

# ***Maya FBX Plugins Guide***

***Version 6.0.2***

***May 2005***

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**Document:** Maya FBX Plugins Guide

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## Chapter 1

# Installing FBX Maya Plugins

## Overview

FBX plugins are used by Maya to import, export, and convert files using the *.fbx* file format. This document describes how to install FBX Maya Plugins on Windows® and Mac® OS X systems.

Plugins for Maya are available for use with Windows 2000/XP and Mac OS X.

## Manual Installation

In order for your 3D software to use these plugins, you must manually move these files into the proper directories.

This section describes the naming conventions, supported software versions, and the installation process for manually installing, disabling, and removing the FBX Plugin for Maya.



### Note:

*FBX Maya Plugins are available for Windows, Mac OS X and Linux.*

### FBX Maya Plugins Naming Conventions

FBX Maya Plugins conform to the following naming conventions:

#### Windows:

`fbxmaya60.mll`

#### Mac:

`fbxmaya60.lib`

#### Linux:

`fbxmaya60.so`

You can change a plugin's name as long as the extension (for example *.mll*, *.so*, or *.lib*) stays the same.

### Supported Maya Versions

The FBX Maya Plugins are currently available for Maya 5.0, 6.0, and 6.5. respectively:

#### Windows:

`fbxmaya50.mll`

`fbxmaya60.mll`

`fbxmaya65.mll`

#### Mac:

`fbxmaya60.lib`

`fbxmaya65.lib`

#### Linux:

`fbxmaya50.so`

`fbxmaya60.so`

`fbxmaya65.so`

### Installing the FBX Maya Plugins on Windows

1. Verify that the version number of the plugins matches the version of Maya installed on your computer. Plugins run correctly only on the version of Maya for which they were created.
2. Copy the file *fbxmaya60.mll* into the `Maya60\bin\plug-ins\` directory.
3. Start Maya and navigate to `Window>Settings/Preferences>Plug-in Manager`.
4. Activate the Loaded column on the *fbxmaya60.mll* to load it.

5. Activate Autoload to have Maya load the FBX plugin automatically at start-up.

## Disabling FBX Maya Plugins in Windows

1. Launch Maya.
2. Select *Windows>Settings/Preferences>Plug-in Manager*.
3. Locate the *fbxmaya60.mll*, *fbxmaya60.so*, or *fbxmaya60.lib* plugin in the list and disable it.
4. Exit Maya.

## Removing FBX Maya Plugins from Windows

1. Exit Maya.
2. Go to the FBX Install shield.
3. Locate the Maya FBX plugin.
4. Disable the Maya option.

## Installing FBX Maya Plugins on Mac OS X

5. Double-click the package icon to start the installation.
6. Enter your login password to continue the installation when prompted.



**Note:**

*You must obtain administrator privileges to continue installation.*

The Welcome window appears.

7. Click Continue to start the installation process.
8. Select a destination disk for your application to be installed and click Continue.
9. Click Install (or Upgrade). A progress bar indicates the time remaining of the installation; when the progress reaches 100%, the Finish button is activated.
10. Click Finish to exit the installation program.



**Note:**

*The plugin is installed in the following directory:  
<Macintosh  
Drive>/User/Shared/Alias/maya/6.0/plugin-ins*

11. Start Maya and navigate to *Window>Settings/Preferences>Plug-in Manager*.
12. Activate the Loaded column on the *fbxmaya60.lib* to load it.
13. Activate Autoload to have Maya load the FBX plugin automatically on start-up.

## Removing FBX Maya Plugins from Mac OS X

1. Exit Maya
2. Locate the *fbxmaya<ver>.mll* plugin. This file is found in the *<Macintosh Drive>/User/Shared/Alias/maya/6.0/plugin-ins* directory.
3. Delete the *fbxmaya<ver>.mll* file

## Installing FBX Maya Plugins on Linux

1. Type the following command to install the distribution:

```
% rpm -U fbxmaya60-5.2.0.i386.rpm
```

The plugin is installed to the following directory:  
*/usr/aw/maya60/bin/plugin-ins/*



**Note:**

*You must obtain administrator privileges to continue installation.*

2. Start Maya and navigate to *Window>Settings/Preferences>Plug-in Manager*
3. Activate the Loaded column on *fbxmaya60.so* to load it.
4. Activate Autoload to load the FBX plugin automatically at start-up.

