

A complex, abstract 3D rendering composed of numerous metallic, organic-shaped components. These components include long, thin, curved tubes, larger bulbous structures, and smaller, rounded shapes. The surfaces are highly reflective, creating intricate patterns of light and shadow. The overall effect is one of a dense, mechanical, or biological structure.

New Features Guide

AUTODESK®
3DS MAX®

8

Autodesk®

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Introduction

The *3ds Max 8 New Features Guide* is intended to guide current users of Autodesk® 3ds Max® through major new features added in this version of the software.

This guide attempts to explain concepts and features in a graphic and immediate way; it assumes a good, prior knowledge of the software.

Each feature is explained so that users can start using it as soon as possible. Some details and some minor features might not be present in this guide. After reading this guide, you will be able to explore the new features and start using them quickly.

This guide is not a substitute for the online reference and the tutorials. The *3ds Max 8 User Reference* documents all feature details; if you have no previous knowledge of the software, you'll want to start learning the program by following the tutorials.

User Interface

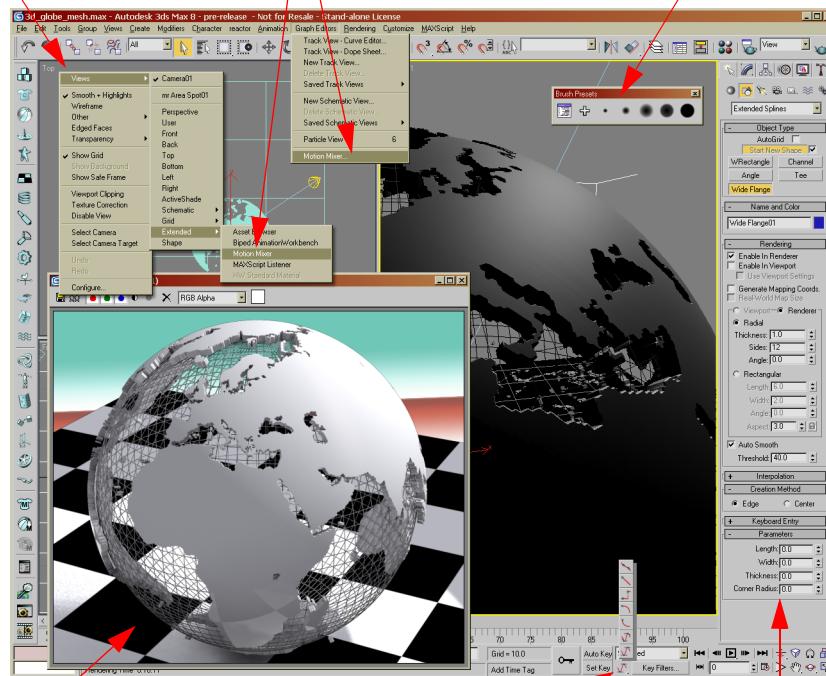
Main User Interface Changes 2

1

Main User Interface Changes

This topic is a summary of the main user interface changes, as well as changes or improvements to commonly used tools.

The viewport right-click menu now has the Views entry at the top for fast access to viewport switching.



mental ray 3.4 is included and provides additional options and a new enhanced final gather sampling algorithm.

The Motion Mixer has been enhanced and now manages all type of animation, not just biped clips.

You can now choose the default tangent type for new animation keys from this flyout in the animation controls.

A new toolbar has been added for mesh painting brush presets. See the Brush Presets topic in this guide for more information.

Functionality from VIZ 2006 has been integrated, including radiosity adaptive mesh subdivision, real-world mapping, and new parametric spline objects.

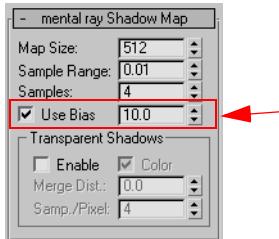
Recent File List

The Open Recent file list in the File menu can now hold up to 50 files. You can change the default number (9) in the Files panel of the Preferences dialog.

mental ray 3.4

A new version of mental ray is included with 3ds Max 8. mental ray 3.4 adds features and improves quality. Of special significance is the rewritten final gather sampling, which allows a lower number of rays to produce quality results.

Additional features and changes to the mental ray 3.4 integration can be seen in the mental ray user interface description in the Render Dialog topic in this guide.



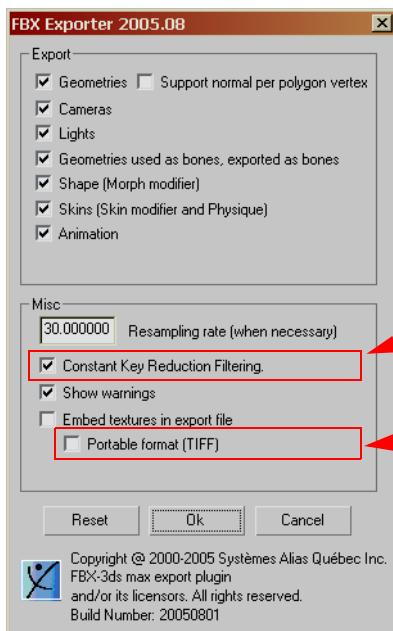
Another noteworthy change is the ability to use a shadow map Bias with the mental ray Shadow Map.

mental ray Network Rendering

Network rendering of 3ds Max scenes (MAX files) with mental ray via Backburner and the command line is no longer bound to a single license. Therefore, an unlimited number of CPUs can be used, effectively behaving exactly as with the 3ds Max default scanline renderer. Standalone licenses are still required when rendering MI files (using ray.exe).

Filmbox Import and Export

A new version of the Filmbox import/export plugin is included. The new exporter is now called "Alias (*.FBX)".



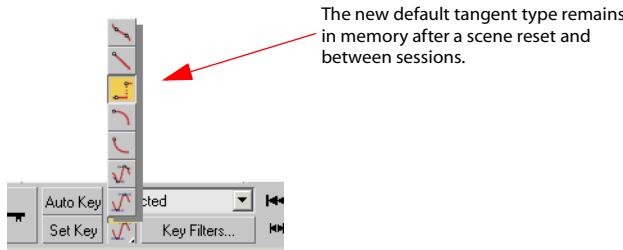
New options are available on the Exporter settings dialog.

Constant Key Reduction Filtering: When on, any position, rotation, or scale keys that do not change during an animation are removed during the export process to reduce file size and complexity.

Portable Format (TIFF): When on, stores bitmaps used in materials in a baseline TIFF format, which is highly portable.

Default In/Out Tangents For New Keys

When setting new animation keys, you can use this flyout for quick access to default tangent types. Changing the default tangent type sets both the in and out tangents for new keys.



MAXScript SQL Access

MAXScript SQL Connect and Queries lets programmers and TDs build scripts to query a database, permitting increased automation within a complex pipeline. See the MAXScript Reference for the SafeArrayWrapper class for examples.

Full MAXScript Support for Controllers

Rewritten expression and scripted controllers now have full MAXScript support. Name dependencies have been removed so that scripted controllers can be merged, XRefed, and copied in the same way as other controller types.

XForm Sub-Object

Xform no longer activates its Gizmo sub-object level by default when selecting it on the stack. This helps avoid undesired transforms of objects via the Xform gizmo rather than transforms to the base object.

Autodesk Inventor and Autodesk Revit Compatibility

Autodesk Inventor IPT and IAM are the native Autodesk Inventor® file formats for parts (IPT) and assemblies (IAM). You can now import both file formats into 3ds Max without having to copy scripts from the install CD. The components of models that you import into 3ds Max retain their object naming as assigned in Autodesk Inventor and appear as editable meshes. Once imported, you can edit the model just as you would any other type of object that you construct. You can apply modifiers, alter materials, add lighting and cameras, create animations, et cetera.

Autodesk Revit users can now create high-quality images of their models with 3ds Max by importing or linking a Revit model via the DWG format, and having the scene objects correspond directly to individual Revit objects.

DWF Export

With the included DWF exporter, you can share designs by exporting 3D models from 3ds Max for viewing with Autodesk DWF Viewer and Autodesk DWF Composer.

Scene Management

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2

Asset Tracking

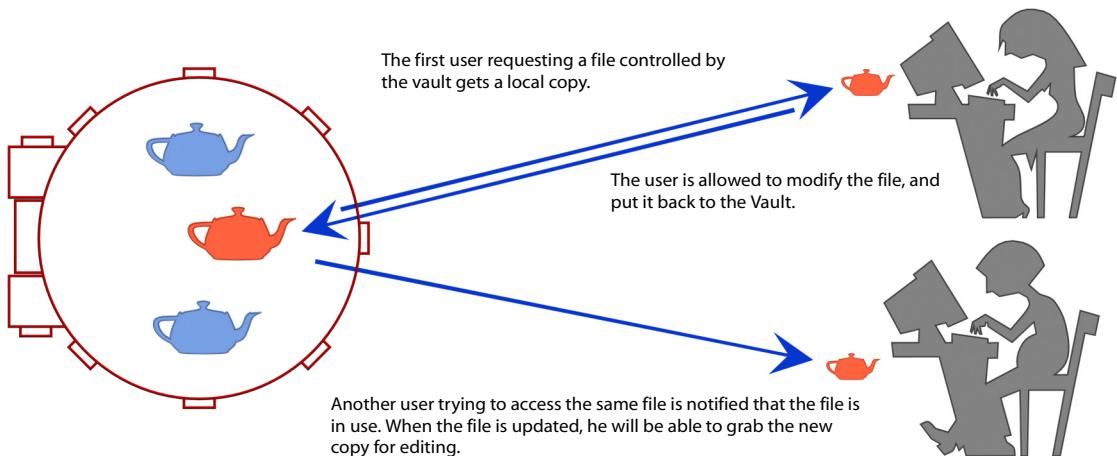


3ds Max 8 adds an integrated user interface to Asset Tracking Systems (ATS), including Autodesk Vault and other systems supporting the MSSCC standard, like Microsoft® SourceSafe and Perforce.

The integration with Autodesk Vault allows you to share and manage assets with other Autodesk products, and also gives you a couple of extra options. This topic assumes you're using Vault, but the general information here is also valid for other asset-tracking systems.

What Does Vault Do?

Asset tracking gives you the ability to centralize your data files, control user access so that data does not get overwritten, keep previous versions in case they're needed, and more.



The Autodesk Data Management Server

The server part of Autodesk Vault is a standalone installation. Project administrators take care of its maintenance, so most users will not have to worry about it. It usually runs on a dedicated server computer.

The Vault Server keeps all the data files in a central location, and provides tools for data archiving and access control.

For each managed file, the server records past user access, current status, and comments. Autodesk Vault also records all dependency information for MAX files and the assets they use; other systems do not track these types of data.

The Vault Client

The client is the part of the Vault installed on your computer. The client logs in to the server, and access the files following specific rules. A local file structure that mirrors the server structure is used for editing files.

The client compares the local copy of the Vault files and notifies users about updates. It also allows users to grab and update files, add, or remove them.

The client comes with a specific browser that lets you view and access the files managed by the server. However, in most cases you can avoid using it because most of its functionality has been integrated into the 3ds Max Asset Tracking dialog.

Basic User Workflow

A user who works on a project managed by the Vault needs to follow extra steps to interact with the Vault asset-management system.

Local file structure: The first step, which needs to be done only once, is to create a “working” directory on the local hard disk to be used as a mirror of the Vault file structure.

Files are copied locally and edited here before being updated to the Vault. Files that you want to add to the Vault must also be put here first.

Log in/Log out: The administrator can give you the server name and specific Vault (there can be a different one for each project). The login process connects you to a specific Vault. You can make the login automatic, so it's not necessary to connect manually every time you start 3ds Max.

Open from Vault: This new option in the file menu will open a file and let you browse for it, but the location will be the Vault structure rather than a directory on the hard disk or network share.

Check out/Check in: Checking out a file from the vault means copying it from the Vault to the local copy of the Vault structure, and locking the file as it is now in your possession for editing. Other users can see the file, and are not able to check it out for editing.

Checking the file back in updates the Vault copy of the file, and lets other users update their copies and eventually check it out again for further editing.

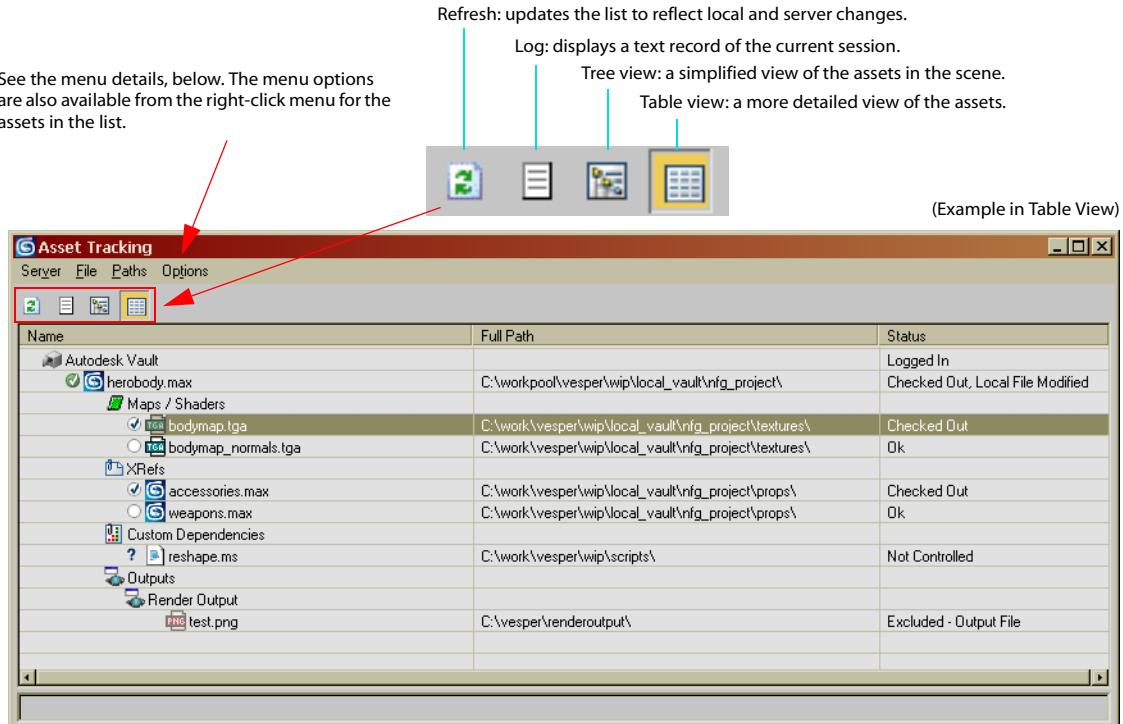
Adding files: When you create new files, you can add them to the Vault if they reside in the local working directory and are used by the 3ds Max scene. Additional options for adding files might require the use of the client Vault browser, which is named Explorer.

Update: Update, or Sync, means getting the latest files from the Vault to the local structure. It can be a manual operation, but files are also updated when you check them out.

The Asset Tracking Dialog

All the files related to the current scene are displayed in the Asset Tracking dialog, available from the File menu.

In this dialog you can check files out and in, sync them, add new ones, and perform other user-specific functions.



The Name column shows the current open scene file, and the assets contained in the scene grouped by type. The small icon in front of each file shows the file status. Icons are detailed on the following pages.

The second column shows the file path to the local copy of the Vault files.

The third column provides details about the file status, including any warnings and other information.

The Server Menu

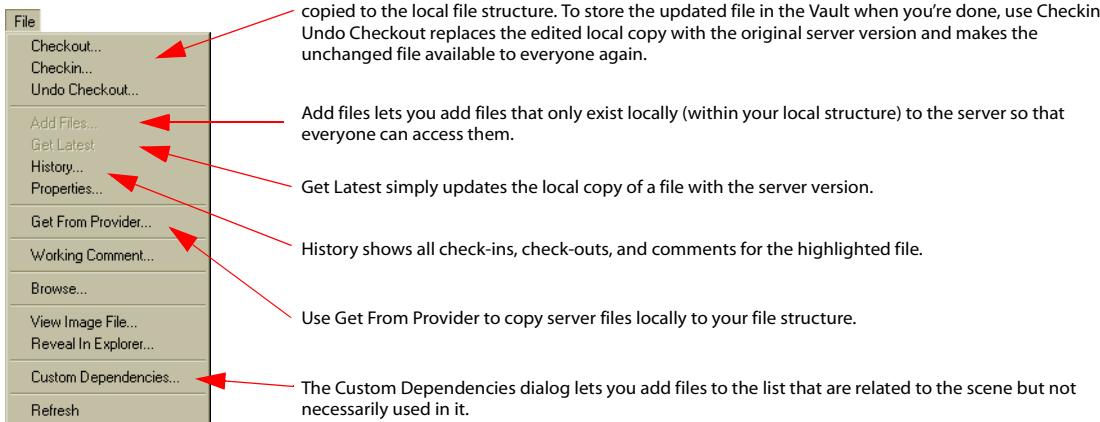


Use Log in to access a Vault server and a specific project database. For details, see the Log In Dialog section, following.

If you need to access a different project database, log out and log in again.

Starts the ATS specific client application or browser. This allows you to manage the Vault files with more options and flexibility.

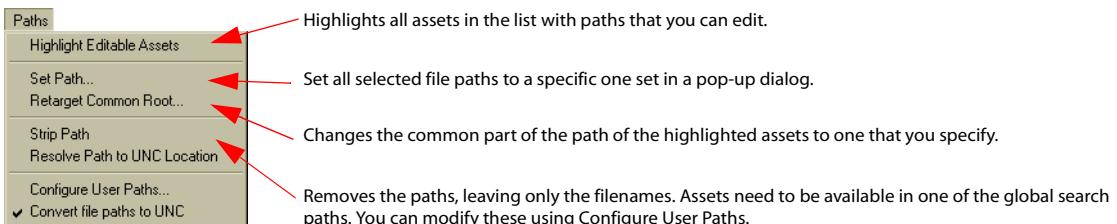
The File Menu



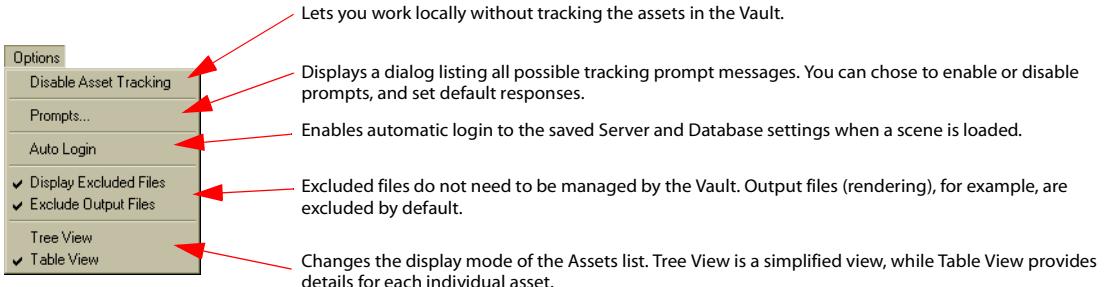
The Path Menu

This menu contains tools that let you change paths to individual or groups of assets within the scene. Some of these tools were in the Bitmap/Photometric Paths utility (which is still available) but are now integrated into the broader Asset Tracking toolset.

Note that these tools do not require the Vault, and are available for any scene.



The Options Menu



For further information, please see the 3ds Max reference and other documentation specific to the ATS system in use.

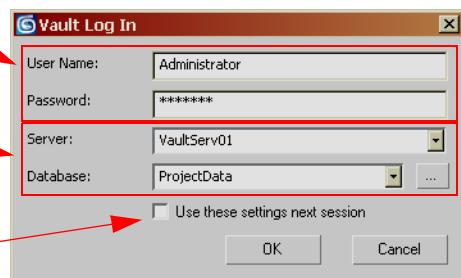
The Log In Dialog

The login dialog is the same no matter what ATS systems is used.

Logging in to a Server requires a user name and password that are set up by an administrator.

Server and Database specify the Vault you want to access. A server can have more than one database.
A database is usually dedicated to a single project.

Enable this option to save the settings so that you will not need to type them again next time you log in.



The Options Dialog

The Options dialog can be accessed from the Server menu or the right-click menu.

Here is where you set the paths to your local file structure mirroring the Vault.

When enabled, this option will log you in to the Vault using the last saved settings as specified in the Log In dialog instead of prompting for log-in info.



Icons

Here is a summary of the status icons that appear in front of each asset file name in the list (Tree or Table View) of the Asset tracking dialog.



- No icon means that the file is on the Vault, but not on your local file structure.
- File is available for checkout. Local file is up to date.
- File is available for checkout, but your local copy is newer than the server one.
- File is available for checkout. Local file is not up to date.
- File is checked out to you and is up to date.
- File is checked out to you and local copy has been edited and is newer than the one on the server.
- File is checked out by someone else. Your local copy matches the server file.
- File is checked out by someone else but your local copy is newer than the server file.
- File is checked out by someone else. Your local copy is not up to date.
- Status not available. (You might not be logged in to the server.)
- File not managed by the Vault.
- (Provider line) You are not logged in.
- (Provider line) Logged in to the ATS.

XRef Enhancements

XRefs have been enhanced, and the XRef Objects dialog redesigned.

Creates a new record (MAX file and XRef objects). The Open File dialog lets you choose a MAX file, and then the scene objects are listed so you can choose the ones to reference.

