects	268
		Create Shape Tool	65
		Credits	483

Crop	146	Paste	426
Curvature Tool	48	Paste Layer	427
Curve Profile Tool	76	Paste Relative	427
Curves		Preferences	433
Simplifying	40	Editor Colors	444
Splitting	40	Options Tab	434
Custom Resource Images	446	Redo	426
D		Reset Layer Scale Normalization	429
Deactivation		Select All	429
Automatic	13	Select Connected	429
Manual	13	Select Inverse	429
Delete Edge Tool	53	Select None	429
Delete Shape Tool	72	Undo	426
Depth of field	386	Effects Tutorials	304
Layers immune to	215	Email Support	510
Display Quality	162	Embedded script files	215
Draw Menu Commands	448	Eraser Tool	56
Freeze Points	456	Export Animation	
Freeze Selected Points	457	Configurations	409
Freeze Visible Points	457	Destination	409
Hide Shape	456	Export as Version 9 File	384
Insert Text	448	Exporting	
Lower Shape	450	Sequential SVG Files	416
Lower to Back	450	Still images	416
Peak	449	Eyedropper	137
Raise Shape	450	Eyedropper Tool	72
Raise to Front	450	F	
Random Line Width	449	Facing a camera	215
Reset All Points	457	File Menu Commands	376
Reset Line Width	449	Close	382
Reset Points	457	Close All	382
Show All Shapes	456	Export Animation with Previous Set-	
Smooth	449	tings	417
Snap to Grid	449	Export as Version 10 File	384
Triangulate 2D Mesh	456	Export as Version 11 File	385
Draw Shape Tool	52	Export FBX	418
Draw Tools	32	Export Frame to SVG	419
Drop Shadow	267	Export OBJ	418
E		Export POV	418
Edit Menu Commands	426	Export Styles	418
Clear	427	Gather Media	383
Copy	426	Import	392
Copy Layer	427	Moho Exporter	419
Cut	426	New	377
Edit Keyboard Shortcuts	429	New from Template	380
Normalize Layer Scale	427	New Workspace	379

Open	380	Tutorials	496
Open Custom Content Folder	425	Help Menu Commands	496
Open Recent	381	About Moho	498
Preview	404	About Moho Debut	429
Preview No Antialiasing	405	About Scripts	498
Quit	425	Buy Content	497
Remove Comments & Tags	385	Check for Updates	497
Save	382	Check For Updates	497
Save All	383	Deactivate License	497
Save As	382	Help	496
Upload to Facebook	419	License Manager	498
Upload to YouTube	419	Online Tutorials	496
Fill Color Override	260	Online Video Gallery	497
Fill Color Selector	259	Register Your Product	498
Fill effects	261	Technical Support	497
Fill Effect Settings	271	Tutorials	496
Fill Enable	259	Update License	498
Fill Properties	259	Upgrade to Professional Version	497
Fills			
Picking colors	78	Welcome Screen	497, 498
Using two	78	Hide Edge Tool	73
Working with	77	Hide Selected Bones	462
Fill Tools	62	Hold Durations	357
Flash		HSV modifier images	215
Exporting	413		
Flip horizontally	211	I	
Flip vertically	211	Image Layers	184
Follow Curve Tool	125	Image Masking	147
Following a path	214	Image Sequence Layers	185
Fonts		Image Texture Fill Effects	265
Using large	434	Insert Text Tool	130
Frame by Frame Layers	182, 194	Installing Moho	
Freehand Tool	49	Macintosh	7
		Windows	6
G		Interpolation Method	338
Gear	478	Introductory Tutorials	15
GPU		Inverse Kinematics	
Enabling	435	Ignoring	88
Gradient Fill Effects	264	J	
Grid shape	53	JSON	381
Group Layers	186		
Group with Selection Layers	182, 187	K	
H		Keyboard shortcuts	
Halo Fill Effects	263	Classic vs new	442
Hardware acceperation		Keyboard Shortcuts	
Enabling	435	Bone Tools	519
Help Menu Comands			