## Removing FBX Maya Plugins from Linux

1. Log into your system as root

2. Uninstall the distribution by entering the following command:

```
% rpm -e fbxmaya60
```

## Renaming Plugins

All plugins can be renamed as long as you do not change the file extension. However, it is only advisable to rename files when you want to keep more than one version of the FBX Maya Plugins in the same directory.

If you choose to backup your files, all files with the same name as those you are installing should be renamed with the extension `.FBX_BAK`.



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**Note:**

*It is recommended that you always remove old versions of the FBX Maya Plugins before installing newer versions.*

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## Chapter 2

# Using FBX Maya Plugins

## Overview

This document shows you how to export *.fbx* files from Maya, and how to import *.fbx* files into Maya.

This document includes important information regarding the Maya features supported by this version of the FBX plugin and MotionBuilder software.



### Note:

*For information on supported features between Maya and other 3D software (cross-package support), consult the Alias website ([www.Alias.com](http://www.Alias.com)).*

This document also includes tips on the Maya workflow and a section on scripting using the Maya MEL commands.

## What's New In 6.0.2

The following section contains the new features, bug fixes, bugs, and limitations of the Maya FBX plugins since version 6.0:

- Fixed crash when exporting scene with hard edges.
- Fixed bad skin assignments when the smooth skin is constructed using the default option: "Remove unused influences" available in Maya 6.5.
- When the imported *.fbx* file has no animation, or the user decides to not import the animation, the timeline in Maya is left unchanged instead of being reset to (0, 1 frame).
- Fixed the problem with FCurve behavior when tangent types are set to clamped.
- The Merge Pivot Nodes As Rotate Axis and Joint Orient option is available only when you import older *.fbx* files (version 6.0 and earlier).

- Fixed a bug with the import or export of key FCurves with mixed tangents types.
- Added a progress bar to show the import status of materials assigned to polygons. This feedback has been added as this process is occasionally long, and might be mistaken for a crash.
- Supports embedding textures and their portable format (*.tiff*).
- Supports color vertices.

## Using the Maya Plugin

This section describes how to export models from Maya using the *.fbx* file format, and how to import *.fbx* files into Maya.



### Note:

*Activating more than one *.fbx* import/export plugin at a time confuses Maya, producing undetermined results. To correct this problem you should restart Maya, making sure that only one plugin is loaded at the beginning of your next Maya session.*

## Exporting from Maya



### Note:

*MotionBuilder do not support negative and non-uniform scaling.*

### To export from Maya:

1. Select File>Export All. A file browser appears.
2. Select FBX as the file type.

- Use the file browser to locate where you want to export your *.fbx* file.
- Type the name of the *.fbx* file in the file name field, and click Ok. The FBX Exporter window appears (fig 2-1).

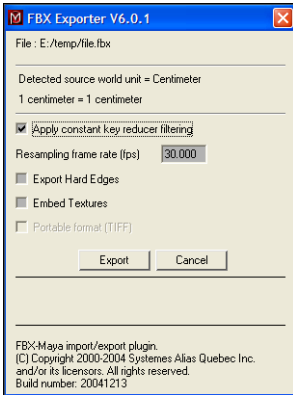


fig 2-1: FBX Exporter window

- Activate the Constant key reducer filtering option, if applicable.
- Enter the desired frames per second (fps) in the Resampling frame rate field.
- Activate the Export Hard Edges option if applicable.
- Activate the Embed Textures option if you want to embed your textures with the file.

### **!** **Note:**

*When creating Blend Shapes, always set the Timeline to the first frame, especially if there is animation. The Blend Shapes must stay at zero before export.*

## Importing *.fbx* Files into Maya

To import *.fbx* files into Maya:

- Select File>Import. A file browser appears.
- Select FBX as the file type.

- Use the file browser to locate the *.fbx* file that you want to import. The FBX Importer window appears (fig 2-2).