Removes a record from the list and all the relative XRef objects.

Merges records using the same MAX source file into a single record.

Enables or disables the current highlighted records.

If **Include All** is on, when you create a new record all objects in the MAX file are added and the list of objects for selection is bypassed.

Adds objects to the record. A dialog showing the remaining objects available in the record source scene is displayed.

If all objects are already in the record, no dialog is shown.

Deletes the highlighted XRef object from the scene and the record.

Merges the highlighted objects into the scene.

Objects can be renamed on the fly to avoid name conflicts with other scene objects. The original name in the source scene maintains the relationship.

Updates all the XRef entries. Use it when objects or materials change in the source MAX files.

Merges all the XRef objects for the selected records into the scene.

Creates a new XRef for the selected scene objects. You are prompted to save a new MAX file that includes the selected objects, and then a new XRef record for them is created.

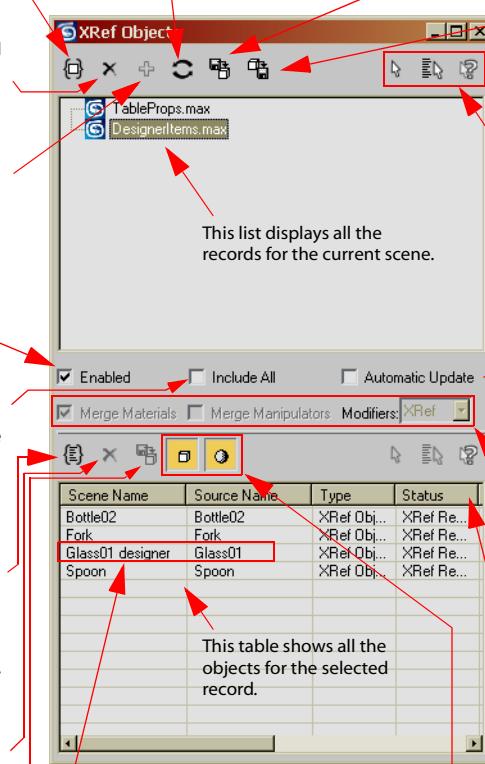
These tools select or highlight the objects in the scene or in the records based on the current record or scene object selection.

With Automatic Update enabled, changes to the source MAX files are detected automatically and the relative objects updated.

These settings are only available when first setting up a record, and are grayed out once a record is established. They reflect the current record settings when grayed out.

The Status column shows if an object is properly referenced or if it was not found.

Enables or disables the list of objects or materials for the current record.



XRef Scene Overlay Option

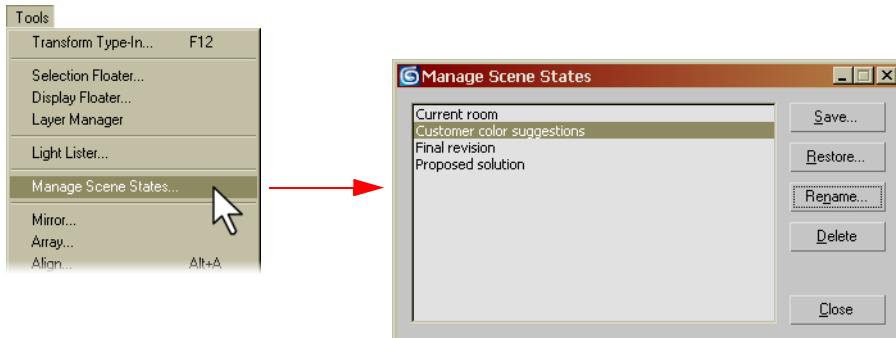


This new option in the XRef Scene dialog designates the selected XRef scene as an overlay. An Overlay XRef is excluded when other scenes XRef the current one. This lets you avoid circular references.

Scene States

This tool lets you save and restores specific properties of scene elements. The main purpose of this tool is to create different versions of a scene without actually creating separate scenes.

This is very convenient in that it lets you make changes in a scene without needing to propagate the changes throughout multiple files.



Definition of "State"

What defines a State are the properties of scene objects, layers, materials, and environment settings. In particular, a scene state can store the position and orientation of lights and cameras.

This is a tool for finished scenes, not for works in progress. A typical use could be in a room interior scene, where you want to try different combinations of lighting, colors, and decor.



In this first state, we have some objects that have been hidden, the main light on the ceiling off, and a first color scheme for this room. This could represent the current situation of the room, before a redesign.



In the second state we can test a new room design. Some objects have been hidden and others made visible. The main light is off, and the mirror lights are now on and have been moved to a new position.

The color scheme is different.



For this third image, we restored everything from the first state except the materials, so we can compare the current room design with just the new color scheme.

What is Saved and Restored

Here is a list of what is saved within a Scene State. Note that each of these elements is optional at save and restore time, as you will see when we describe the Save Scene State and Restore Scene State dialogs.

- **Light Properties:** The properties from the lights' Modify panel rollouts, such as On/Off status, color, shadow On/Off and settings. Also light-object properties, such as the Renderable flag, Motion Blur, Advanced Lighting, and mental ray Indirect Illumination settings.
- **Light Transforms:** The position and rotation of light objects and targets.
- **Object Properties:** The settings from the Object Properties dialog, including Visibility, Rendering Controls, Display, Motion Blur settings, and Hidden/Frozen status. Also, Advanced Lighting and mental ray Indirect Illumination settings.
- **Camera Properties:** The camera properties from the cameras' Modify panel rollouts, such as Field of View, ranges, and Depth of Field or Multi-Pass effects.
- **Camera Transforms:** The position and rotation of camera objects and targets.
- **Layer Properties:** The settings of each layer.
- **Layer Assignment:** The objects assigned to each layer.
- **Materials:** The current scene materials and their assignment to objects. This does not affect the Material Editor slots. Note that at restore time, Material Editor slots might become unassigned because of material swapping in the scene.
- **Environment:** The settings from the Environment dialog, like background, Global Lighting, and Exposure Control. Atmospheric effects and Rendering Effects are excluded.

States are saved within the MAX file, so they are available when you open the file. There are no separate files to carry along with the MAX file.

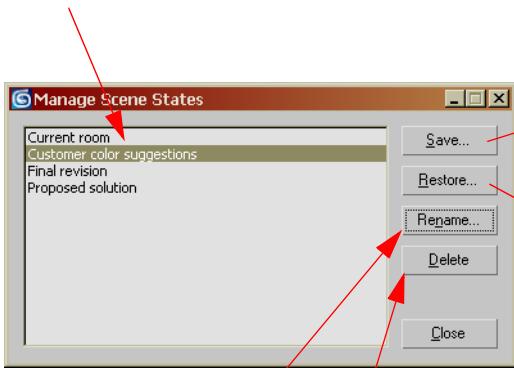
Batch Rendering

This feature is particularly advantageous when used in conjunction with the new Batch Rendering tool, described in a separate topic.

With batch rendering and states, you can render multiple stills of the various states in a single operation that can be set to run overnight.

User Interface

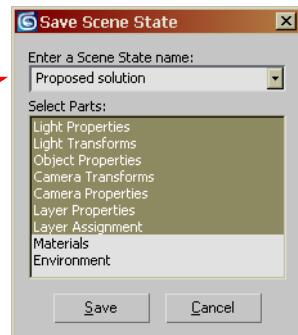
The list shows all the states that have been saved. Use a descriptive name with as much detail as possible.



Use Rename to change the name of the highlighted state.

Use Delete to remove the highlighted state from the list.

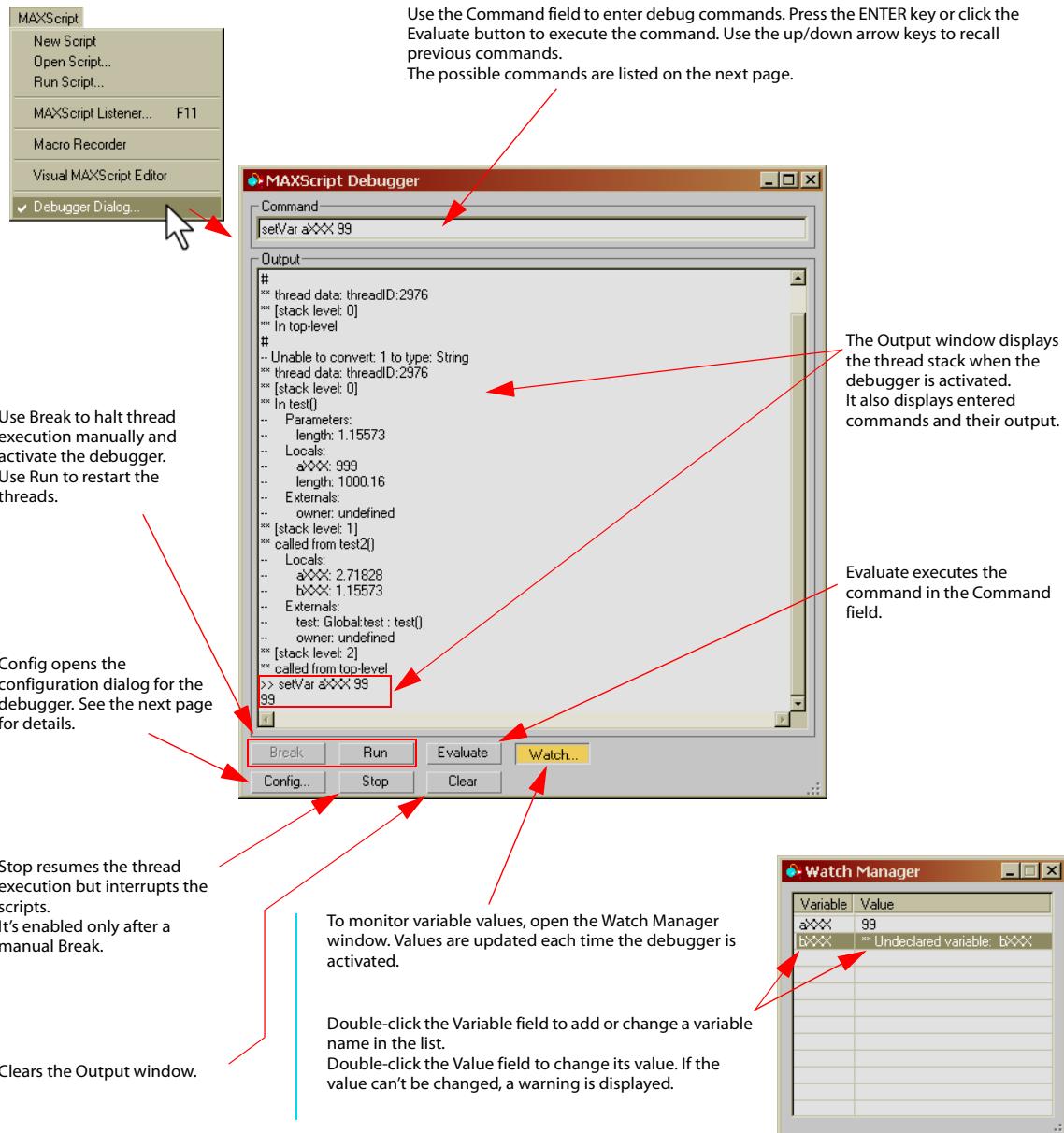
The Save Scene State dialog lets you type in the name of the state or choose an existing one from the drop-down list if you want to overwrite it. Then highlight the parts you want to save for the state. If you prefer, you can simply save all of them and then restore selectively.



Use Restore to restore the scene to the selected state. You can choose a different state from the drop-down list. If you want only certain parts, highlight the ones you want to restore before clicking Restore.

MAXScript Debugger

The MAXScript Debugger is a thread-analysis tool that can be activated manually or on an error. When activated, all 3ds Max threads other than the debugger threads are suspended to allow the current status to be analyzed. While in this mode, because no threads are running, 3ds Max is unresponsive in the background until the threads are restarted.



Available Commands

- **threads** - List all threads.
- **setThread < integer literal >** - Set specified thread as active thread.
- **stack** - Dump stack for active thread.
- **setFrame < integer literal >** - Set specified frame as active frame.
- **locals {<string literal>}** - Dump variables for current active thread and active frame. If a string literal is specified, the locals for the specified variable are dumped.
- **getVar < string literal >** - Get value for specified variable, starting search from active frame.
- **setVar < string literal > < expr >** - Set value for specified variable, starting search from active frame; expression is evaluated in active frame's scope.
- **eval < expr >** - Evaluate expression; expression is evaluated in active frame's scope.
- **? -** Display list of debugger commands.

Configuration Dialog

These options set the conditions for the automatic activation of the debugger. If a throw, error, or exception occurs, the debugger is activated and all threads are stopped.

These options specify if the debugger should be enabled under quiet mode, net render, and unsafe method calls.

Timeout before a command or stack dump execution automatically restarts all the threads.

Time to wait for a garbage collection to finish if a break was requested while one was in execution.

Restore the default settings for all the parameters.

If the condition for automatic activation is within a Try statement, you can choose to ignore it.

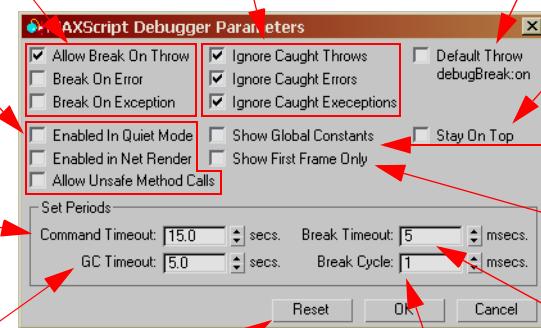
If the debugBreak keyword is not specified in a Throw statement, this setting determines if a break occurs.

The debugger is a non-modal dialog and can disappear behind other dialogs or the 3ds Max window. Use this option to keep it in foreground.

Shows global constants such as pi, e, random, or print, that are used in the frame being dumped.

Shows information for the first frame only, suppressing sub-frame information.

Timeout for a break attempt. If a break of all threads is not successful within this time, threads are restarted and another attempt is made.



The length of time to wait between break attempts.

OpenEXR Support

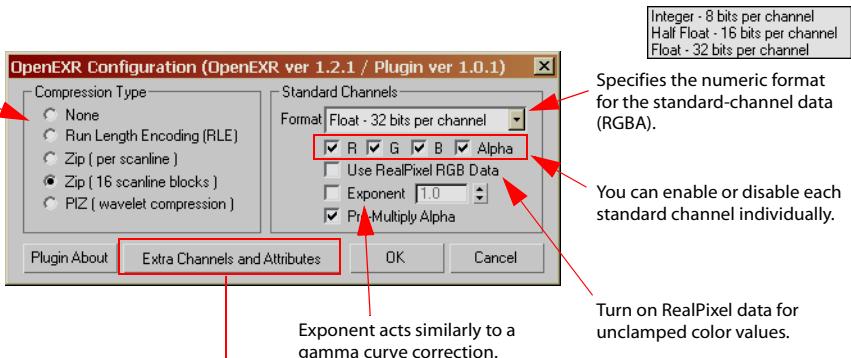
OpenEXR is a new image file format that can store floating-point data values. This makes it particularly useful for high dynamic range (HDR) images, among others.

OpenEXR is a new image format in addition to the many others already supported in 3ds Max. You can use it for input and output wherever a bitmap is accepted. The file extension is .exr.

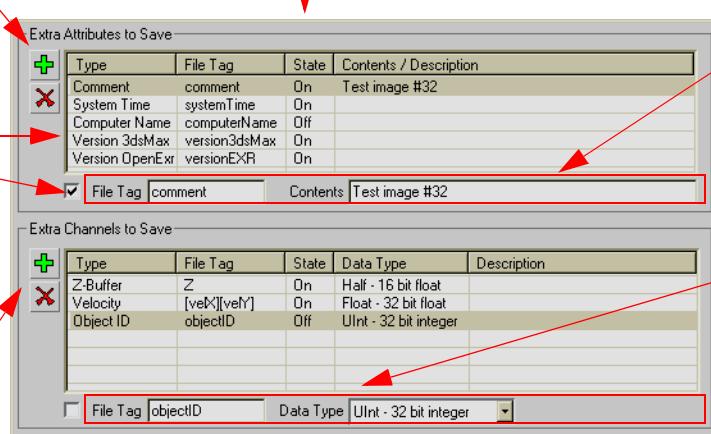
The OpenEXR format is quite flexible, and provides many options for controlling all the aspects of its data. You can see this from the many settings available in the Load and Save dialogs described here.

Save Options

OpenEXR supports a variety of compression options for the data.



Use the + button to add attributes from a predefined pop-up list. Use the X button to delete the highlighted attribute.



Load Options

This line marks the Black point. All the values below are considered black.

This line marks the White point. All the values above are considered white.

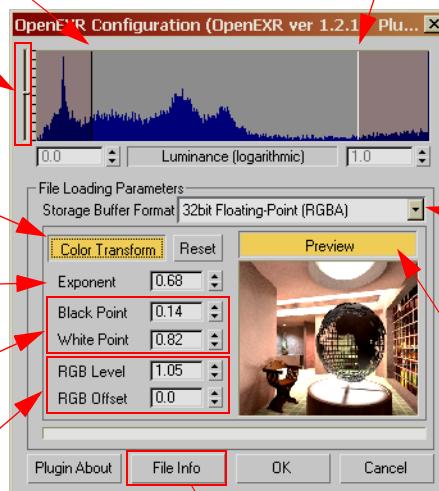
Drag this slider to scale the histogram vertically.

Click to enable the color transforms, managed by the parameters immediately below.

Exponent works similarly to a gamma correction.

Set the Black and White points here. The histogram range display will update.

RGB Level and Offset amplify and shift the RGB values.



Choose the numeric format for the buffer that will hold the loaded image. The formats supported are listed above.

Enable Preview to see the image thumbnail, and interactively view adjustments when tweaking the Color Transform parameters.

The File Information dialog shows all the details available for the file, including size, compression method, and image characteristics.

This table shows the saved attributes and their values.

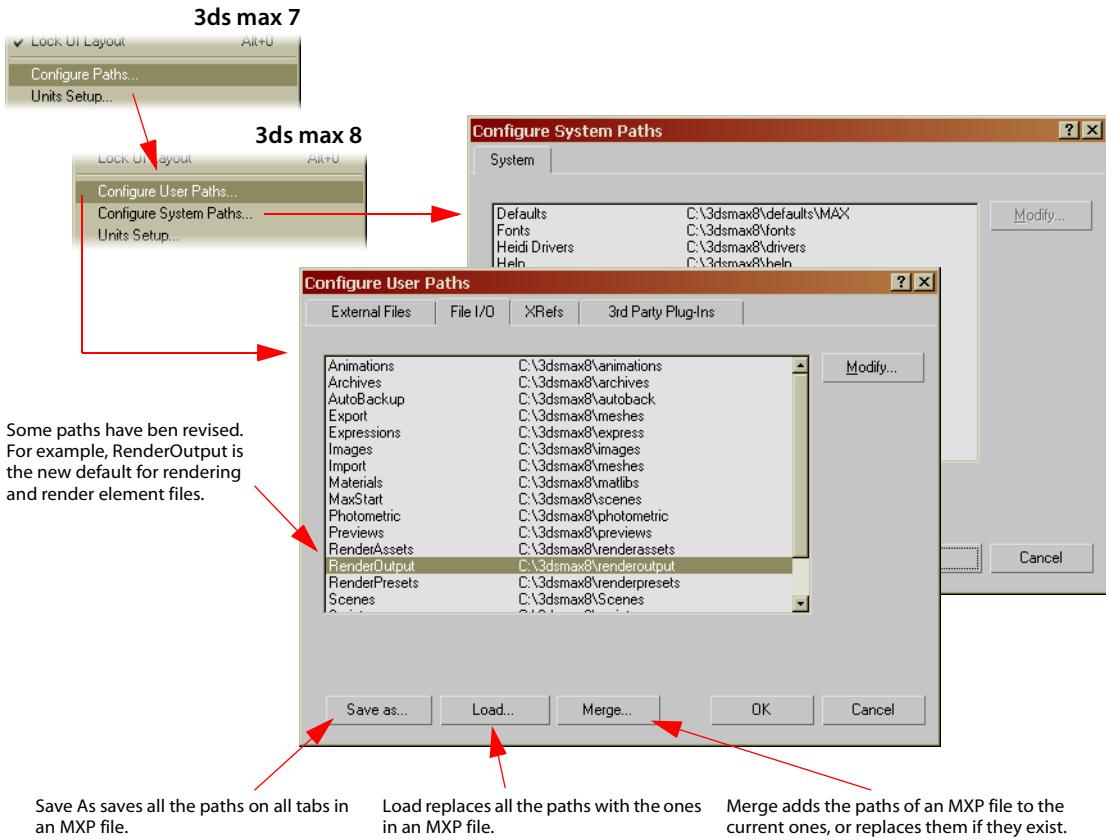
This table shows the available channels. (A=Alpha, R=Red, G=Green, B=Blue, Z=Depth, and so on). It also reports the numeric format in which the channel was saved.