Common	518	Layer Selector	129
Fill Tools	519	Layer Settings	
Timeline Window	519	3D Options Tab	250
Vector Layers	518	Bones Tab	254
Keyframes	352	Depth Sort Tab	239
Adding	354	General Tab	205, 207
Coloring	356	Image Tab	241
Copying and pasting	354	Masking Tab	224
Deleting	355	Motion Blur Tab	222
Editing multiple	356	Note Tab	253
Hold durations	357	Particles Tab	249
Moving	356	Physics Tab	253
Pasting relative	427	Shadows Tab	217
Selecting	355	Switch Tab	248
Transitions	357	Vectors Tab	232
Keyframe window	494	Layer Shading	219
		Layer Shadows	218
L		Layers List	
Layer blending	217	Changing Layer Settings	176
Layer blur radius	209	Context Menu	174
Layer Colors	177	Quick Settings	179
Layer Comments	217	Layers Window	165
Layer Comps	176	Comments	169
Renaming	177	Kind	169
Layer Effect Channels	349	Label	170
Layer Kinds	181	Name	170
Layer List	173	Preferences	438
Columns	168	Quick Settings	171
Searching	167	Reordering Column Headers	172
Layer Motion Channels	349	Resizing Columns	173
Layer opacity	209	Shortcuts	519
Layer Referencing	178	Sorting Columns	172
Layers		Tags	171
3D	200	Timeline Visibility	171
Aligning	183	Visibility	171
Animated effects	208	Layer Tags	217
Changing settings	176	Layer Toolbar	166
Colorizing	212	Layer Tools	117
Copying and pasting	176	Legacy Effects	269
Creating new	166	Library	289
Deleting	167	Adding Metadata	302
Duplicating	166	Custom Locations	292
Hiding	208	Details Panel	302
Naming	208	Icons	301
Patch	201	Include factory content	434
Rendering off	208	Location Menu	291
Reordering	174	Metadata Searches	295
Settings	167	Recycle bin confirmation	434

Searching	293	Orbit Workspace Tool	140
Library List		Origins	
Factory Content	298	Offsetting	157
Maintaining	296	Outline	211
Non-Factory Content	299	Ovals	52
Library Tabs	290	P	
Line Width Tool	72	Paint Bucket Tool	67
M		Pan/Tilt Camera Tool	139
Magnet Tool	54	Pan Workspace Tool	140
Manipulate Bones Tool	94	Particle Layers	195
Markers		Particle Layer Tool	145
Fine-tuning	151	Particle-Only Channels	350
Masking		Patch Layers	201
Tips and Tricks	226	Perspective Points Tool	60
Media Support	523	Photoshop	
Merge alpha	275	Exporting from	403
Merge Strokes	51	Importing files	397
Moho Discussion Forum	510	Pin Bones	90
Moho Exporter	419	Playback Buttons	161
Action Buttons	420	Point Reduction	
Export List	421	Setting	51, 56, 72
Queue Settings	423	Point Reduction Tool	58
Moho Web Support	510	Points	
Morphs		Translating	42
Creating	370	Poser Integration	396
Motion Graph	360	Poser tool	142
Mouse Shortcuts	519	Preferences	433
In Angle knobs	520	Documents Tab	436
In numeric fields	520	Editor Colors	444
Timeline Scrubbing	520	General Tab	434
Workspace Navigation	520	Layers/Objects Tab	437
Move Layer Tool	117, 124, 128	Timeline Tab	440
Multi-Brushes	277	Tool Layout Tab	442
Creating	278	Tools Tab	441
Multiple Document Support	377	Product Comparison	500
Multiple layers		Project Settings	385
Editing	205	R	
Multi-touch support	521	Real-time Media connection	396
N		Rectangles	52
Noise Tool	61	Registration	16
Note Layers	198	Render styles	387
O		Reparent Bone Tool	98
Offset Bone Tool	99	Roll Camera Tool	139
Onion Skins	345	Rotate Points Tool	44
		Rotate Workspace Tool	140
		Rotating to face camera	215