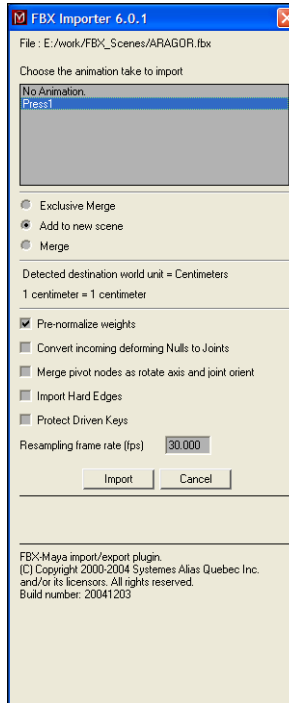


fig 2-2: FBX Importer window

- Choose whether the *.fbx* scene is to be merged in the current scene or imported in an empty scene by activating/disabling the Merge option.
- Activate any of the options that apply to your scene.
- Enter the desired frames per second (fps) in the Resampling frame rate field.
- Click Import.

## Maya Workflow Tips

The following sections contain information to help streamline the workflow between Maya and FBX Maya Plugins software.

## General Process

Follow this general workflow:

1. Create the model, textures (UV file texture), and skeleton in Maya.
2. Bind the model and edit the weight of the CVs or Vertices in Maya.
3. Export all (FBX).
4. Open the file in your FBX Maya Plugins software.
5. Animate the character.
6. Transfer all the animations (plot animation) to the character bones.
7. Import this new file back into the ORIGINAL Maya scene.

## Creating Models in Maya

FBX Maya Plugins software supports the following:

<b>NURBS and Polygons</b>	Supported. Hard and smooth edges supported as well.
<b>Blend Shapes</b>	<i>Do not delete the targets until the file is transferred into your software.</i>  <i>Note that the plugin only support BlendShapes that have a "Deformation Order" that is upstream, that is, Before, FrontOfChain or Default</i>
<b>Pivots</b>	Supported.
<b>Lights</b>	Intensity value scaling is supported, as well as import support for intensity animation and color curves.  Export support for intensity animation.
<b>Cameras</b>	Default export specs, curves, and FOV are supported.  Import for squeeze ratio, near/far plane value, aperture width, height, FOV, and focus length are supported.

FBX Maya Plugins software does not support the following:

<b>Trims or NURBS Booleans</b>	Converts them into Polygons (Modify > Convert > NURBS to Polygons).
<b>Subdiv to Polygons (Maya 3.0)</b>	If you are using Subdiv Surfaces, use the Extract Vertices command (> Subdiv. Surfaces), not the Tessellate command (> Subdiv. Surfaces), to convert Subdivs into Polygons.
<b>Subdiv to Polygons (Maya 4.0)</b>	Use the Subdiv to Polygons command (Modify > Convert).
<b>Deformers (Lattices, Sculpt...)</b>	Only Clusters are supported.

- Verify that the Normals are pointing outward. FBX Maya Plugins software does not support reverse normals.
- Curves show up as nulls (locators) in FBX Maya Plugins software.
- If the rotation or scaling pivots are changed in the original Maya scene between the time of the *.fbx* import and export, the animation curves applied are resampled.



### Note:

Avoid using groups. Instead, parent the geometries. Groups create nulls (locators).

## Creating Textures in Maya

Use File Textures and Polygon projections. Bake (Hypergraph>Convert to File Textures) any native Maya textures (Grid, Ramp...), Layer Shaders and any File textures that have a UV rotation (Place 2D texture node).

In FBX Maya Plugins software, the UV rotation has a 'corner' pivot instead of Maya's 'center' pivot.

**Textures Appear "Stretched":** If you see stretched textures in your software, set the following line to 'No' in the configuration text file:

```
UseStripForMesh = No ; Available option
Yes, No.
```

## Creating and Binding Skeletons in Maya

FBX Maya Plugins software supports the following:

<b>Smooth/Rigid binding</b>	Supported.
<b>Modified Weighting</b>	Supported.