OpenEXR File Information		
Filename: C:\vesper\renderoutput\room.exr	Date: 04/11/2005	Time: 16:35:00 PM
Size: 726456	Width: 320	Height: 240
Pixel Aspect: 1	Channels: 7	
Compression: Zip (scanline blocks)	Line Order: Increasing Y	
Data Window: [0.0] - [319.239]	Screen Center: [0.0]	
Display Window: [0.0] - [319.239]	Screen Width: 1	
Attribute List		
File Tag	Type	Contents
comment	string	Test image #32
systemTime	string	11d7m/2005y 23h35m15s
version3dsMax	string	3dsMax: 7.800 API: 16 SDK Rev: 0
versionEXR	string	Plugin: 1.0.1 OExr: 1.2.1 ZLib: 1.4.4
Channel List		
File Tag	Bit Depth	Sampling
A	32-bit floating-point	[1,1]
B	32-bit floating-point	[1,1]
G	32-bit floating-point	[1,1]
R	32-bit floating-point	[1,1]
Z	16-bit floating-point	[1,1]

Paths Configuration

The Configure Paths dialog has been split in two and reorganized, separating the path settings into System and User paths.

System paths are related to the 3ds Max installation, while the User paths are user or project specific. The Configure User Paths dialog lets you save and load path configurations.



Merge is useful only if a subset of paths is saved. For example, you can delete all paths except the maps ones, and then save a series of MXP files just for different server map locations.

Be sure to save your current paths before deleting them.

You can then restore your paths, and use Merge to change the map paths only, without affecting the others. The same file can be used by other members of your team to unify your work environments when collaborating on a project.

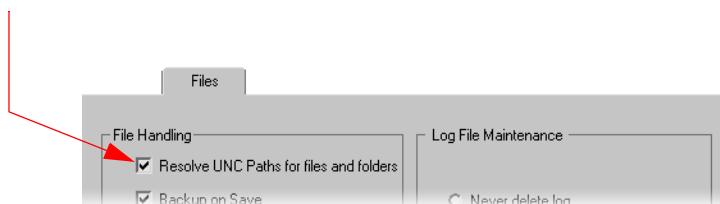
Preferences Dialog

UNC Path Resolve

The automatic resolve to UNC path names of network drive paths is now an option in the Preferences dialog > Files panel.

Previously, after browsing for a file on a network drive and selecting it, the path was converted from a drive letter path ("n:\myfolder\myfile.jpg") to a UNC path ("\server\share\myfolder\myfile.jpg") to assure that network rendering jobs would always have paths that work from any machine that participates in the process.

The option is on by default for compatibility with previous versions. Turn off the check box to keep paths with network drive references.

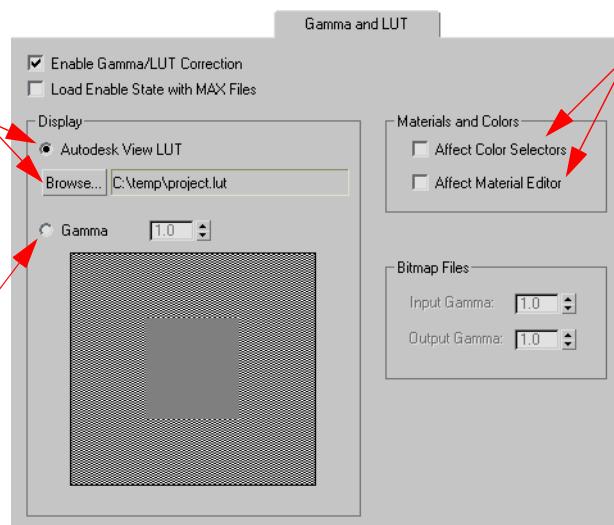


LUT Integration

A Look-Up Table (LUT) is a system used by other Autodesk products to provide consistency of image colors display between applications. In 3ds Max, support for LUTs is for display only. LUT files cannot be created within 3ds Max, but can be created in applications like Discreet® Inferno®, Discreet Flint®, and Discreet Smoke®.

Choose Autodesk View LUT and browse for a LUT file to use.
Only the image output and display is affected, not the way 3ds Max works internally during rendering.

Note that Gamma and LUT are exclusive. You can't use them both at the same time.



Turn on these options if you want the LUT or Gamma also to affect the display of the colors in the color selectors and in the Material Editor.

Mouse Wheel Zoom

There is a new Mouse Control option on the Viewport panel.



Real-World Mapping

The General panel includes a new option for Real-World Texture Coordinates. See the Real-World Mapping topic in this guide for details.

Modeling

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3

Hair And Fur



The Hair and Fur feature comprises a world-space modifier assigned to the geometric object to grow hair on and a render effect that renders the hair and composites it into the rendered image.

The modifier, called Hair and Fur (WSM), lets you define the look and style of the hair, while the render effect takes care of how the hair is used for rendering.

The render effect, called Hair and Fur, is automatically added when you apply the modifier to an object in the scene.

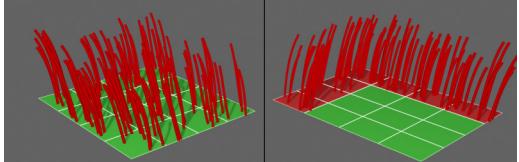
Despite its name, you can also apply this feature as an advanced scatter tool by using instanced geometry instead of the built-in hair. This allows you to use it for effects such as a grassy plain, a field of flowers, and porcupine quills.

Hair and Fur works with the Scanline renderer as well as mental ray. There are some differences between the two, but both give you the same basic results and features.

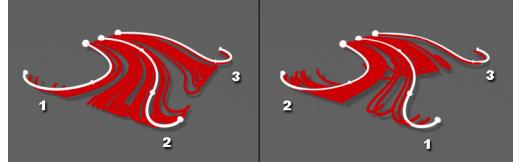


Mesh and Spline Based Hair

You can grow hair from a mesh or from splines simply by applying the modifier to a mesh or poly object, or to a spline object with multiple spline sub-objects that shape the hair mass. The modifier recognizes the kind of object it's applied to and works appropriately.



On a mesh, hair grows over the whole surface by default. With a sub-object selection, you can limit the area where hair grows. Sub-object selection is not available if the modifier is applied to splines.



On a spline object, hairs are created by interpolating between spline sub-objects in the order in which they were attached when the compound spline was created. If the order is wrong, detach the elements and reattach the splines in the correct sequence.

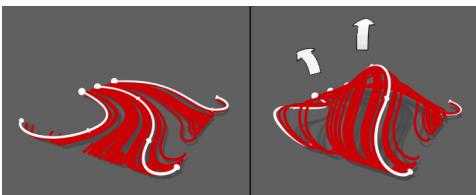
Hair and Fur Modifier

We'll start with an overview of the Hair and Fur features. Later in this topic, when we describe the user interface, you will find more details on each.

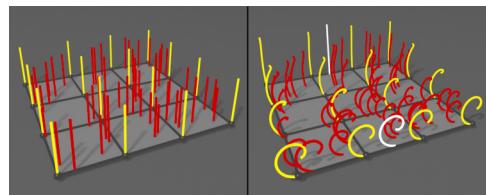
Hair Guides

It's impossible to manage thousands of hairs interactively. Thus, in your scene, you will see only a few red hairs to give you an idea of what the final hair will look like, and a set of lines, called guides, that you use to style the hairs. The rest of the hairs are added at render time, interpolated among the guides.

If you apply the Hair and Fur modifier to a spline, the sub-object splines serve as the guides. If you apply the modifier to a mesh, guides are created automatically at each geometry vertex. By default, they are hidden in the viewport, but can be enabled if you prefer.



With the modifier applied to a spline, the hair updates and re-interpolates between the revised shapes when you change the vertices. This gives you excellent control over the hair style but is limited to a manually manageable spline.



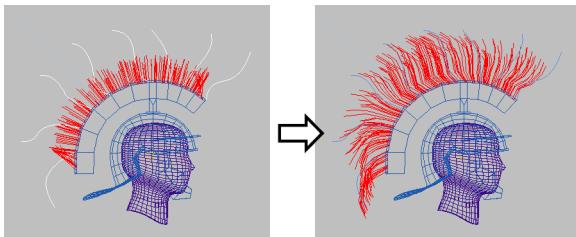
With the modifier applied to a mesh, you can have dozens or hundreds of guides (yellow lines, above). For high numbers of guides, styling is better done using automatic tools like the Style dialog, where you can "comb" hairs with mouse strokes.

Hair Styling

You can style hair in a variety of ways. If you are using the modifier on a spline, styling is, of course, defined by the splines themselves, as shown above.

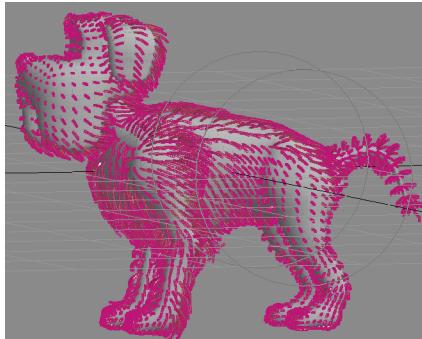
But when the modifier is applied to a mesh, you have two choices for styling: You can use external splines, or you can manipulate the guides directly in the Style dialog.

In the first case, you can create a separate spline object with individual splines defining the direction and shape of the hair, and then designate the object with Recomb From Splines. This method does involve interpolation, but the splines serve mainly as guides in space; that is, each hair gets its shape and length from the closest spline or splines. In fact, the splines don't really need to be on the surface, but it helps if they are, thus giving you a close visual match between splines and the resulting hair.



In the left-hand image, a spline object (the white lines) was created manually and aligned with the surface where the hair was grown. Recomb From Splines reshapes the hairs to match the volume defined by the spline.

Using the Style dialog instead gives you access to a set of useful combing tools. With these tools, you can comb the guides as you would comb real hair. We will look at the Style dialog and its toolset later in this topic.



The Style dialog displays your model and all the guides. With mouse strokes you can comb the guides to achieve the desired hairstyle.

Hair Look

The modifier provides parameters to define the look of the hair, including the amount, the thickness, the color and the frizziness. You can also map most of these parameters. Let's look at a few examples of how you can customize hair.

Density and thickness



Hair Count sets the total number of hair to render. Small surfaces require fewer hairs than large surfaces.
Hair Count sets the overall density.



You can also control hair count by using the Density setting, which acts as a multiplier. You can use a map to vary density in different parts of the surface.



You can control the root and the tip thickness of the hairs.

Scale



You can scale the default hair length uniformly or with a map. In this example a simple gradient map scales the hairs from 0% to 100%.



Another option randomly scales individual hair to give them a more natural look. In this example a gradient map is used to change this random scale. Hairs on the left are all the same length, while on the right there is a wide range of lengths.

Color

Color settings define the material of the hair. These are applied when hair is rendered as a rendering effect. Later you will see how hair can also be rendered as geometry, in which case you need to assign a material to the hair; this material overrides these settings.



The basic Color parameters let you set a different color for root and tip. The colors are interpolated along the hair length.



Alternatively, you can use maps to change hair color by area. You can use different maps for the hair roots and tips, and you can mix maps and solid colors (for tinting).



You can also set a random hue and value variation so that all the individual hairs are similar in color, but not exactly the same.



A final parameter that can add a great deal of realism is the percentage of mutant hairs. Mutant hairs are hairs that assume a different color than the rest, like human white hairs.

Material Properties



As with standard materials, you can also specify Glossiness and Specular values for hair.

Hair Style Variations

These controls let you add a natural shape and distribution variation to the hair.



Frizz adds curls to the root (top two images) or the tip of the hair (bottom two images). Frizz is random, but not at the individual hair level. Hairs are affected in small groups.



Kink is a more aggressive random displacement of the hair. It can be applied to the root (top example) or the tip (bottom).



Multi Strand generates a cluster of hairs around each original hair. This property applies more to short fur and simulating grass than human hair.

Hair Quality

These setting affects the overall quality of the hairs. Not every setting works for each rendering method. See the Hair and Fur Render Effect section, below, for more details.



You can specify how many rendering passes to perform. Each pass re-renders the same hairs slightly offset from the previous pass, and the sum of all passes increases the apparent thickness of the hair mass. Think of this process as a supersampling.



Hairs are divided into segments along their length. The higher the Hair Segments value, the smoother the curves, but the geometry also becomes more complex. Use a Hair Segments value appropriate for the hair length.

Instanced Hair

By default, individual hairs are just conical objects, but you can also specify any object to be used as individual hairs. The object is then instanced and modified, like a default hair.



The flower seen at the bottom is instanced as a group of hair. The flower is bent and oriented as standard hairs would be. When using instanced objects, you can choose to merge their original material (left), or use the hair geometry material.



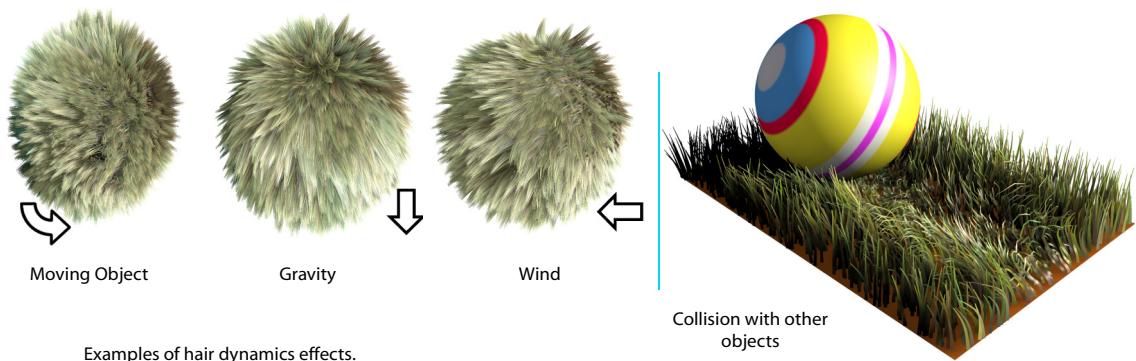
When using instanced objects as hairs, the root thickness controls the thickness of the whole object. The tip thickness is not used, but the instanced object can use a Taper modifier to achieve similar results.

Make sure your instanced object's pivot is close to the base, and that it has enough vertical segments to bend and be deformed as specified by the hair settings.

Also, remember that if your object is complex, during rendering the amount of objects could generate very large quantities of polygons.

Dynamics

When you use dynamics, the hair responds to motion of the base object and can also react to collisions with other objects and forces such as wind and gravity.



Examples of hair dynamics effects.

Lighting

Hair is lit either with a default omni light, which is managed internally by the hair renderer, or by using scene spotlights.



In a scene with no lights, or omni lights, the hair is lit by the default hair omni light. This internal lighting is useful while working on hair to preview the result quickly with a nice uniform light showing all the hair details.



The final lighting can be achieved with spotlights. The hair casts shadows on itself and nearby objects. Specific settings for shadow casting and self-shadowing let you fine-tune the effect.



The ambient occlusion effects can also be controlled to increase or soften the contrast of the hair mass.

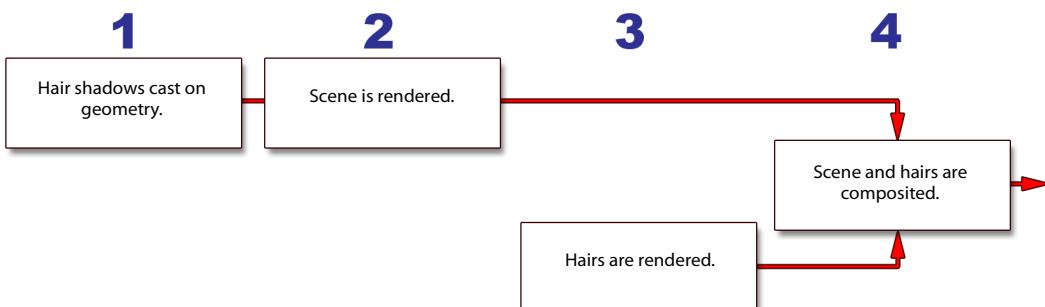
With the standard hair rendering as a render effect, shadows (except hair self shadows) are pre-calculated and cast during the scene rendering.

Hair and Fur Render Effect

When you apply a Hair and Fur modifier to an object in the scene, the hair and Fur render effect is automatically added to the list of effects.

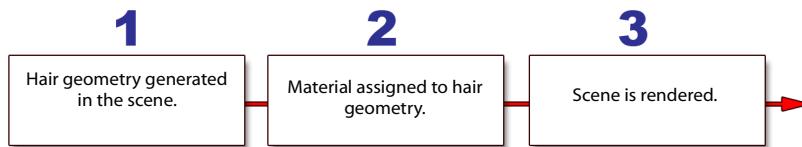
One important setting found in the Hair and Fur effect is the rendering method, with three choices.

So far, most of the features we have illustrated are based on the Buffer rendering method. This is the most efficient rendering for complex scene with thousands of hairs. Its efficiency is due to the fact that the hair geometry is never fully generated, but is created on the fly, thus optimizing memory usage and yielding fast, realistic results.



The Buffer method works only in Camera- and Perspective-view renderings.

Alternatively, you can choose the Geometry rendering method. This method actually generates the hair geometry before starting the scene rendering. The complexity and the small details of the generated geometry will have an impact on the rendering engine. The result looks different, and you will have to deal with lighting and materials differently than the way we have illustrated so far.



When using geometry, lighting as described previously does not apply and the standard lights and shadows are used, as with any other object in the scene.

A third method, MR prim, available when using the mental ray renderer, allows you to use the mental ray 3.4 hair primitive.

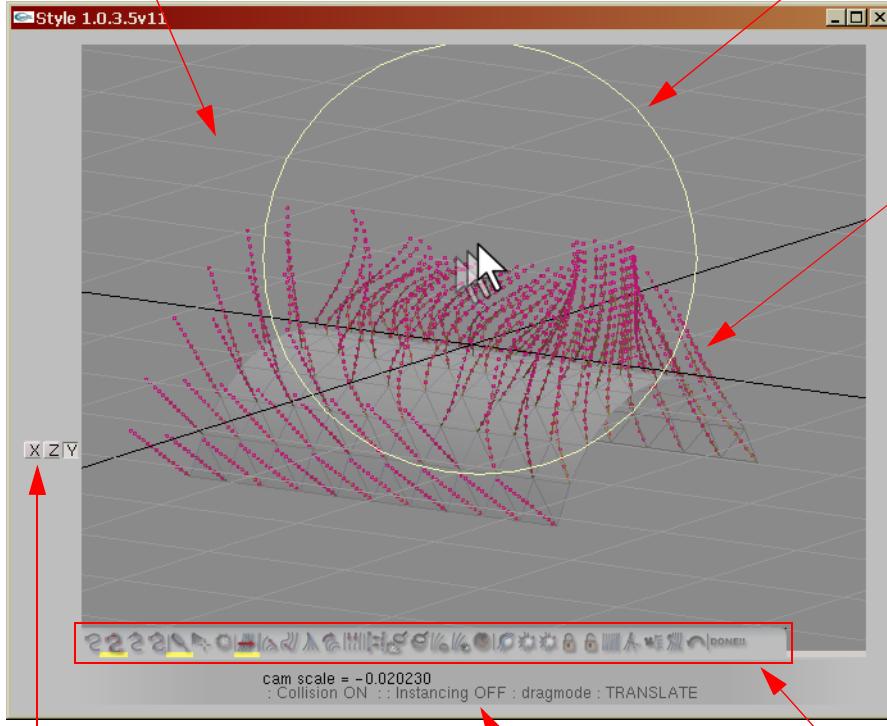
The Style Dialog

The Style dialog displays the model and all hair guides. You will have access to a set of tools that let you comb the guides in different ways, while you can zoom in, zoom out, and rotate around your object.

You can zoom in, out, and rotate the view using the mouse and key combinations.

Middle Mouse Button: Pan
Alt+MMB: Rotate
Ctrl+Alt+MMB: Zoom in-out

This circle shows the stroke area of influence. You can enlarge or reduce it by holding the B key and moving the mouse.

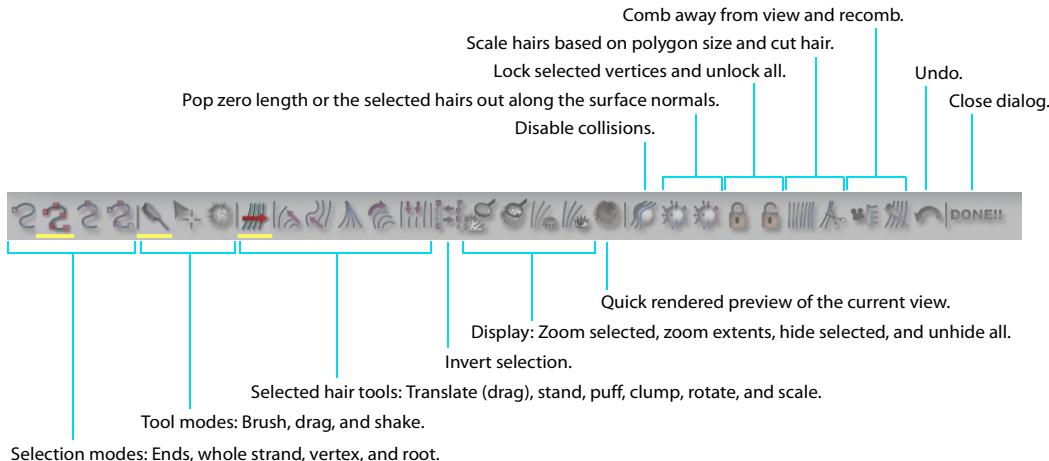


Use these buttons to reset the view to the X, Y, or Z axis.

The status lines give you details about the current tool and other options.