Rotating to follow path	214	Error Test	481
Round End Caps	283	List Channels	481
S		Load Data File	481
Scale compensation	215	Print Globals	482
Scale Points Tool	44	Print Moho API	481
Scatter Brush Tool	59	Print Test	482
Script Menu Commands		Sound	482
Install Script	484	Bone Audio Wiggle	483
Scripts Menu Command		Layer Audio Wiggle	483
Other Popular Scripts	484	Visibility	483
Scripts Menu Commands	476	Fade	483
3D	476	Wavy Fade	484
Auto-Scale	477	Warp	484
Cube	477	Black Hole	484
Rotate X	477	Wavy	484
Rotate Y	477	Select Bone Tool	82
Rotate Z	477	Select Points Tool	39
Torus	477	Select Shape Tool	63
Camera	477	Sequencer	358
Handheld Camera	477	Set Origin Tool	124
Orbit Camera	477	Shaded fill effects	262
Draw		Shapes	
	478	Shape Selection	257
Apply Sketchy Effect	478	Shear Layer Tool	129
Auto Weld	478	Shear Points Tool	60
Polygon	478	Shortcuts	513
Simplify Curve	479	Adding	431
Split Curve	479	Show Path	94
Star	479	Show Play & View Controls	488
Toggle Legacy Curves	479	Show Timeline Options	488
Image	479	Sketch Bones	94
Layer Effects	479	Smart Bones	103
Layer Trail	479	and Binding	115
Magic Lines	480	Creating an action	105
Perspective Shadow	480	Creating a second action	108
RT: Break Apart Shapes	480	Editing actions	111
Particle Effects	480	Fixing transitions	111
Energy Cloud	480	Other uses	114
Explosion	480	Positive and negative values	463
Rain	480	Smart Warp	
Smoke	480	Assigning 2D Mesh	236
Snow	481	Assigning to image	244
Sparkles	481	Using	236
Scripting Documentation	484	Smoothing	
Script Writing	481	On Blob brush	56
Alert Test	481	On Freehand tool	51
Automation Test	481	Soft Edge Fill Effects	263
		Special tools	142

Spinning Text	483	Toolbar	160
Spirals	53	Toon Settings	244
Standard Mode	18	Track Camera Tool	138
Stars	52	Tracked Layers	
Startup Mode	18	Assigning	155
Status Bar	161	Tracking Points	
Stroke Brush Selector	273	Adding	149
Stroke Color	272	Adjusting sensitivity	154
Stroke Effect	281	Re-syncing	151
Stroke Effect Settings	283	Transform Bone	92
Stroke Enable	272	Transform Layer	
Stroke Exposure Tool	74	Moving	119
Stroke Line Width	281	Rotating	120
Stroke properties	272	Scaling	120
Style Management	257	Translate Points Tool	41
Styles		Triangles	52
Importing	393		
Style Window	256	U	
Swatches	285	Updates	
Switch Layers	190	Automatically checking for	434
Switch Layer Tool	144	User Manual	510
Switch-Only Channels	350		
Switch Selection Window	193	V	
System requirements	5	Vector Layers	183
		Vector-Only Channels	348
T		Video Tracking Tool	148
Technical Support	510	View Menu Commands	486
Discussion Forum	510		
Email	510	Fade Unselected Layers	489
Online Manual	510	Active Switch Layer	490
Web sites	510	Auto Hide Curves	489
Text	130	Design Mode	490
Text Layers	203	Direction	487
Threshold	210	Enable Grid	487
Through Transparency	266	Enable Grid Snapping	487
Timeline		Enable Onion Skins	489
Animation channels	347	FBX Preview Mode	490
Showing and hiding	351	Grid Settings	487
Condensing and expanding	334	Reset	486
Consolidating channels	333	Return to Mainline	490
Controlling time	336	Select Tracing Image	489
Multiple Layers	362	Show 3D Axes	488
Navigating with mouse	337	Show Curves	489
Playing partial segments	347	Show Document Tabs	491
Timeline Channels		Show Output Only	488
Separating	121	Show Rule Of Thirds	488
Timeline options	335	Show Tracing Image	489
Timeline Window	366	Stereo	491

Timeline Channels	488
Video Safe Zones	488
Zoom to Layer	487
Visibility in rendering	209

W

Window Menu Commands	492
Actions	493
Audio Recording	495
Character Wizard	495
Docking	493
Layers	492
Layer Setting	494
Library	495
Poser Parameters	495
Style	492
Switch Selection	493
Timeline	492
Tools	492
Window Mode Indication	258
Windows	
Docking and undocking	164
Main Window	159
Word Balloons	
Creating	136
Working area	159
Workspace Tools	139

X

XMP Comments	392
XMP Tags	392

Z

Zig Zag	479
Zoom Camera Tool	139
Zoom In	487
Zoom Out	487
Zoom Workspace Tool	140