FBX Maya Plugins software does not support the following:

<b>IK Spline and Handle</b>	To transfer IK animations, transfer the IK animation to the joints in Maya, using the Bake Simulations (Edit > Keys).
<b>Expressions, Driven Keys and Constraints</b>	If you wish to transfer animations created by these tools, transfer the animations in Maya to the proper node using the Bake Simulations command (Edit > Keys).
<b>Flexor deformations</b>	Do not appear.
<b>Joint scaling</b>	Do not scale any bones.
<b>Character Set</b>	Do not use Character Set in Maya.

## Animating in Maya

FBX Maya Plugins software supports the following:

<b>FCurves (channels)</b>	For the clamped interpolation and weighted tangents, FCurves are resampled at the rate set in the Export dialog box.
<b>Pivots</b>	Supported. You can only retain the current scene's pivot information.

FCurves with unsupported interpolation or Transformation FCurves on an object using rotate axes or joint orientation (whose values are located in the Attributes editor) are resampled at the rate set in the Export dialog box.

## Exporting Files in Maya

Export all (>File) commands using the *.fbx* format. This also saves an *.mb* or *.ma* file as a backup file.

## Opening Maya Files in MotionBuilder Software

Animate your character using your FBX Maya Plugins software (Control Sets, Constraints, motion capture data, and so on). Transfer all the animations (character>plot animation) to the character's bones.

## Saving Maya Scenes in *.fbx* Format.

Import this new file in the original Maya scene (Merge Back).



### Note:

*During exclusive merge, the .fbx import does not duplicate any elements that already exist; it only transfers the animations on these nodes.*

MotionBuilder software does not support the following:

<b>Cubic interpolation with TCB tangents</b>	These curves are resampled at the frame rate selected in the Import dialog box.
--	---

If you are merging back Blend Shape animations, you must not have a keyframe on the Blend Shape Input attribute of the Blend Shape base node at any time point on the timeline in Maya before importing the *.fbx* file.

## Flexors and Other 'Unsupported' Features

**Working with Lattices:** If the binding of your character is done through Lattices, only export/import the skeleton of your character.

Start with an 'extreme motion' take to cover most of the deformations so you do not have to verify the deformations on every take. This lets you to work only with a skeleton import/export.

## Supported Maya Features

The following table lists the Maya import and export features supported by FBX Maya Plugins software:

<p><b>Exporting .fbx files for MotionBuilder software</b></p>	<p>Meshes, NURBs, and skeletons. Cluster deformations and skeleton cluster deformations are supported.</p> <p>Only simple materials are supported: Phong. Texture mapping is converted as UV Maps. Placement and Rotation is supported. Procedural textures are not supported. Blend Shape deformations are supported, provided that the target is not deleted.</p> <p>Blend Shape channels must already have at least one key when an .fbx file is merged back.</p> <p>Rotation pivot and scaling pivot of models must be exactly the same before exporting.</p> <p>User attributes are supported.</p>
<p><b>Importing .fbx files into Maya</b></p>	<p>Meshes, NURBs, and Skeletons created by Maya are supported, as well as Material, Textures, and animations.</p> <p>User attributes are supported.</p>
<p><b>Same Node Names</b></p>	<p>Supported.</p>

## Known Limitations

This section lists the fixed bugs and the known limitations in the 6.0.2 version of the Maya FBX plugin.

## Constant Key Reducer

In versions prior to 5.2, the Constant Key Reducer option was active regardless of whether it was activated or disabled in the Export dialog.

Whenever you exported, the keys in the Maya animation would be reduced.

This option has been fixed in v6.0.2 of the FBX Maya Plugin. You may now disable the Constant Key Reducer in the Export dialog.

## Other Limitations

The following are other known limitations of the FBX Maya Plugins:

- Scaling and rotation on clusters may not behave as expected if the pivot is not at the cluster origin.
- The import of Rigid Bind elements will be deformed two times. We recommend that you merge back your scene with the original to prevent this behavior.
- The Visibility FCurve adjusts itself to contain only 0 or 1 values. Also the FCurve is converted to Constant (step) interpolation. Therefore, any value above 0 is considered as 1 (visible) and any value below or equal 0 is considered 0 (invisible).