See the toolbar details on the next page.

A detailed description of the tools and how to properly comb complex objects can be found in the User Reference and the tutorials. Here we give only a quick reference:



A brief description of each button is also displayed on the status lines when you place the mouse cursor over them.

User Interface

This section describes the user interface for the Hair and Fur modifier and render effect. Most of the features have already been illustrated in the previous pages, and here we will briefly recall them, and in some cases add some details.

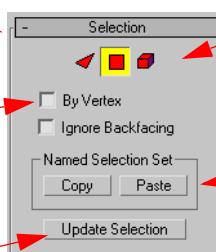
Hair and Fur Modifier

Selection Rollout

This rollout is always available, but the controls don't function if the modifier is applied to a spline object.

The By Vertex option lets you click a vertex to select all faces that touch it.

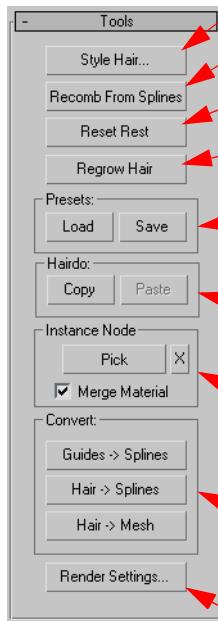
Click here to update the hair growth to a changed sub-object selection. This is not automatic because it's not fast enough to be interactive.



Because hair grows on a surface, only face, polygon, and element sub-object levels are available.

Use Copy and Paste across modifiers on the stack to get sub-object selections from below the current stack level. The modifier does not automatically use a selection passed up the stack to avoid unintentional changes of selection.

Tools Rollout



Opens the Style dialog for interactive hair styling.

Lets you select a spline object to use as a guide for recombining the hair.

Redistributes the hairs and averages the guide placement after mesh changes.

Reinitializes the hair generation, giving you a new default growth.

Lets you load and save hair settings. When loading, you can browse presets using thumbnails.



Use Hairdo > Copy and Paste to reuse settings between different modifiers.

Use Pick to select an object to use as a hair strand. Use the X button to clear the instance.

These tools convert the guides and hairs to scene objects. Each is a one-time conversion and generates a separate object. It does not affect the modifier or hair rendering.

Opens the Hair and Fur render effect settings on the Environment and Effects dialog.

You can also open these settings from the Rendering menu as with any other render effect.

General Parameters Rollout

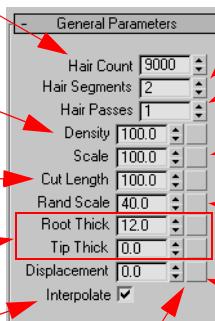
Sets the total number of hairs to generate for the surface.

The Density multiplier is most useful when mapped so you can vary the density on different areas of the surface.

Trim the hairs relatively to the overall scale.

Set the thickness of the hair root and tip.

Enables interpolation of hair shape between guides.



The number of segments along the length of each hair strand.

Number of rendering passes. Increasing this renders higher-quality hairs but lengthens rendering.

Overall length multiplier. The initial hair length is based on the mesh size.

Randomly changes the hair length. Higher values result in greater variation.

Shifts the hair root along the surface normal. Useful to ensure that hairs intersect the surface, especially when instanced geometry is used.

Use these buttons to assign a map to the parameter.

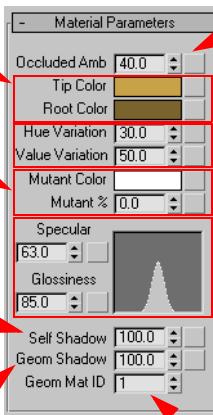
Material Parameters Rollout

Set the colors for root and tip. Colors are interpolated along the hair.

Specify a different color for mutant hairs, and their percentage. Mutant hairs are randomly placed hairs that are a different color from the rest.

Control the degree of self shadowing (hairs shadowing each other). A value of 100 might create very dark shadows, often undesirable.

Controls the intensity of the shadows cast by other objects on the hair.



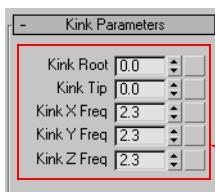
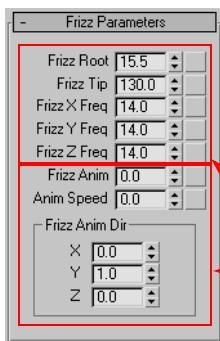
Control the effect of the ambient occlusion within the hair mass.

Add random variation of the color and darkness.

As with standard materials, you can specify specularity and Glossiness for dull or shiny hair.

This value pertains to the Geometry rendering method. The hair mesh is generated before rendering, and is assigned this sub-object material ID. You need to assign to the mesh a Multi/Sub-Object material with a sub-material whose ID matches this value.

Frizz and Kink Parameters Rollout



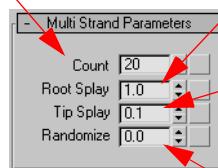
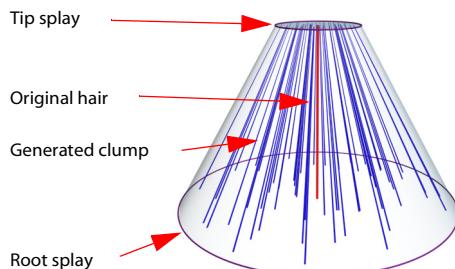
Frizz and Kink are two different kinds of noise that can be applied to the hair strand. Frizz is a bit less rough than Kink.

Both features have noise settings for intensity and frequency, applicable to root and tips separately.

Frizz also adds noise-animation parameters.

Multi Strand Parameters Rollout

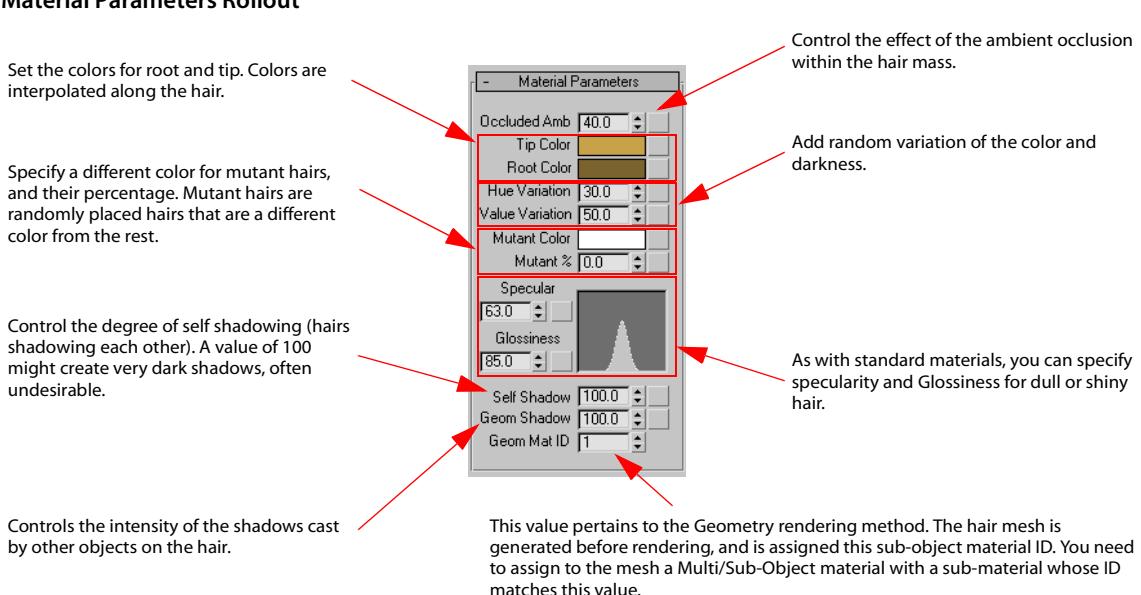
Sets the number of hairs to grow as a clump around an original hair.



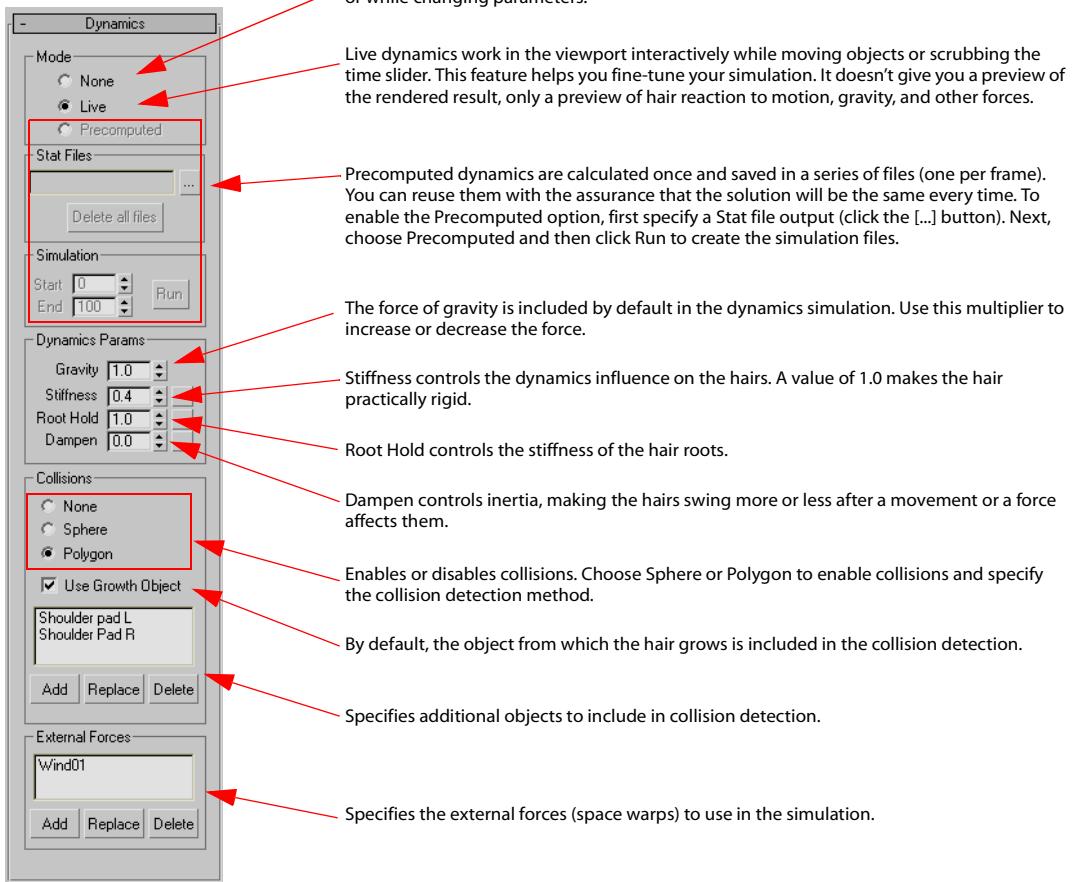
Root Splay is the radius of the circle at the base of the hair where the clump grows.

Tip Splay is the radius of the circle at the tip of the hair where the clump ends.

Increasing Randomize varies the clump-hair lengths.



Dynamics Rollout

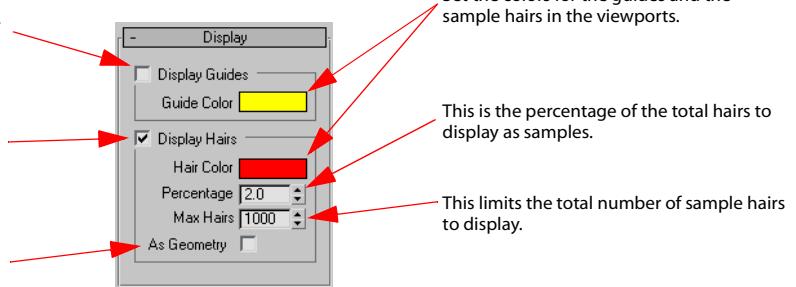


Display Rollout

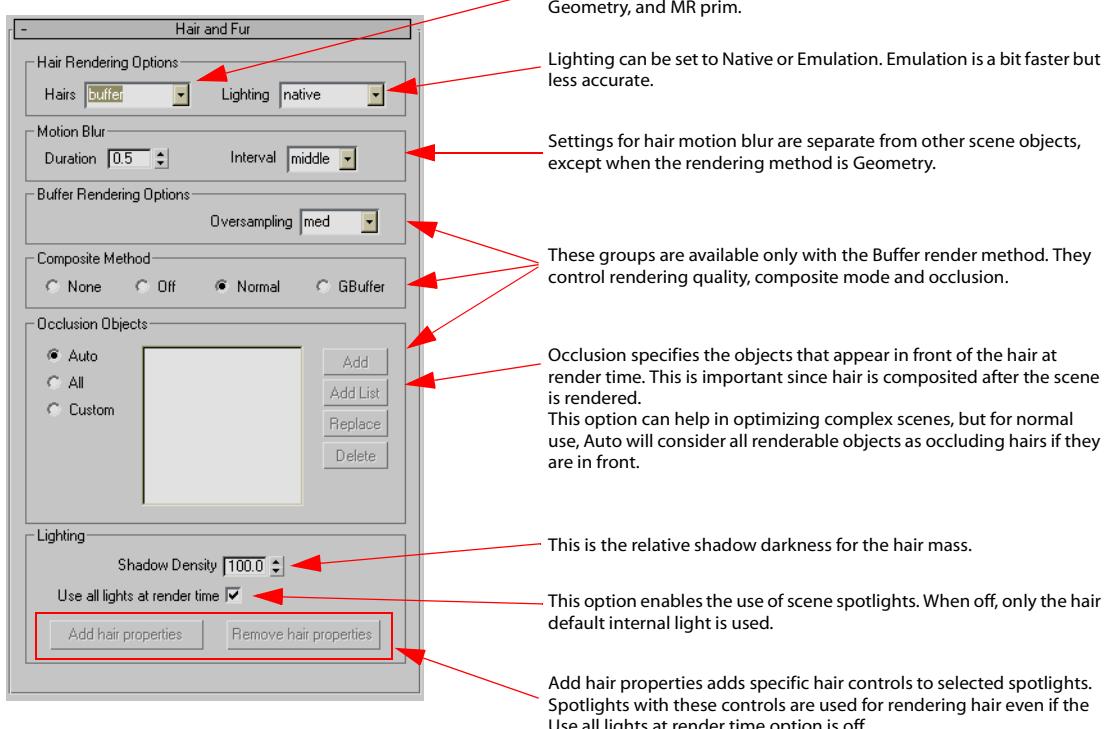
Viewport display of guides is off by default. You can enable it here.

Toggles the display of the sample hairs.

With this option, sample hair geometry is used instead of splines.



Hair and Fur Render Effect



Conclusion

Because of the inner complexity of the simulation and the many variables affecting the final result, achieving good results with Hair and Fur is not something you can accomplish in a few minutes.

Take the time to get to know all the tools and features by practicing initially with simple scenes. Often, you can create a starting point for a hairstyle using interactive dynamics and external forces.

The more you use Hair, the better you will understand how it works, and the easier it will be to achieve extremely realistic results and special effects.

We recommend that you read the reference documentation and the tutorials, which provide additional information plus tips and tricks not mentioned in this overview.

Cloth



The new Cloth system for 3ds Max is a dedicated simulation toolset; it uses geometry and mathematical formulas to mimic the way cloth, and, in particular, clothing, works in the real world.

You can use Cloth for both modeling and animation.

The way you model your cloth affects how it behaves. The density and structure of the mesh determine the detail and type of folding that can occur. A higher-resolution cloth allows for finer, more natural-looking folds.

You can increase the resolution of cloth by setting the Density value higher in Garment Maker, or by applying the HSDS modifier to the cloth object, above the Cloth modifier in the modifier stack.

Garment Maker

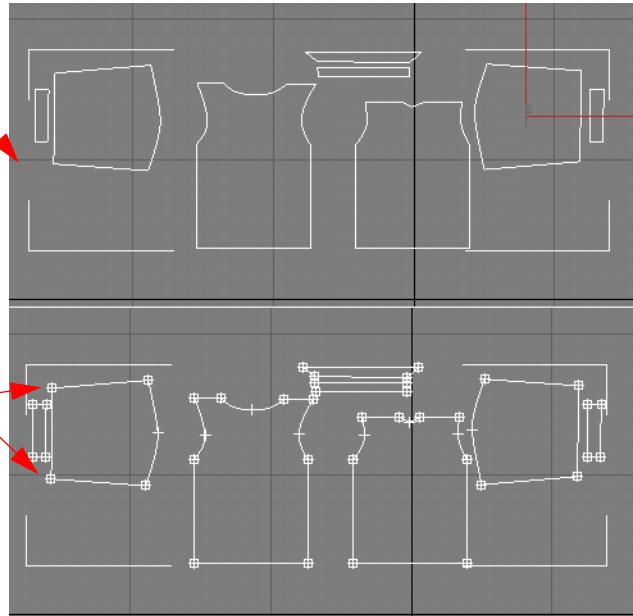
Any geometry can serve as cloth, but the best place to start is with the Garment Maker modifier. This lets you lay out or import a pattern (the pieces of cloth that get sewn together) as a shape object, usually with splines, and then combine the pieces to create an article of clothing, in a process similar to making real garments. Once you have the garment, you can apply the Cloth modifier and then use it to dress a character or other object that might use a cloth covering, such as a table or umbrella.

When you apply Garment Maker to a spline, it creates a mesh made up of irregular triangles, called a Delaunay mesh, suitable for draping over surfaces. You can make the resolution as fine or as coarse as you like using the Density setting on the Main Parameters panel. The default Density value, which Garment Maker calculates from the size of the spline, is a good starting point.



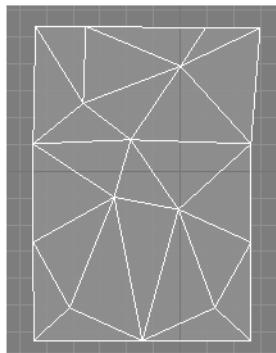
To begin an article of clothing, draw a pattern with flat splines in the Top viewport. All the pattern elements should be part of a single spline object. Be sure to break the splines at the corners so Garment Maker doesn't round off the corners.

Draw the panels in the Top viewport with splines or NURBS curves, or export them from a pattern-creation program such as PatternMaker (<http://www.patternmaker.com>). Shown here is a shirt pattern created in 3ds Max with splines.



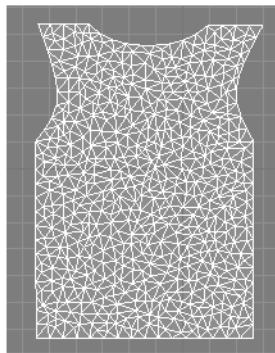
To avoid rounded corners, break the splines at the corners.

Next, apply the Garment Maker modifier and set the Density to an appropriate value. Garment Maker uses a Delaunay meshing algorithm to create cloth that can fold irregularly, for a real-world effect.



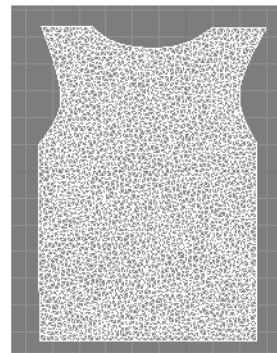
- Main Parameters
Density [0.1]

If Density is set too low, the pattern outline can be distorted, and the cloth won't drape properly.



- Main Parameters
Density [0.975]

The default Density value is based on the pattern size, and is usually a good starting point.

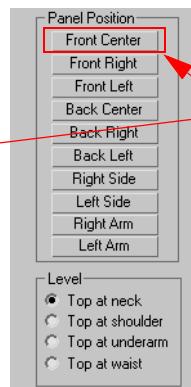
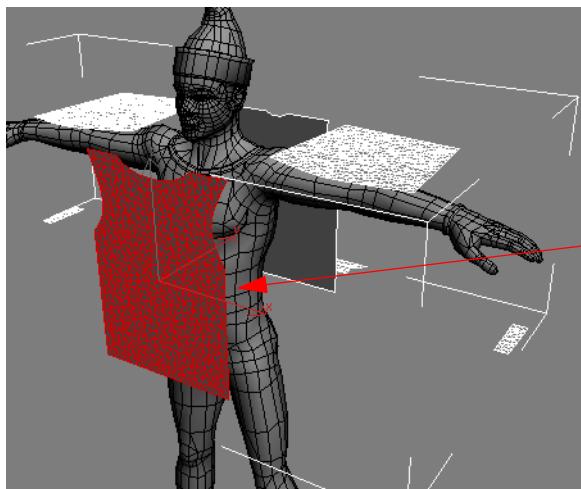
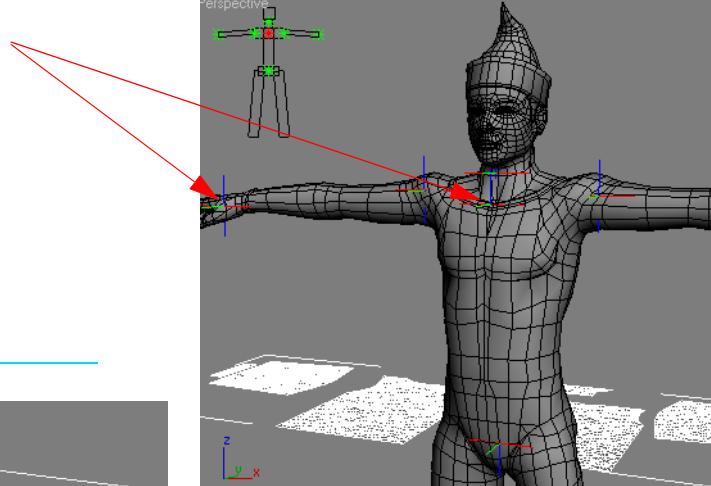
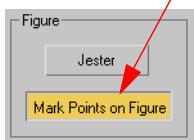


- Main Parameters
Density [2.0]

If Density is set too high, the cloth simulation could require extra calculation and take too long.