When exporting, if the Tangent type is Slow or Fast, the plugin resamples objects. Objects are also resample if the OutTangent is Linear and the InTangent is different, or the OutTangent is Flat, Smooth, or Fixed and the InTangent is not Flat, Smooth or Fixed.

Nurbs display precision is supported and exported as StepU and StepV parameters in FBX Maya Plugins software. Both U and V are assigned the same value; as in Maya, its value is unique. Values of the Precision parameters are clamped to a maximum of 15 (The software's limit).

When importing, the maximum value between the StepU and StepV is used.

When Shape objects (used in the Blend Shape) have the same name as other objects in the scene, the name clashing solver can behave erratically. Avoid this by using different names for models.

Maya's AMBIENT lights are not supported for now and are exported as NULL objects. Area lights are exported as a Point light.

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*Known Limitations*

The Maya plugin is only capable of processing upstream Blend Shape deformer. It processes the Default, Front of Chain, and Before modes.

The renaming strategy is used for two scenarios:

- Multiple instances have the same name. A symbolic code is used to keep coherence between the two algorithms. Although the plug-in cannot write names in the form name (x), it still able to read them.

The new suffix is then: `_ncl1_X`, where X is the instance number.

- Upper/lower case conflicts. In this case the suffix is more complex since it must keep track of which character was/is upper/lower case in order to be able to convert back on import/merge.

The following suffixes are used to indicate the case:

<b>Indicates case</b>	<code>_ncl2</code>
<b>Marks characters that were originally upper case and have become lower case</b>	<code>_ulXXXX</code>
<b>Marks characters that were originally lower case and have become upper case:</b>	<code>_luXXXX</code> Where XXXX is an integer number that represents the character position in the string (bitwise). For example, <code>_ul5</code> indicates that the first and third characters in the string have been changed from upper to lower case. A suffix can be made of the combination of <code>_ul</code> and <code>_lu</code> sub-suffixes.

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*Known Limitations*





## Chapter 3

# Maya MEL Scripting

## Overview

This chapter contains the command required for scripting with Maya Mel commands.

All FBX Maya Plugins' MEL commands begin with the FBX prefix. They display error messages on the script console when they are used incorrectly. The MEL commands that are registered by the plugin are listed in the Plugin Manager information dialog box.

## Maya MEL Scripting

To take advantage of the following MEL commands, you must have the Maya plugin installed on your computer.

### FBXBatchDialog Box

Display the Batch dialog box. The Batch dialog box contains all import controls and export controls displayed by the Import dialog box and the Export dialog box, plus a check box to enable or disable those user interfaces.

The Batch Dialog box must be opened from the script editor. Since you must use this MEL command to disable the import/export user interfaces, you can call it again when it's time to re-enable the import/export user interfaces.

### FBXResamplingRate -v [float]

Set the rate at which the exporter produces keyframes when it needs to resample data.

Resampling is needed when the interpolation of the Maya animation curve cannot be perfectly represented by curves in MotionBuilder, MotionBuilder Professional, Alias MoCap, and Alias OnLine.

### FBXExport -f [filename]

Export the specified file. If FBXExportShowUI is true, the Export dialog box is shown.

### FBXExportShowUI -v [true | false]

True	Displays the Export dialog box each time user clicks File > Export or uses the FBXExport MEL command.
False	Never displays the Export dialog box. The only way to have the Export dialog box displayed again is to set this flag to "true" by using this MEL command or by checking the appropriate check box in the Batch dialog box.

### FBXImport -f [filename] -t [take index]

Import the specified file. If FBXImportShowUI is true, the Import dialog box is shown. The file imported is the one accessible for take querying after the execution of the command.

## FBXExportApplyConstantKeyReducer -v [true|false]

<b>True</b>	FBX animation FCurves are filtered through a Constant Key reducer. This eliminates constant keys on a FCurve and helps to reduce the size of resampled FCurves, especially Scale.
<b>False</b>	If you want keys to occur at a defined time, even if they are constant and appear to be unnecessary, set the flag to False. This ensures that the animation data is not filtered.