Use the Figure group controls to designate your character model and mark its points, and then use the Panels sub-object level of the Garment Maker modifier to place the different panels near where they'll go in the finished article of clothing. Use your character geometry as a guide.

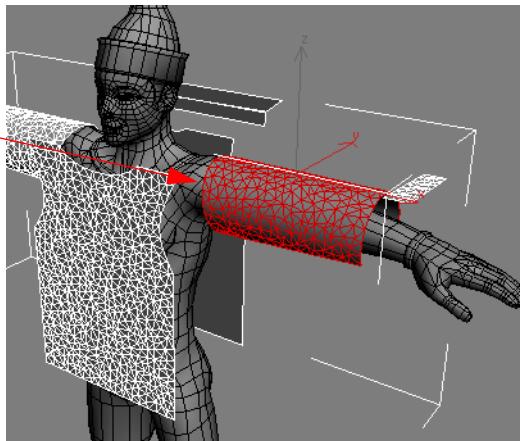
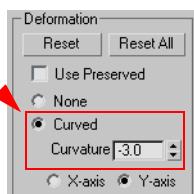
With **Mark Points on Figure** on, click the points on your character as guided by the stick figure in the top-left corner of the viewport.



At the Panels sub-object level, you can position panels manually, or use the Panel Position and Level controls to position panels automatically. Usually you'll get best results by combining the two methods.

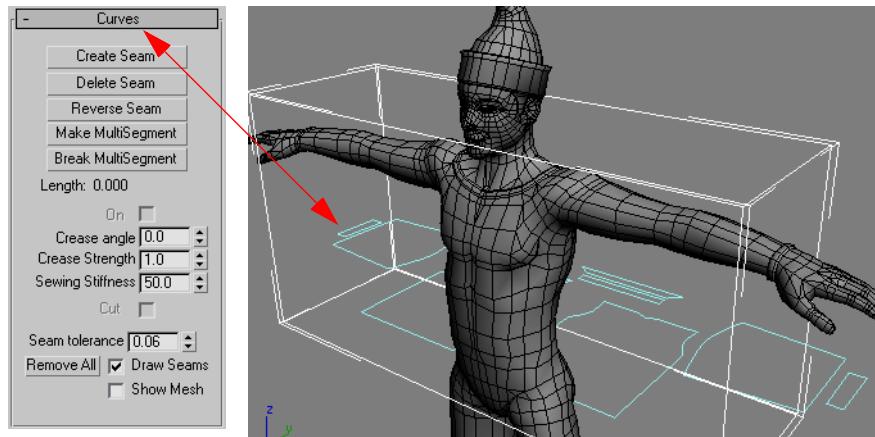
You can also use controls at the Panels level to add curvature to panels, such as for sleeves and pant legs.

To create a cylindrical curvature, choose Curved in the Deformation group and then set the Curvature value.



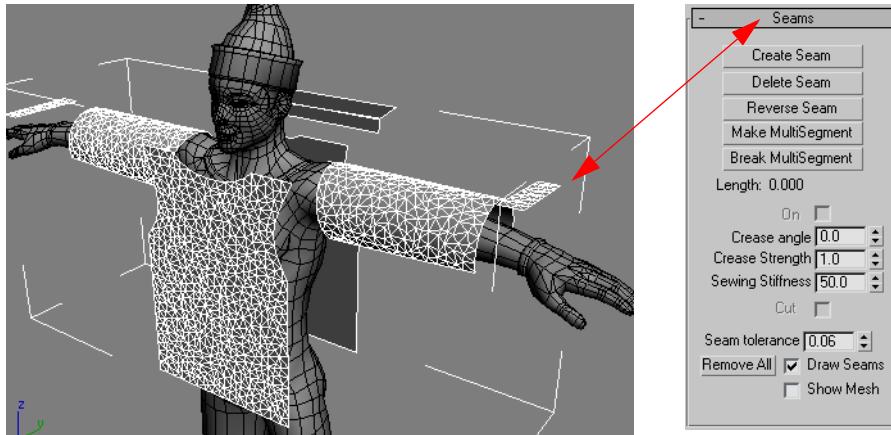
Finally, in Garment Maker, use the Curves and Seams sub-object levels to “sew” the panels together.

Curves sub-object



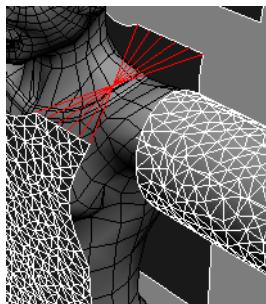
The Curves and Seams sub-object levels offer identical controls for sewing garment panels together. The difference between them is that, at the Curves sub-object level, the panels lie flat, in their original layout, while at the Seams sub-object level, they remain as you positioned them with respect to the character model.

Seams sub-object

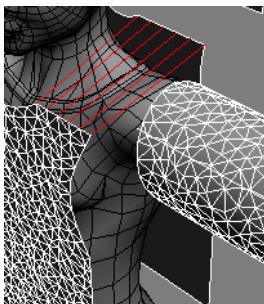


Use whichever mode works best for the current project.

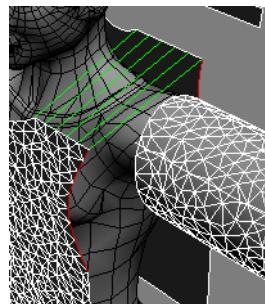
Creating a seam is analogous to sewing pieces of cloth together. You select the segments of the original splines and then click Create Seam. The seam appears as a group of parallel threads connecting the segments. If the threads cross over each other, use Reverse Seam.



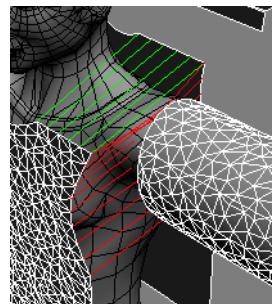
Select the two shoulder segments and then click Create Seam.



To correct the crossed threads, click Reverse Seam.



Select the two sleeve-hole segments and then click Make MultiSegment.



Now you can create a seam between the sleeve and the sleeve-hole segments.

In order to create a seam, the structure of segments to be connected must be comparable. In the example illustrated above, the shape of the sleeve end segment is similar to an inverted U or an omega. You must create a similar structure in the main part of the shirt before you can sew them together.

To connect the sleeve panel to the front and back shirt panels, you must first connect the latter two panels at the shoulder. You can then create a MultiSegment (two segments acting as one) from the sleeve-hole segments to emulate the sleeve end segment structure.

After you create the seams, you use the Cloth modifier to pull them together in a simulation.

Cloth Modifier

The Cloth modifier turns any object into cloth; it works on standard geometry, including mesh objects created with Garment Maker. Cloth lets you specify a wide range of attributes, such as which objects should be cloth and which objects the cloth should collide with, how the cloth should fold, and forces (space warps) that should affect the cloth. Cloth also gives you simulation controls, so you can simulate with or without creating keyframes.

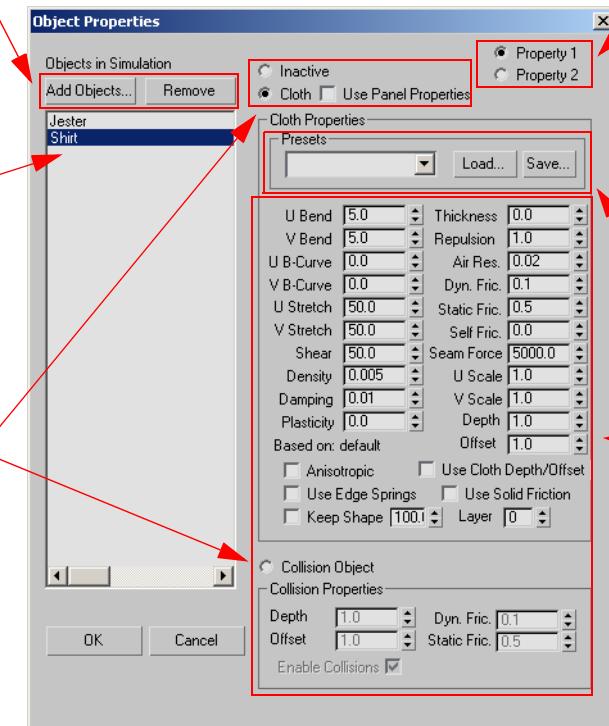
You start by applying Cloth to objects in your scene. You can simply select all objects that will participate in the cloth simulation and then apply the Cloth modifier, or just apply it to a single object and then add the other objects later.

The basic setup for cloth objects is done in the Object Properties dialog. This dialog contains many of the most important cloth settings. Most of these settings are replicated at the Group and Panel sub-object levels, so you can vary the properties throughout a cloth object's surface.

Specify the objects that participate in the cloth simulation using these buttons.

Choose the objects in the simulation and then set their properties. You can set properties for multiple objects at the same time.

Choose whether the highlighted object in the list is to be inactive, cloth, or a collision object. Use Panel Properties lets you set different properties for each part of an article of clothing separately, at the Panel sub-object level.

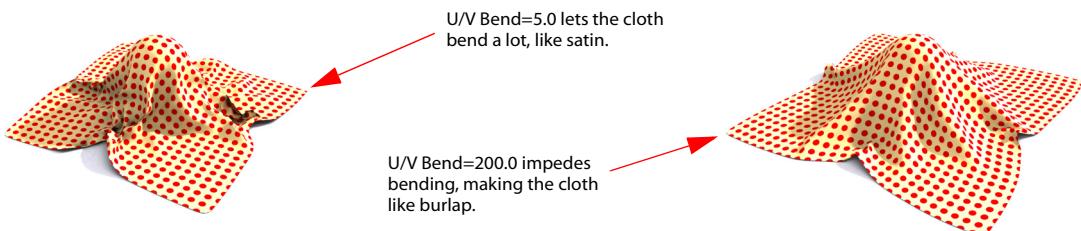


You can set two different sets of properties for a cloth object, and then interpolate or animate between them.

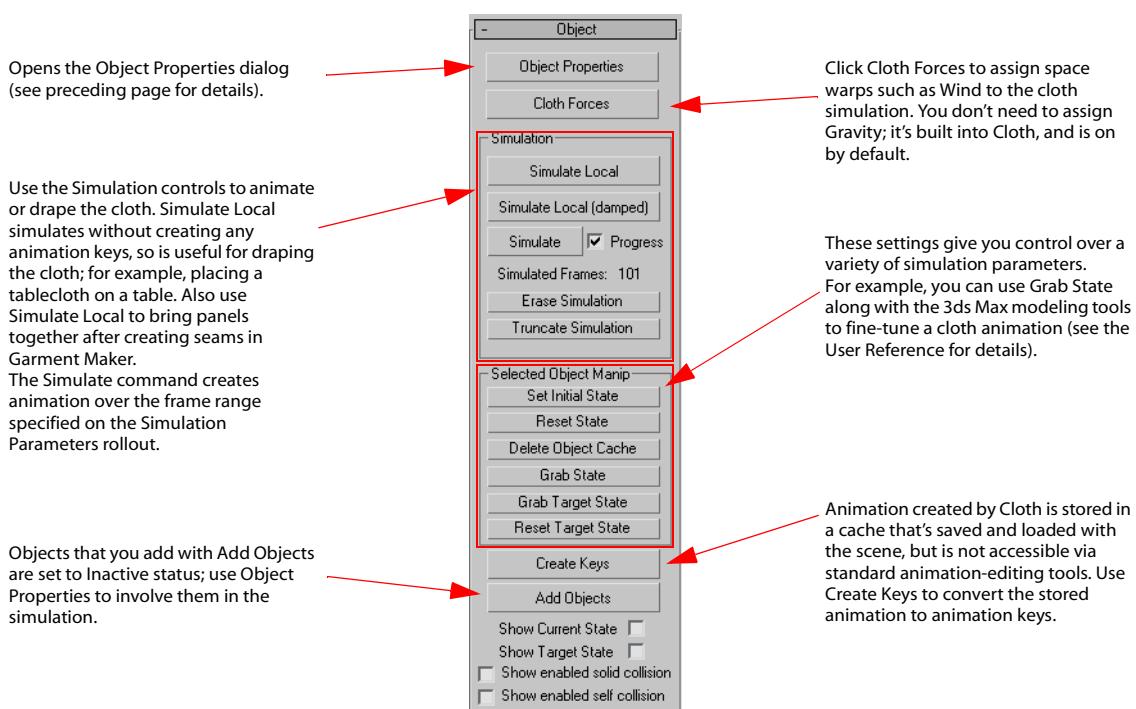
The Presets list makes it easy to use standard cloth setups such as cashmere and satin.

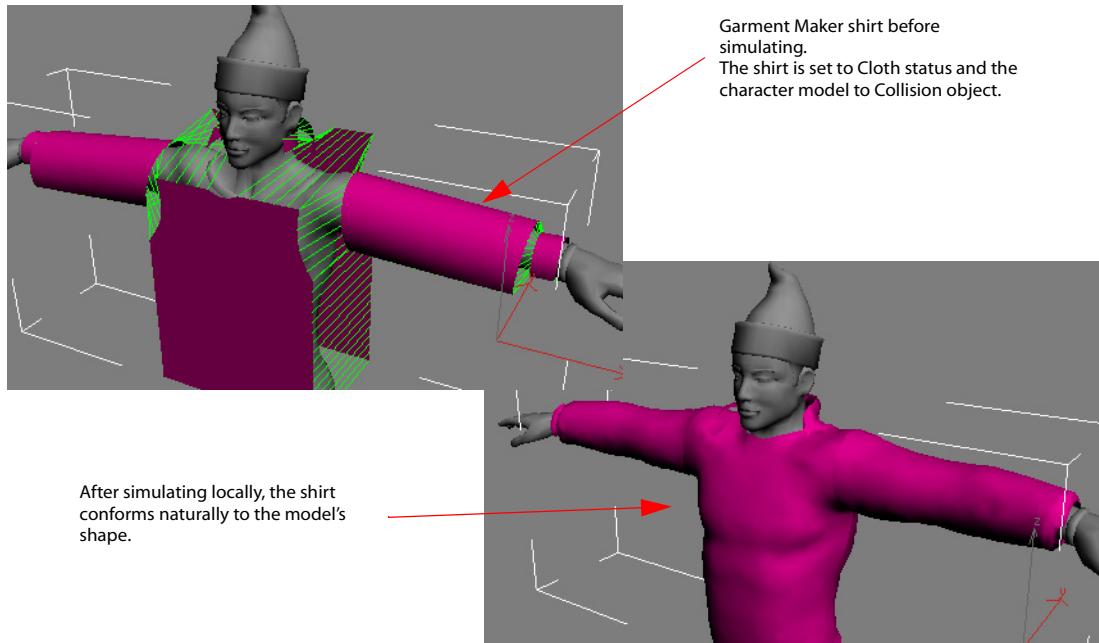
Set the cloth or collision object properties here. The properties include resistance to bending and folding, thickness and density, and the amount of friction between cloth and itself and other objects.

The U Bend and V Bend parameters control the rigidity of the cloth.



The main rollout of the Cloth modifier functions as a command center for the cloth simulation and setup.



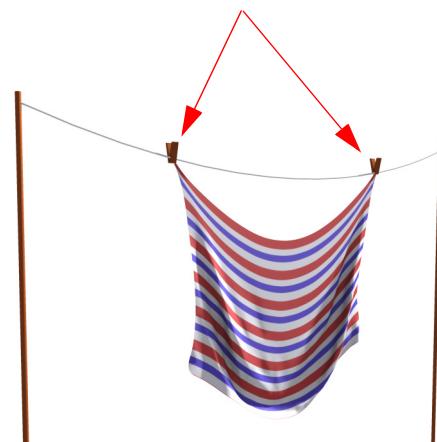


The Cloth modifier has several sub-object levels that let you customize the simulation. The Group level lets you select cloth vertices, assign them to groups, and apply a special constraint and properties to each group. For example, you can “pin” the corners of a cloth to a clothesline using the Drag constraint.

At the Group sub-object level, select the vertices to pin; in this example, they're the two top corner vertices. Next, click Make Group, give the group a name, such as “corners,” and then click Drag. This makes the vertices remain in place during the simulation.

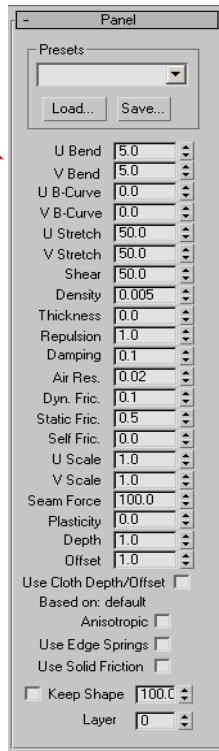


The “corners” group contains the top-left and top-right vertices in the cloth.

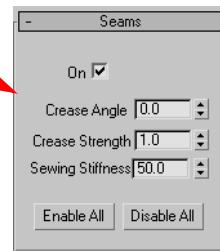


The remaining Cloth modifier sub-object levels are Panel, Seams, and Faces.

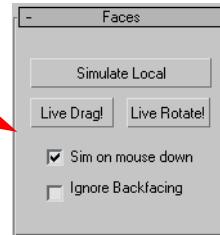
If you turn on Object Properties > Use Panel Properties, you can set the properties for each panel separately as defined in Garment Maker. For example, you could make the collar and cuffs of a shirt out of stiffer material than the rest of the garment.



At the Seams level, you can select seams created in Garment Maker and set simulation parameters such as Crease Angle.



Use the Faces sub-object level to move and rotate parts of your cloth interactively while simulating. This doesn't create animation keys, but it's useful for setting up the cloth exactly as you want it.

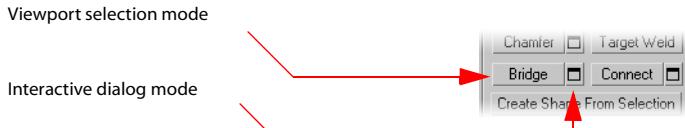


Editable Poly Enhancements

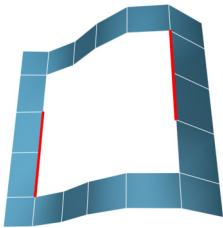
This topic summarizes the enhancements to the Editable Poly object and the Edit Poly modifier.

Edge Bridge

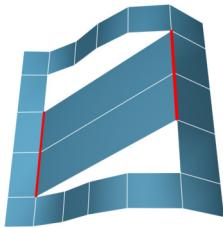
The Bridge tool has been extended to support connecting edges. As with Border and Polygon sub-objects, you can connect edges using the interactive dialog or by directly selecting edges in the viewport.



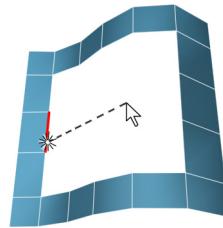
Viewport Selection



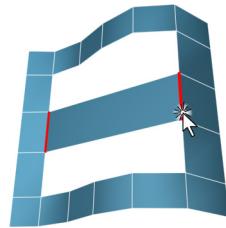
First method: Select two groups of contiguous edges. Make sure the selection is valid or no bridge will be created.



Click Bridge to create the bridge polygons. The settings applied are the ones used most recently in the interactive dialog.

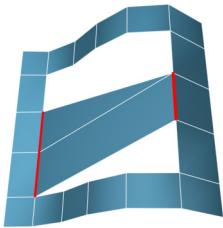


Second method: If no edge is selected, when you click Bridge it remains active. Select an edge: A rubber-band line appears.

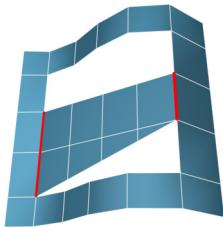


Select the second edge, and the bridge is created. This method limits you to connecting only two edges at a time. Repeat to create additional bridges.

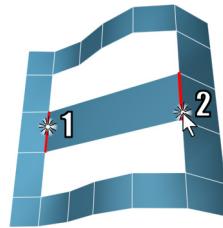
Interactive Dialog



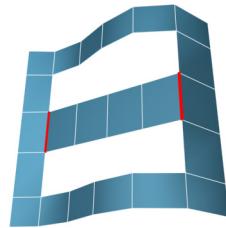
With Use Edge Selection active, the bridge is created immediately. The selection must be valid, as described above.



Tweak the parameters in the dialog interactively. You can adjust the number segments and the triangulation method.



With the Bridge Specific Edges option, use the buttons to pick two edges. Only two edges can be selected.

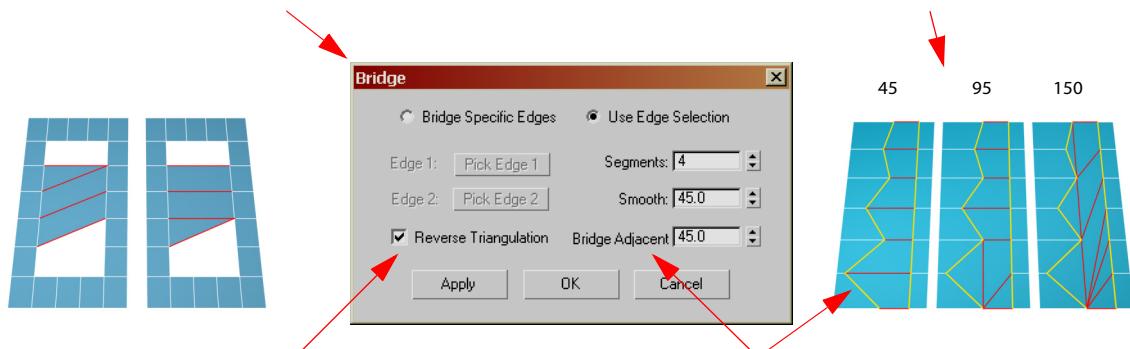


Tweak the dialog parameters. Use Apply and then select more edges to create other bridges.

Note that several buttons on the Edit Edges rollout have been moved to position Bridge consistently with other sub-object levels.

The Bridge Interactive Dialog

This dialog is similar to the Bridge dialogs for Border and Polygon sub-objects. Here we highlight the Edge-specific settings.



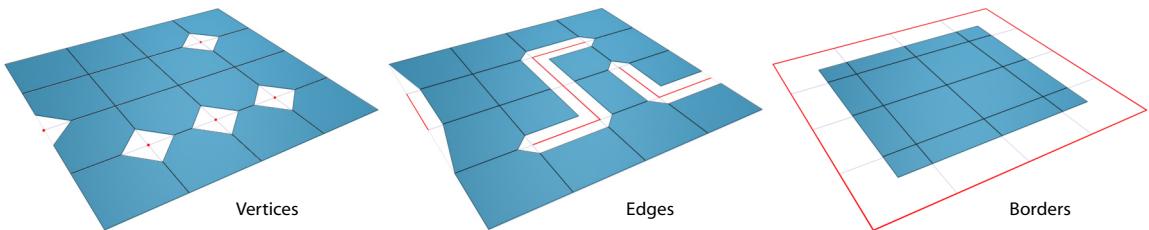
When the two groups of edges to bridge do not have the same number of segments, some faces of the bridge will be triangular. This option reverses the default triangulation.

Example of Bridge Adjacent with different angle values.

Open Chamfers



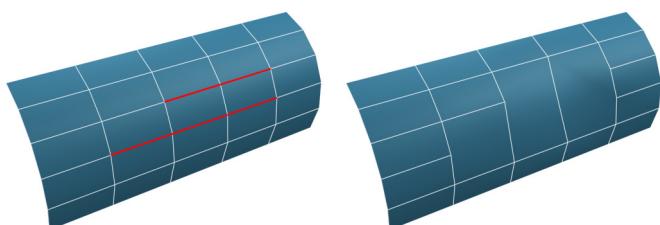
The new Open option for the Chamfer tool lets you create gaps in the surface.



Clean Remove

At the Edge sub-object level, when you click Remove, you can now also use CTRL to delete the vertices that are left with only two edges.

This allows you to create single straight edges wherever possible.



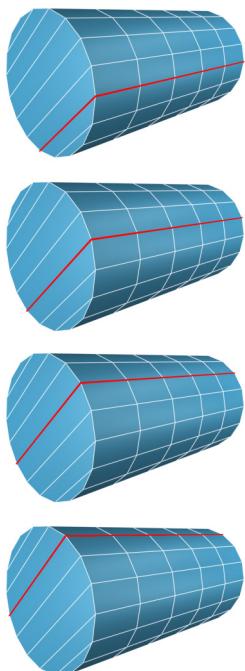
Ring and Loop shifts

This feature enhances the Ring and Loop selection tools by allowing the current selection to be shifted along the loop or ring direction.

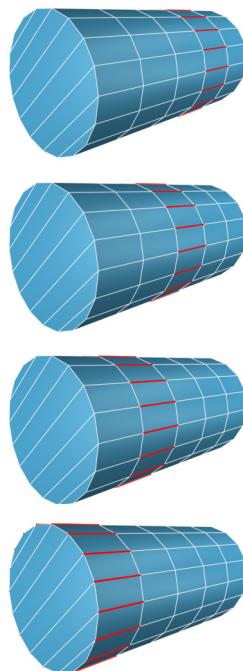


These two spinners shift the current selection along the direction of loop or ring in either direction. Using CTRL adds to the current selection, and using ALT subtracts from the selection.

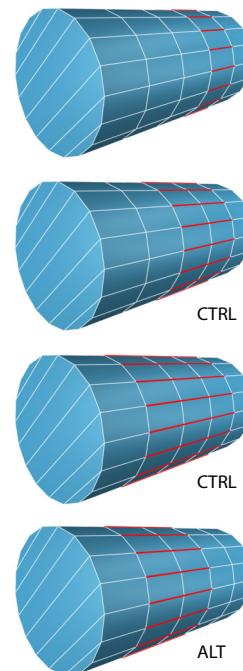
Shifting a loop along the ring direction.



Shifting a ring along the loop direction.

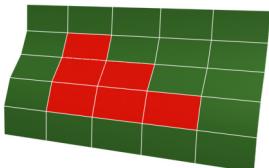


Adding ring selections with CTRL, and removing with ALT.

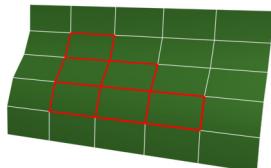


Sub-Object Selection Addition

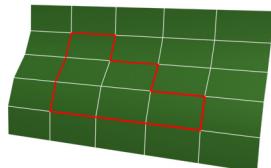
When switching to a different sub-object level, press SHIFT while clicking the sub-object icon to convert the selection to only the sub-objects at the edge of the current selection.



Original Polygon selection.

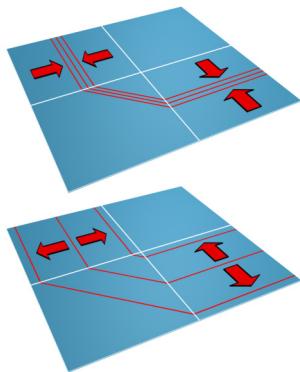


CTRL+click Edge sub-object button.

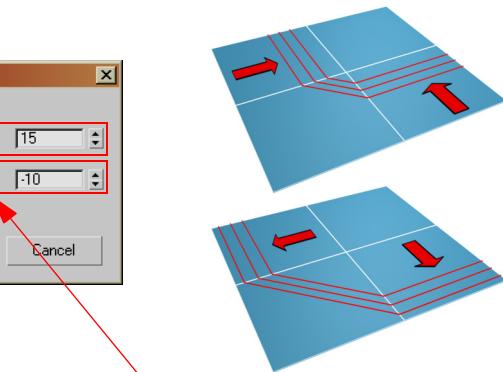
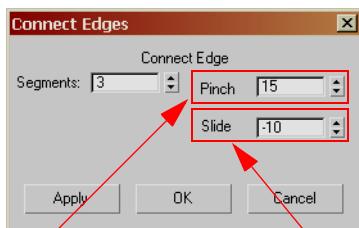


SHIFT+click Edge sub-object button.

Edge Connect Enhancements

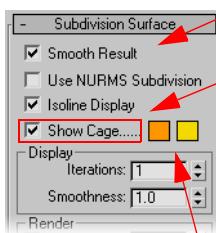


Pinch widens or squeezes the connecting edges.



Slide moves the edges toward one side or the other.

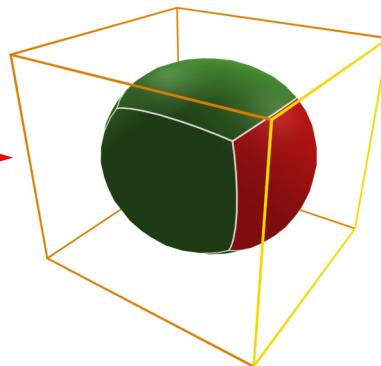
Subdivision Surface Rollout



The two color swatches set the colors of the cage and the current selection.

Smooth Result has been moved to the top.

The new Show Cage option enables or disables the display of the mesh before the subdivision at the sub-object level. Previously, the cage was always visible.

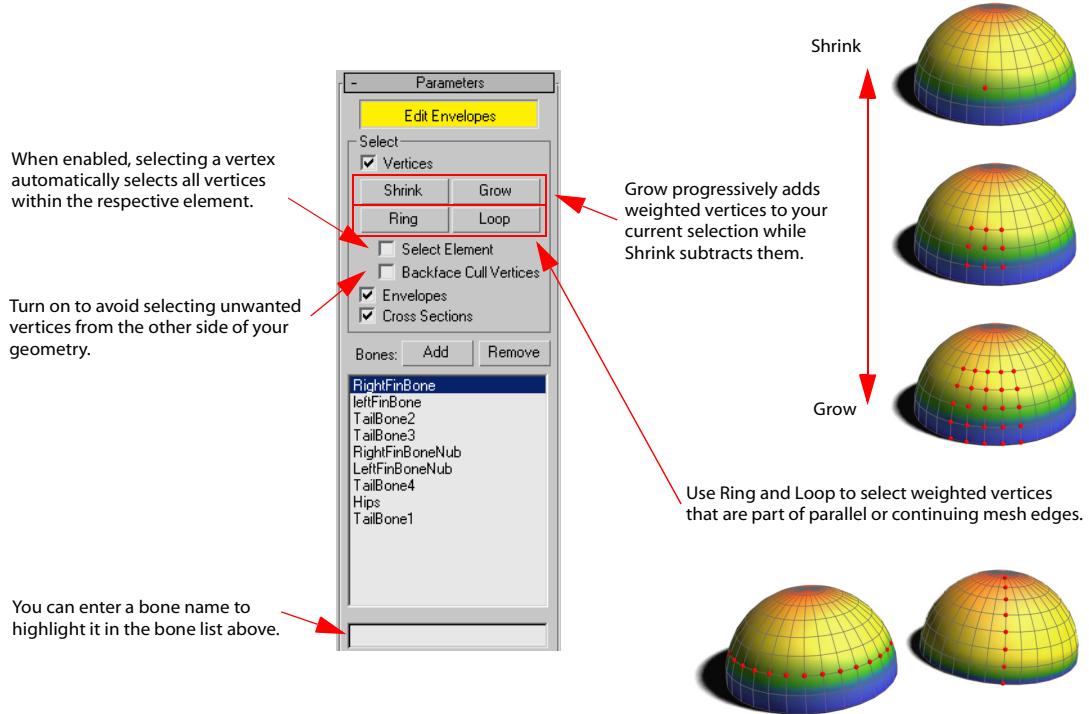


The Show Cage option and the color swatches have been added to the MeshSmooth and Edit Poly modifiers as well.

Skin Improvements

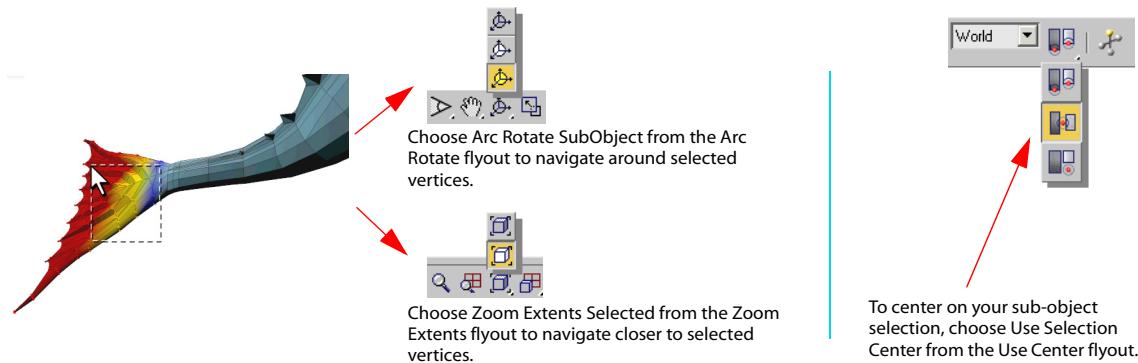
Vertex Selection Options and Type-in Names for Bone Selection

Additional options are available for selecting vertices from a skinned mesh.



Zoom and Rotate around Sub-Object Selections

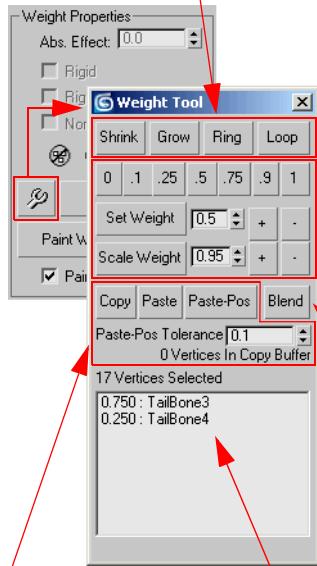
To improve viewport navigation on sub-objects, the Arc Rotate SubObject and Zoom Extends Selected tools can be used to navigate around selected vertices from a skinned mesh.



Weight Tool Dialog

This toolset improves the weighting workflow by providing you the means to select vertices easily and assign them weights, as well as copy, paste, and blend weights between them.

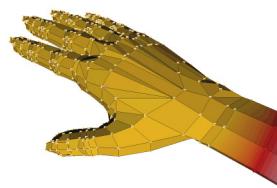
The Shrink, Grow, Ring, and Loop tools are also accessible from the Parameters rollout.



You can store one or multiple weight values and re-assign them to other vertices. This is useful when you need to match weights between juxtaposed skinned meshes and their surrounding vertices.

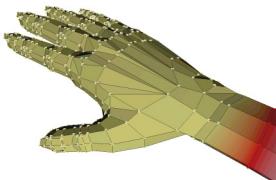
Displays the selected vertex weights along with the bone envelopes contributing to their weighting. You can select individual envelopes in the active viewport by highlighting the respective bone in the list.

You can weight selected vertices either by assigning new values or multiplying the current ones by a custom scale factor.

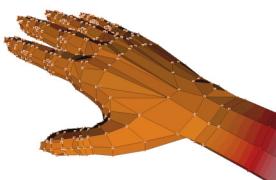


Current weight = 0.50

Scale Weight factor = 0.25
New weight = 0.125

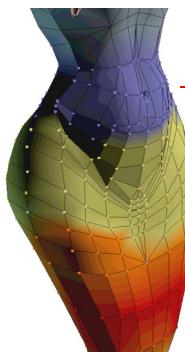


Scale Weight factor = 0.50
New weight = 0.25

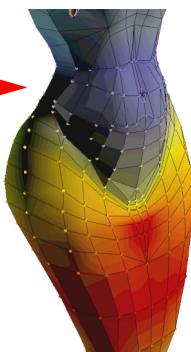


Scale Weight factor = 1.50
New weight = 0.75

Smooths out a weight region by blending each vertex weight with its neighbors.



The selected weights are divided into distinctive regions.

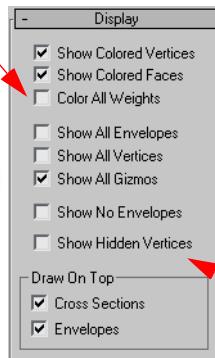
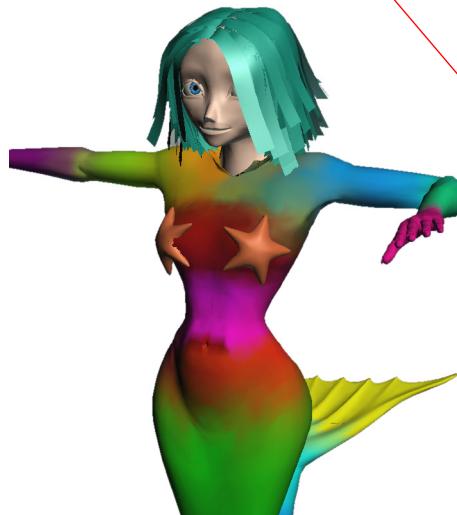


After using Blend, the weights are blended to create a smooth transition gradient.

Weight and Vertex Display Options

These new options help you better visualize skinned vertices.

Assigns a color to every bone. The vertex weighting blends the colors together.



You can assign a color to vertices that are not weighted on the Colors panel of the Customize User Interface dialog.

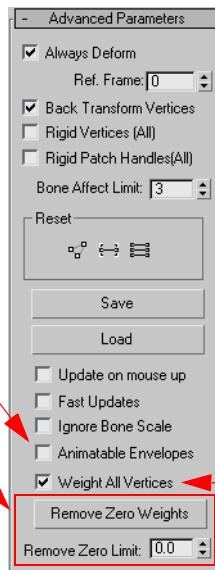


Toggles the visibility of currently hidden vertices when skinning a mesh.

Advanced Parameters

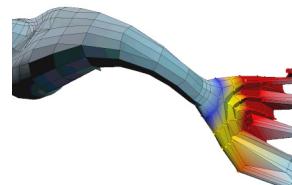
You have greater control over whether to weight all vertices or to remove them entirely.

Toggles the possibility of creating keys on skin parameters while in Auto Key mode.

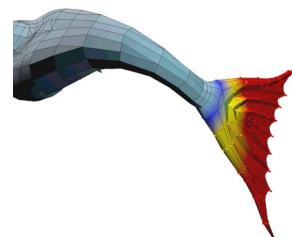


Strips a vertex of its weight if it is lower than the Remove Zero Limit value. This is useful for making your skinned model lighter because less unnecessary data is stored in the geometry.

Weight All Vertices = off
Some vertices from the tail fin are not weighted.



Weight All Vertices = on
All vertices from the tail fin are weighted.



Forces every vertex that is not under the control of an envelope to be weighted to the bone closest to it.

Unwrap UVW Enhancements

Unwrap UVW offers several new features and workflow enhancements in 3ds Max 8. A major addition is the new Pelt mapping mode.

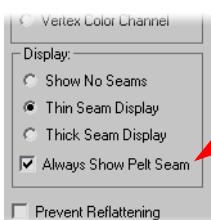
Command Panel



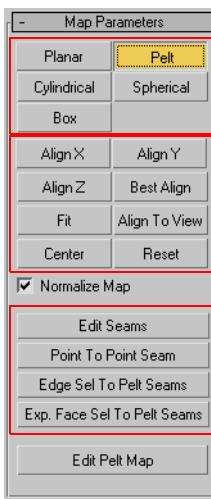
Sub-object levels now include Vertex and Edge. At any level, the editor and the viewport are synchronized, and you can make selections wherever is most convenient.



The Edge sub-object level now has standard Ring and Loop selections.



This option toggles display of the pelt seams, which are drawn in a light-blue color over other seams (in green).



The Map Parameters rollout replaces and enhances the earlier Sub Object Params group on the Selection parameters rollout.

The standard mapping modes have been added to Unwrap UVW to provide additional starting points. Pelt mapping, however, is completely new. These buttons are enabled only at the Face sub-object level, and take effect only when faces are selected.

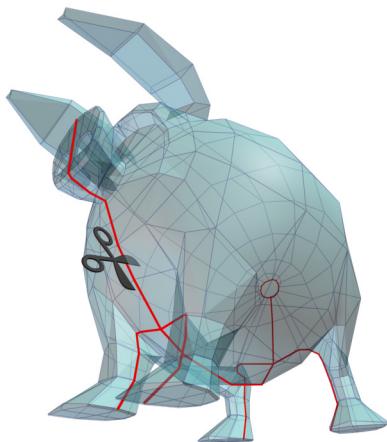
When a mapping mode is active, a projection gizmo appears. Use these options plus the standard transform tools to align and fit the gizmo.

These tools let you define Pelt seams and select faces for pelt mapping. We will detail them later in this section, when we look into Pelt Mapping.

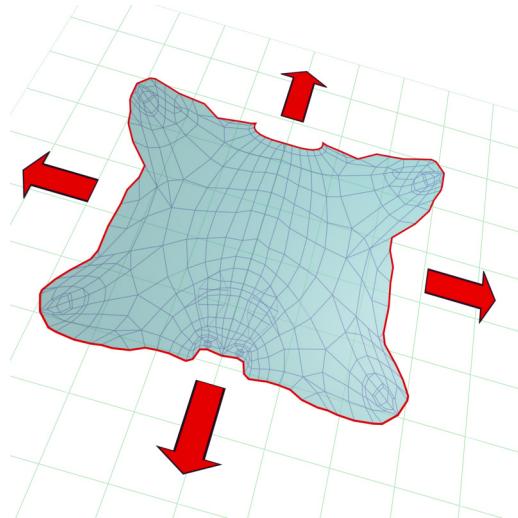
Edit Pelt Map starts the editor and the Pelt Map Parameters dialog. This button is available only when Pelt mapping mode is active.

Pelt Mapping

With Pelt mapping, the mesh is cut along the specified seams, stretched along the edges, and finally pulled flat.



First, you need to decide where the mesh is to be cut. This is the pelt seam. Where to cut depends on the model and the desired result.