## FBXImportMode -v [exmerge|add|merge]

There are three possible states:

<b>Exmerge</b>	Merges the imported <i>.fbx</i> file to the current scene in the following way:  Nodes of the same name and nature will have only their animation curve replaced. No new nodes are created.
<b>Add</b>	A new scene is created prior to the file import.
<b>Merge</b>	Merges the imported <i>.fbx</i> file to the current scene in the following way: any node without its equivalent in the scene is created. Nodes with the same name but not of the same nature, for example, sphere and bone, are replaced. Nodes with the same name and nature only have their animation replaced.

## FBXImportMergeBackNullsPivots -v [true|false]

<b>True</b>	The rotation transformation of the null (or joints) elements in the hierarchy that are used as pre rotation and post rotation are respectively assigned to the joint orient and the rotate axis of the original node.  The pre rotation and post rotation node are then deleted.  The look-up is done on a name basis since the pre rotation node's name contains the <i>__Pre_</i> suffix while the post rotation node's name will have a <i>__Post_</i> suffix.  This function should be used when the scene was exported using the FBXExportReplacePivotsByNulls script set as True.
-------------	---



**Note:**

*When the import mode is set to exmerge or merge this option is automatically set to True.*

## FBXImportShowUI -v [true|false]

In the Import dialog box, there is no check box for this flag. It is important to understand that once FBXImportShowUI is turned off (false), the user interface does not appear until FBXImportShowUI is set to true. There are two possible states:

<b>True</b>	Displays the Import dialog box each time user clicks File > Import or uses the FBXImport MEL command.
<b>False</b>	Never display the Import dialog box. The only way to have the Import dialog box displayed again is to set this flag to "true" by using this MEL command or by checking the appropriate check box in the Batch dialog box.

## **FBXRead -f [filename]**

Read the specified *.fbx* file without actually importing anything into Maya. Instead, the file is stored in a buffer. Use this command for take querying.

Once read or imported, you can use the commands `FBXGetTakeCount`, `FBXGetTakeName`, `FBXGetTakeIndex` for take querying.

Make sure the file you are reading matches an existing file name. The file in the buffer is destroyed if a user attempts to read or import a non-existent file.

## **FBXGetTakeCount**

Returns the number of takes saved in the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXGetTakeIndex [take name]**

Returns the index of the first take named as the parameter in the take array. This command works on the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXGetTakeName [index]**

Returns the name of the take at the specified index in the take array. This command works on the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXGetTakeComment [index]**

Returns the comment attached to the take at the specified index in the take array. This command works on the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXGetTakeLocalTimeSpan [index]**

Returns the local start and local stop time of the take at the specified index in the take array. This command works on the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXGetTakeReferenceTime Span [index]**

Returns the reference start and reference stop time of the take at the specified index in the take array. This command works on the file stored in the file buffer. You can load a file into the file buffer using the `FBXRead` command.

## **FBXImportConvertDeformingNullsToJoint -v [true|false]**

As Maya does not support null elements in a bone hierarchy, when this option is set to true, all faulty nulls elements found are transformed into joint nodes.

## **FBXImportHardEdges -v [true|false]**

When set to true, all vertices located at the same exact position are merged back as a unique vertex. The plug-in then finds out if the edges connected to each vertex are hard edges or smooth edges, depending on their normals.

This function should be used when `FBXExportHardEdges` was set to True on export.

## **FBXExportReplacePivotsByNulls-v [true|false]**

When set to true, all joint orient and joint rotation axis transformation are converted to null (or joints) elements in the hierarchy. The joint orient becomes a pre-rotation node and will have the suffix `__Pre_` in its name. The rotation axis becomes a post rotation node and has the suffix `__Post_` in its name.

For example, if you set a joint orient value and a rotate axis value other than zero, the resulting hierarchy contains a new node taking the joint orient transformation. The joint and new node then take the rotate axis transformation.

When exporting your skeleton hierarchy using this mode, and importing back your animated hierarchy with the `"FBXImportMode -v exmerge"` option, your IK setup is unchanged.

This function works properly for skeleton hierarchy only.

## **FBXExportEmbeddedTextures -v true|false**

When The value is set to true all textures are saved