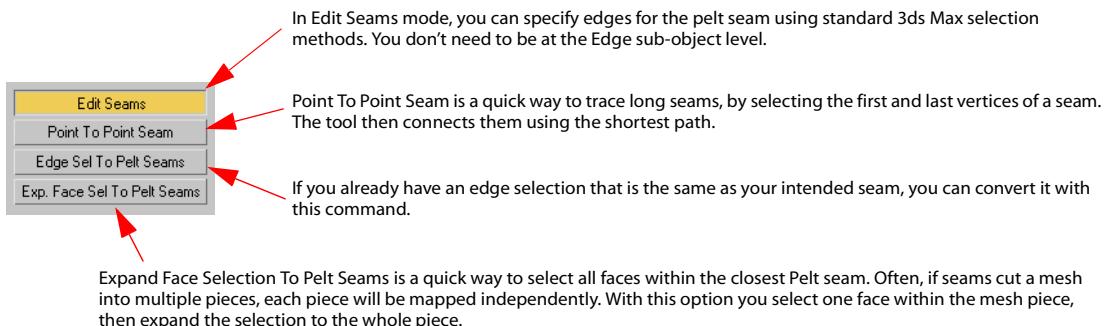


Then, the edges are pulled away and the mesh flattened. This is an iterative process that requires several steps and user adjustments.

Workflow

The best way to better understand the process and introduce the tools is with an example.

- 1) The first step is to define the pelt seams, visible as a light-blue edges.



Remember that open edges and face selection borders are automatically added to the Pelt seams.

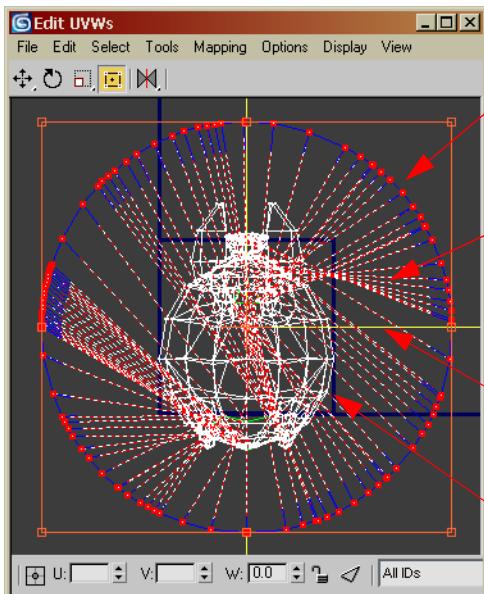
- 2) The second step is to go to the Face sub-object level of the modifier and select all the faces to map. In most cases, this will be the whole model, or a mesh section contained within seams.

3) Next, choose Pelt mapping mode. A planar gizmo appears. Orient that gizmo as appropriate. This is your initial projection.

A rule of thumb is to orient the plane opposite to the seam. Of course, it depends on the model.

4) Once the gizmo is oriented, click Edit Pelt Map to open the editor and the Pelt Map Parameters dialog.

Let's look at the user interface and name some elements before we proceed to the other steps.

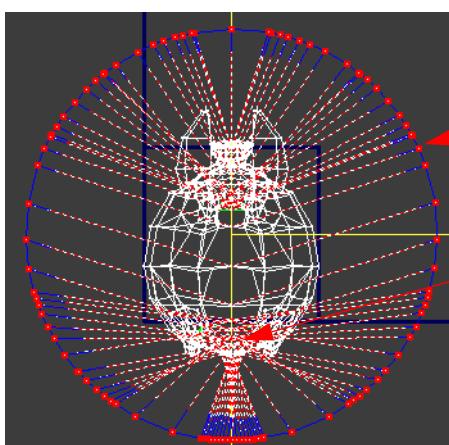


This circle of points is called the Stretcher. These points can be manipulated like other vertices (selected, moved, rotated, etc.), but they are not UV points, and are only temporary during the Pelt mapping process.

These lines are Springs, and they represent the pulling direction. Each vertex of the mesh along the seams has a matching vertex on the stretcher. The Springs connect the two.

This yellow gizmo is the mirror plane for the stretcher. If your mesh is symmetrical, you can reshape half of the stretcher and then use Mirror to make the same changes to the other half.
The vertical bar is the mirror plane. The horizontal one indicates which half will be mirrored.

The mesh initially is a planar projection as specified by the gizmo. Notice that the mesh and the stretcher might be misaligned at the beginning, and it's visible by the asymmetrical Springs orientations.



When you first enter the Pelt Map editor, the stretcher is selected. Use the rotate tool to rotate it so that the springs assume a more symmetrical or ordered shape.

At this stage, take a close look and see if the gizmo orientation could be improved. For example, if the springs seem to cross each other, you might need to flip the gizmo.
Spend some time and do some Pelt tests early to check for the best starting point, before you start manual adjustments.

The Pelt commands are on a floating dialog. The Pelt process is active while this dialog is on screen. When it's closed, the Stretcher and the Springs disappear, and the current UV mapping becomes a standard UV mapping.

Reset Stretcher voids all your edits and returns the stretcher and the mesh back to the original status.

This command matches the stretcher to the current edges of the UVs (All springs will be zero length). It's useful after a first Pelt pulls, to align the stretcher to the edge, and then scale the stretcher for further and more accurate shaping.

Straighten Stretcher mode lets you quickly align groups of vertices and reshape the stretcher.

Use Mirror Stretcher to copy the shape of half of the stretcher to the other half (yellow gizmo).

This group controls the Springs characteristics.

This selects all the Stretcher points. Use it when you need to rotate or scale it after manually shaping.

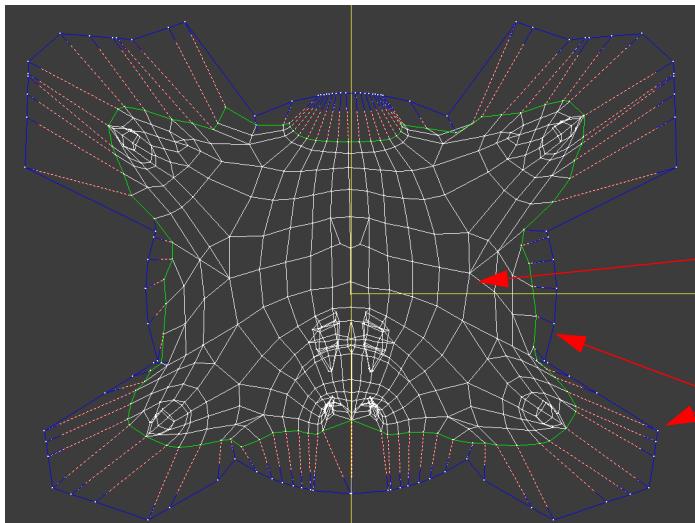
Selects all the UV vertices affected by Pelt.

Pulling the Pelt is an iterative simulation. Here you set the pulling parameters.

After a Pelt-pulling simulation, the flattened UVs shape might become more circular and lose the original mesh shape. Use Relax to reshape the UVs.

Click to start the Pelt-pulling simulation. You can repeat it many times, alternating with Relax and adjustments to the Stretcher.

5) The process now consists of running Pelt-pulling simulations, and adjusting the Stretcher shape and size.



Basically, you repeatedly use Pelt pulling, Relax, Straighten, Mirror, Scale, and make manual adjustments of the individual vertices until you get the best flattening solution.

Here you can see the final Pelt mapping for this example. The UVs have been flattened and distributed pretty evenly.

The stretcher had to be reshaped to follow the shape of the legs and reflect the mesh details.

Note that you can select some UV vertices, and that the simulation will work only on the selection. Soft selection is supported.

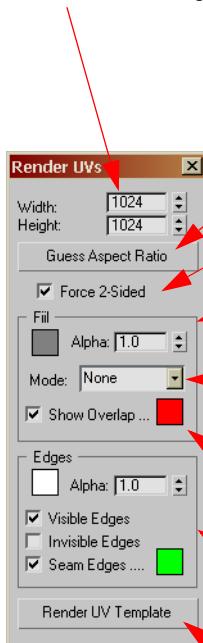
Pelt mapping is not editable. Once the Pelt commands dialog is closed, the current flattened UVs become your current UV mapping. The Stretcher and Springs are removed.

Other Enhancements

Render UVW Template

This tool generates a bitmap with the current UVs layout for use as a reference in a paint application. You can find it in the Tools menu of the Editor dialog.

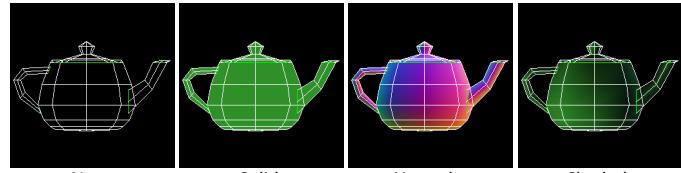
These set the size of the generated bitmap. The UVs will be adjusted to the aspect ratio of the image.



This option adjusts the Height value trying to get the best possible aspect ratio.

Enable Force 2-Sided to also render UVs that are facing away. This is typical with mirrored UVs using half-painted textures for symmetrical objects.

These are the fill settings for the polygons. Choose a color and an alpha value if you need transparency. These values work only when a fill mode other than None is active.



None

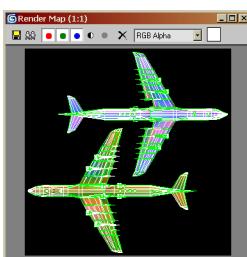
Solid

Normals

Shaded

Enabling Show Overlap colors the overlapping UVs with the specified color.

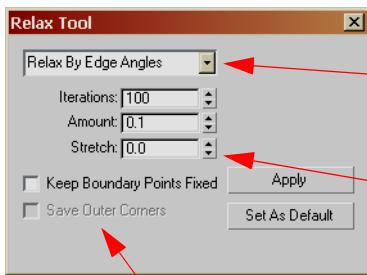
These are the settings for the edges. As with the fill, you can choose a color and alpha value. You can also hide or show specific types of edges.



Click here to render the template. The bitmap is created in a frame buffer and you can then save it in any format from the frame buffer toolbar.

Enhanced Relax Tool

New options for Relax have been introduced to help eliminate mapping distortion.



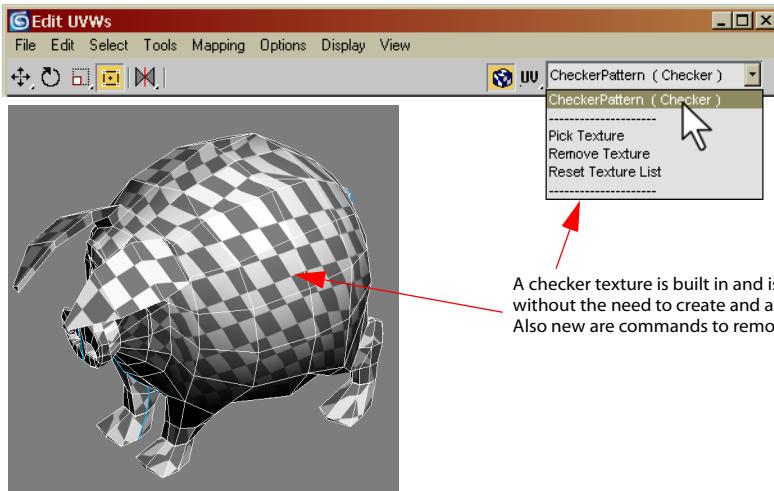
Relax By Face Angles
Relax By Edge Angles
Relax By Centers

Three relax methods are available. Relax by Edge Angles is the default and usually the best choice. Previous versions of 3ds Max used the Relax By Centers method.

Stretch controls the distortion of the UVs.

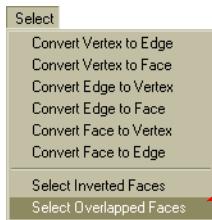
Save Outer Corners is available only with the Relax By Center method.

Built-in Checker Map



A checker texture is built in and is useful for quickly testing UV stretching without the need to create and assign materials.
Also new are commands to remove textures and clear the list.

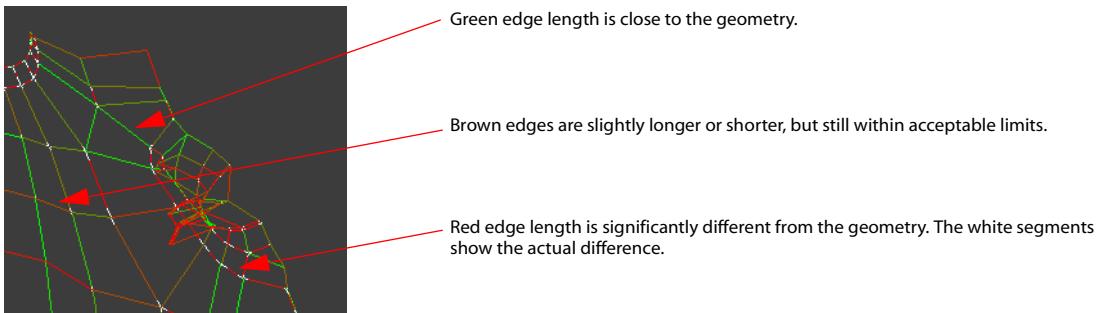
Select Overlapped Faces



This new command selects all faces that are overlapped by other faces. It's available only at the Face level.

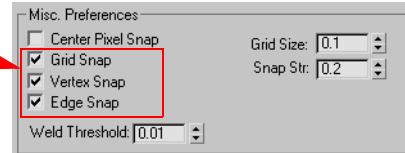
Show Edge Distortion

This option, found in the Display menu, highlights the UV edges that are much longer or shorter than the corresponding geometry edges.



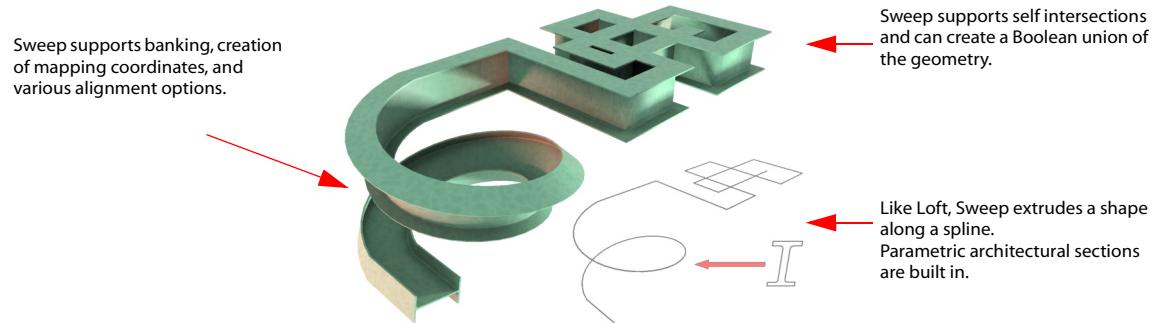
New Snap Options

Three new snap options are available on the Advanced Options dialog.



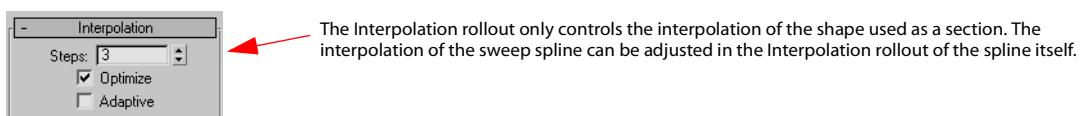
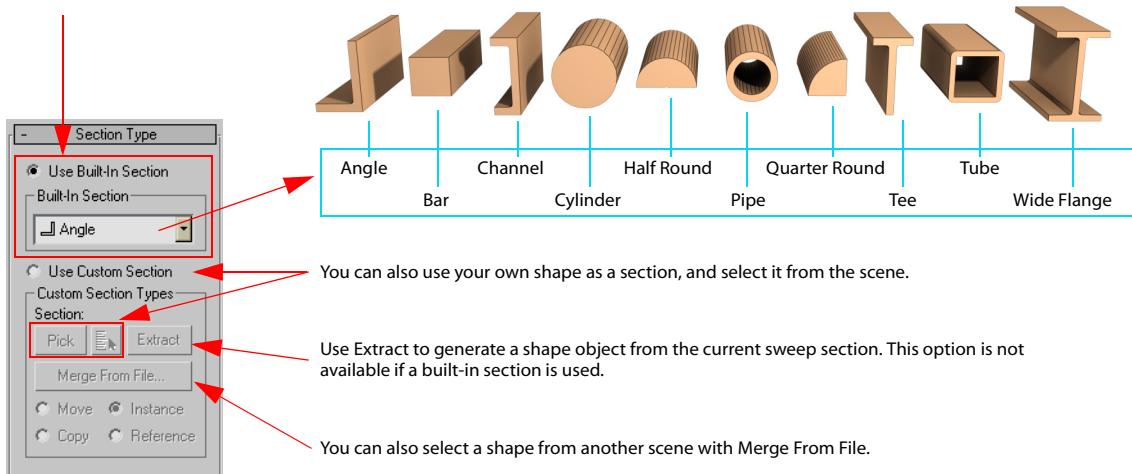
Sweep Modifier

This modifier is similar to the Loft compound object, but has a different workflow and different features. On most occasions, you might find the ease of use and speed of Sweep more suitable for your specific needs.

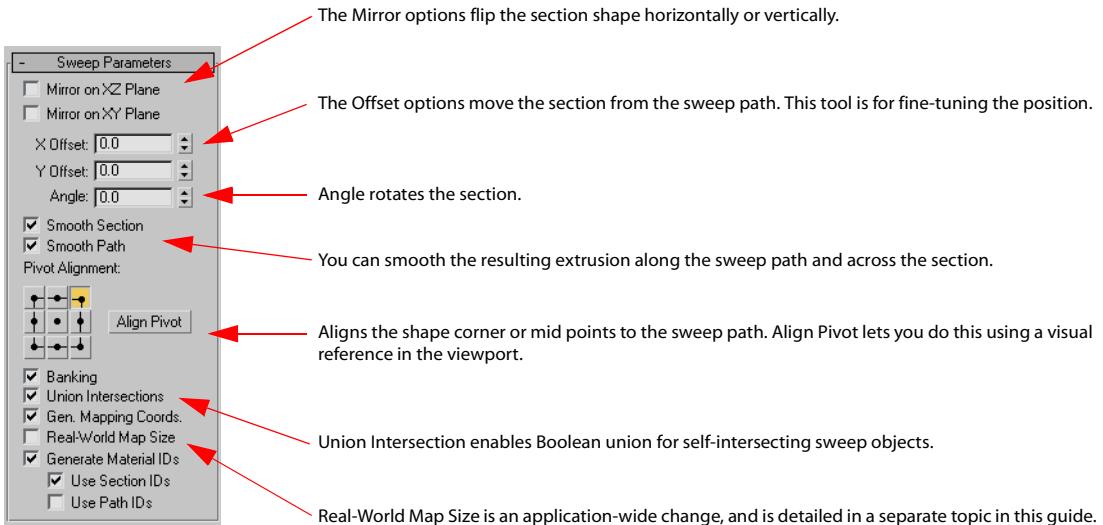


User Interface

You can use any of the available built-in sections. After choosing one, you can edit its specific parameters on a modifier rollout.



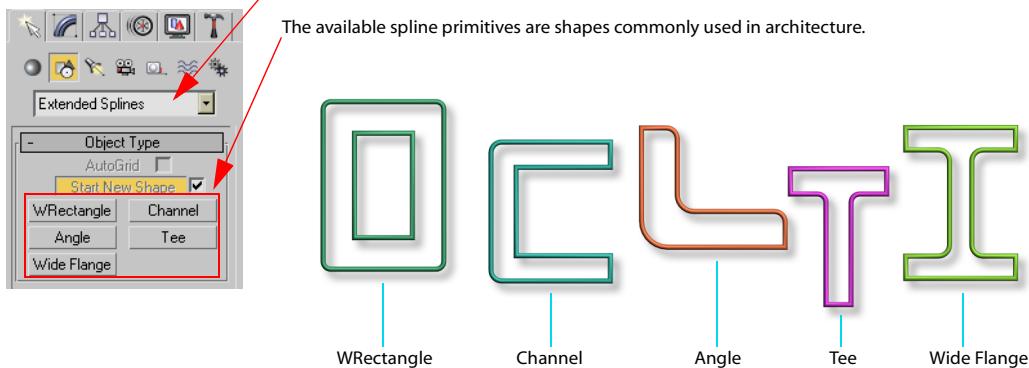
User Interface (Continued)



Splines

New parametric spline primitives called Extended Splines are available on the Create panel. You create these primitives by first dragging the mouse to set the width and height, and then moving the mouse to set thickness.

Choose the new Extended Splines group.



Each of the new spline primitives has a Parameters rollout for accurate sizing and for adjusting the corner fillets.

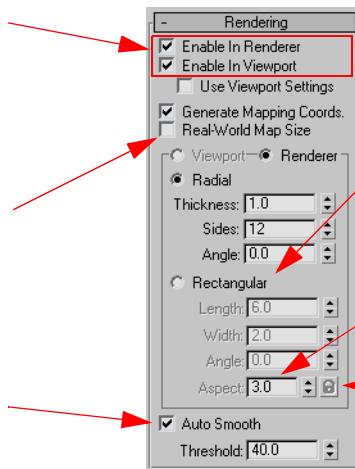
Rendering Rollout

The Rendering rollout for all splines has been enhanced. Following are descriptions of the new options.

The Renderable and Display Render Mesh options have been replaced by two check boxes to enable the mesh for rendering and/or in the viewports.

Splines support the new real-world mapping feature. See the Real-World Mapping topic in this guide for more information.

Auto Smooth uses the Threshold value in degrees to smooth the mesh surface.



The new Rectangular mesh type let you specify Length and Width for the spline mesh section.

Aspect is updated to reflect changes to Length and Width. If you change Aspect, the value of Length is updated while Width remains fixed.

If you lock the Aspect setting, the current value is fixed and Length and Width are updated whenever you change either of them to maintain the specified aspect ratio.

Brush Presets



Mesh painting brushes are used in 3ds Max to paint deformations, weights, vertex colors, and soft selections.

This new feature allows you to save multiple brush settings for each of these contexts, and to assign them to buttons on a toolbar.

A basic set of predefined brushes is available. You can customize those presets and add more.

The Brush Presets Toolbar

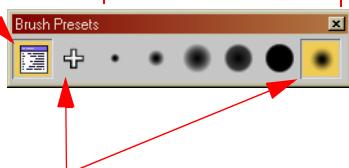
You enable the toolbar by right-clicking an empty area of the main toolbar and choosing Brush Presets.

Because the toolbar works in combination with the Painter Options dialog and other settings for each context, buttons on the toolbar are disabled until you enter one of the mesh painting contexts.

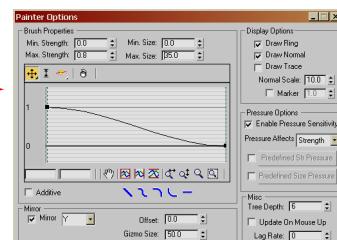
In this example we look at Paint Deformation brushes. The basics are the same for each context, but there are specific settings for each that are saved with the brushes. We will see them later.

[Click here to open the Brush Preset Manager dialog, explained on the next page.](#)

Choose one of the saved presets here. Each button image is representative of the actual brush size and falloff settings. When a brush is active (button depressed), the brush Painter Options dialog and the context-specific brush parameters are updated, and changes are saved back to the preset.



When a brush button is active, changes to the brush parameters are automatically saved for that preset. If no buttons are active, the current brush can be customized. To add the current settings, click the "+" button and a new active preset will be created.



The toolbar is activated every time you enter a mesh-painting context, and the brushes reflect the settings for that specific context.

Note: The number of saved brushes and the saved settings from the brush Painter Options dialog are common to all contexts. Adding a brush or changing its size affects that preset in every context.

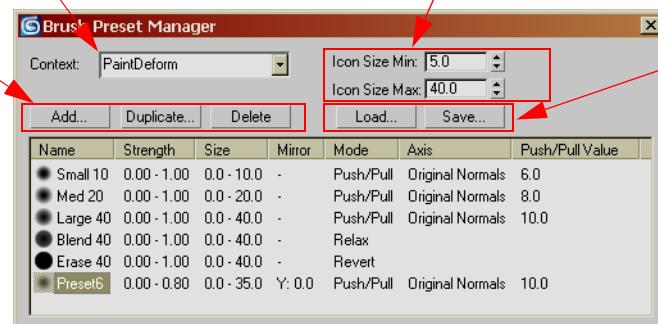
Brush Preset Manager

The Brush Preset Manager dialog lets you see the details of each saved brush, and also delete or save them to a file. When the dialog is open, you can use it to select presets too, and the toolbar will activate the matching button.

Choose the context from this drop-down list. You can view the context-specific settings saved with each brush.

VertexPaint
PaintDeform
PaintSoftSel
Paint Skin Weights

Add a new preset, or duplicate or delete the current one. Remember that these affect the same brush in all contexts.



This Min and Max values are used to scale the toolbar button icons. Use them to set a range for your brushes. This is only a visual cue adjustment; it has no effect on the brush settings.

Load and save sets of brush presets. Sets are saved to a BPR file.

Common Settings

These columns show the brush settings common to all contexts. They are the settings from the Painter Options dialog.

Context Specific Settings

These columns show the context specific settings for each brush, and are different for each context. See below for details.

Brush Context Specific Settings

The samples above use the Paint Deformation context. Here are examples of settings saved for the other contexts.

Mode	Color	Opacity	BlurStrength
Paint	█	100.000000	100.000000
Paint	█	100.000000	100.000000
Paint	█	100.000000	100.000000
Blur Brush			
Erase			

VertexPaint modifier

Mode	Selection Value
Paint	0.800000
Paint	0.800000
Paint	0.800000
Blur	
Revert	

Soft Selection

Mode
Paint
Paint
Paint
Blend

Skin Weights

4

Materials

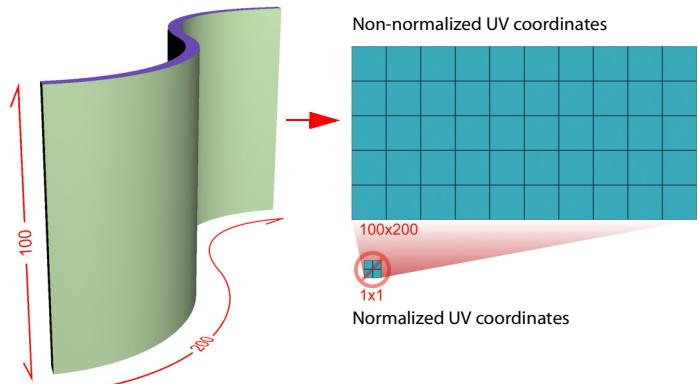
<i>Real-World Mapping</i>	68
<i>Material Editor Utilities</i>	70

Real-World Mapping

This feature uses non-normalized UV coordinates and user specified bitmap sizes to match textures and geometry relative size.

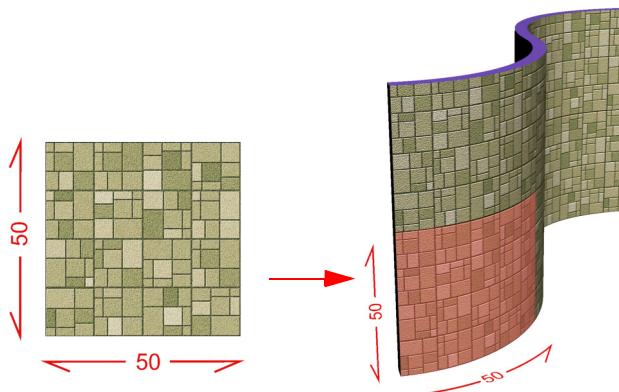
Objects in the scene can be of any size.
Non-normalized UV coordinates keep
the original object size.

Normalized UV coordinates shrink their
surface coordinates down to a 1x1
square. This is the way mapping was
done traditionally, but this step is
skipped when real-world mapping is
active.



If UV coordinates maintain the original
object size, and we know the size in
units of the texture that we use for the
mapping, we can tile them
automatically using the correct
proportions.

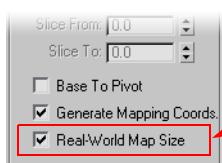
The user must specify the size of the
texture in units.



Knowing the texture size and object size allows accurate mapping of different-sized objects. The texture will be the same size no matter the dimensions of the object it's applied to.

UV Coordinate Generation

The first place you'll find user-interface changes resulting from this feature is a new option for automatic generation of real-world UV coordinates for standard primitives.



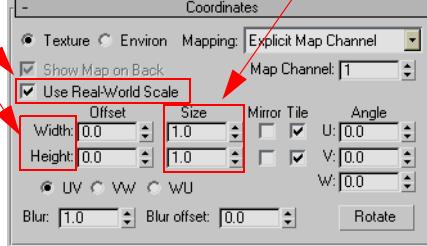
This new option is available for most primitives, including Sphere, Cylinder, Plane, and Torus.
When on, the UV coordinates are not normalized.

Texture Size

The size of an object is a known quantity, but you need to specify the size of your textures. In other words, you must define the width and height of the image in units, not in pixels. For example, a bitmap of a few bricks from a wall could be 30 inches in width and 20 inches in height. This is the real-world size information needed for correct mapping.

Enabling this option on the Coordinates rollout of a 2D texture such as Bitmap changes the U and V fields to Width and Height.

The Tiling fields are replaced by Size fields where you specify the size of the texture in units.



Note that if you switch back to regular UV mapping by turning off Use Real-World Scale, the tiling values will be updated to match the tiling that would have been used for the real-word setup.

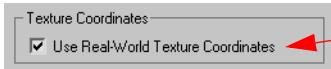
Other Affected Components

Other components include changes related to this feature. For example, the UV Map modifier has the same option as primitives to generate non-normalized UV coordinates.

Also, the Material Editor Options dialog has some new settings to apply real-world mapping to the sample geometry used in the material slots. See the Material Editor topic in this guide for more information.

Defaults

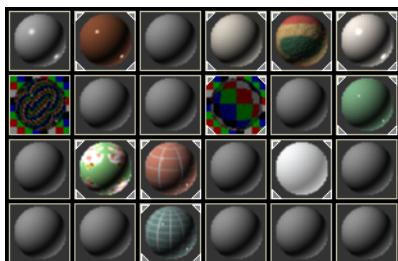
The Preferences dialog > General panel includes a new option related to this mapping method.



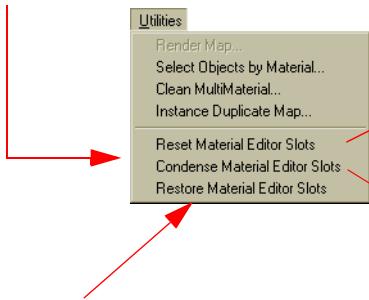
When this option is enabled, new primitives and new 2D maps will have the Real-World Map Size and Use Real-World Scale options already turned on.

Material Editor Utilities

New tools in the Material Editor > Utilities menu are used to manage materials in the editor slots.



Reset replaces all slots in the editor with default materials. Materials in the scene are not affected.



Restore reverses the last Reset or Condense operation.



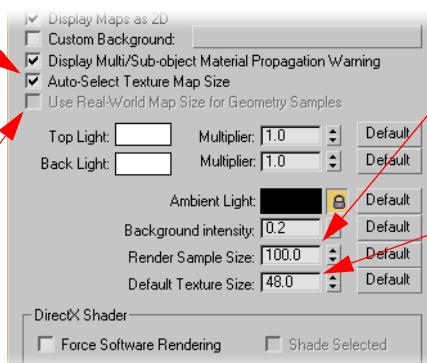
Condense discards unused materials and moves all the used ones to the top.

Options Dialog

The new Material Editor options are related to the new real-world mapping feature. To best understand these options, please first read the Real-World Mapping topic in this guide.

Auto-Select Texture Map Size
automatically chooses Real-World UV coordinates for individual slot geometry samples based on the presence in the material of maps set to use real-world map sizes.

This option becomes available when Auto-Select Texture Map Size is off. It lets you toggle the ability of geometry samples to use real-World UV coordinates.
Note that this option affects all geometry samples.



Render Sample Size specifies, in units, the size of the geometry samples. It affects all the material sample slots.

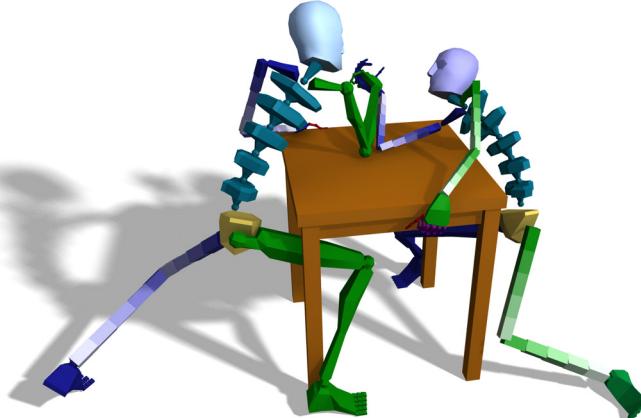
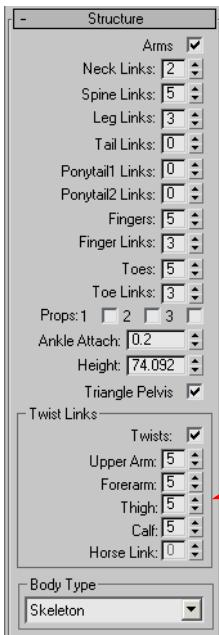
This parameter sets a default texture size (both width and height) for newly created maps. See the default setting explained in the Real-World Mapping topic. Real-World textures need to be the default in the Preferences dialog.

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Biped

Twisty Bones

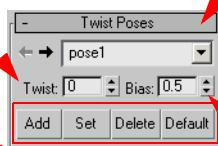
The bone-twist options are now expanded to cover all biped limbs. This allows better mesh deformation on skinned models when twisting occurs on animated limbs such as legs and arms.



Each limb can have as many as 10 twist links. The default state of a twist link is frozen. You need to unfreeze it before applying it to your skin envelope.

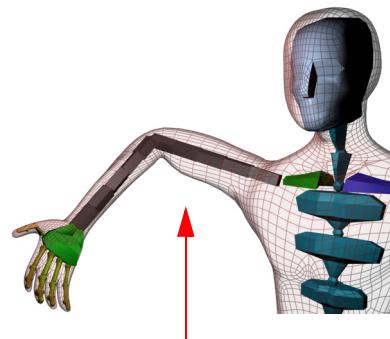
Determines the amount of rotation applied to the twist links.

You can calibrate the twist links for limbs with three degrees of freedom by setting up twist poses at different rotations. These poses become references to evaluate the in-between twists.

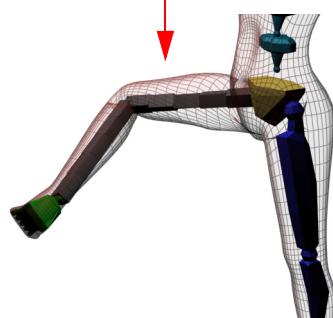


These buttons let you add new twist poses and modify, delete, and reset current ones.

Sets the distribution of rotation along the twist links. A value of 1.0 concentrates the twisting towards the top link while a value of 0.0 converges it towards the bottom link.

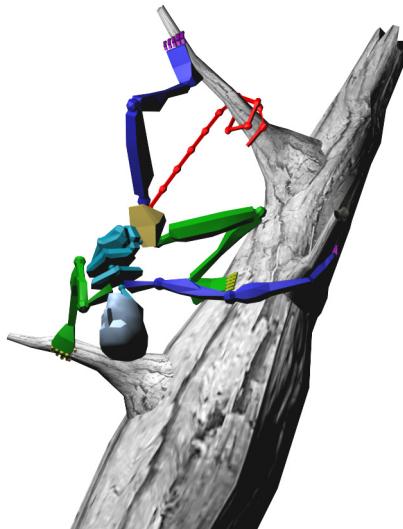


Twist links drive skin meshes smoothly along the biped limbs to avoid breaks within the polygon loops. This improves the look of a textured model when it is animated.



Bend Links

The Bend Links toolset offer new tools to allow easier control over a chain link, such as a biped spine, neck, or tail.



Twist Individual mode allows you to rotate a single link without affecting its parent or child.

Zero Twist resets every chain link's rotation to 0 in local X.

Bends Links mode transfers the rotation of your selected link to the following child links, creating a natural curvature.



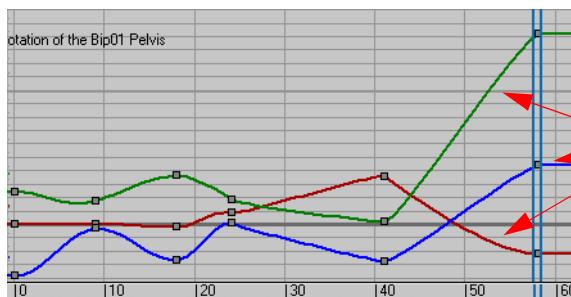
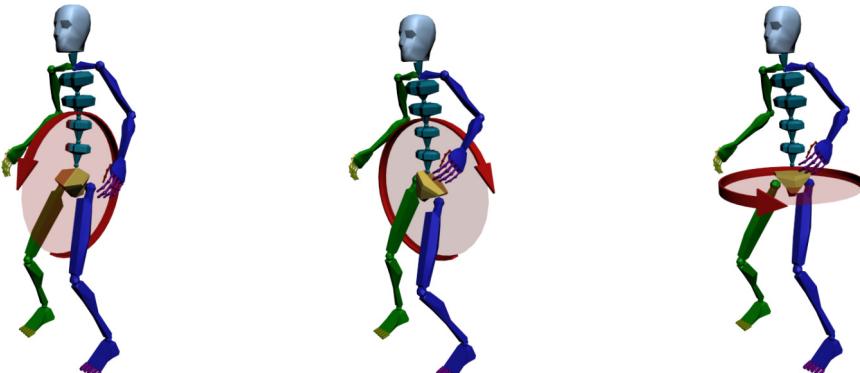
Twist Links mode allows you to rotate your link on the local X axis without interfering with the other two axes.

Smooth Twist mode distributes the rotation of all chain links based on the orientation in local X of the first and last links.

Zero All resets every chain link's rotation to 0 on all axes.

Pelvis as Ball Joint

The biped's pelvis now has three degrees of freedom (DOF). You can rotate it on all three axes without affecting the spine and upper body at the same time because the pelvis gyrations are isolated from the center of mass (COM).



The three-DOF pelvis motion is now displayed as three separate Euler or quaternion (TCB) function curves in the Curve Editor and Workbench. This is especially useful when loading animation from a motion capture file.

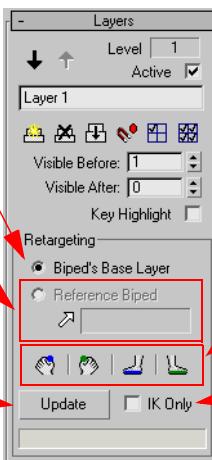
Biped Layer Retargeting

You can preserve a biped's IK constraints throughout layers by accurately retargeting its limbs to either the biped's base layer or to another biped as reference.

Choose this method to use the IK constraints from your biped's base layer as retarget reference. This is helpful when you animate a character on separate layers and need to match its hands and feet accurately.

Choose this method to retarget your biped's hands and feet to those of a different biped. When two characters have disproportionate body parts, retargeting their hands and feet correct their positioning so they match precisely.

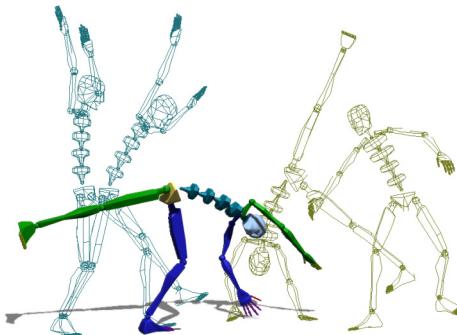
Click to refresh the hands and feet positioning based on the retarget method, the active retarget body parts buttons, and the IK Only option.



Turn on to use the hands and feet IK constraints of the base layer to reposition those on the current layer.

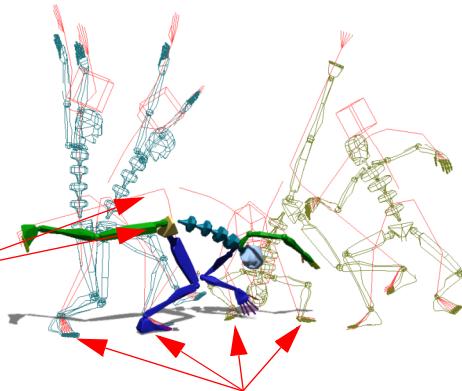
Enable to retarget hands and feet only during frames containing IK data. Otherwise, the hands and feet are retargeted on both IK and FK keys.

You can use retargeting to maintain the IK constraints on your base layer while you make changes on other layers. For example, you could lower your biped's center of mass while preserving the positioning of the hands and feet.



The biped's cartwheel animation on the base layer.

The red outline represents the biped's keyed animation on the base layer while another layer is currently active. You can use it to compare changes in your animation.

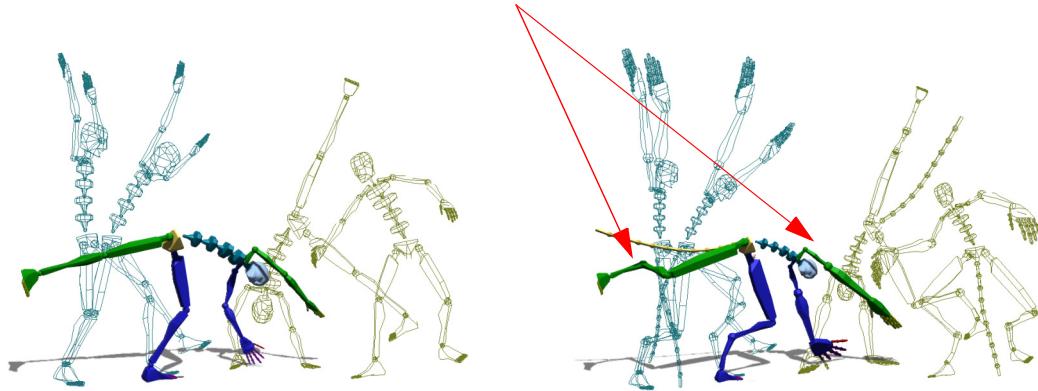


Lowering the biped's center of mass causes the whole biped to move downwards, which causes the cartwheel animation to change between the base layer (red outline) and the upper layer.

The hands and feet from the upper layer are retargeted to match those of the base layer. By honoring their IK constraints, they remain on the floor instead of passing through it.

If you share an animation between two bipeds which do not share the same body proportions, you can use retargeting to precisely match their hands and feet throughout the motion. The other limbs are updated to bend accordingly.

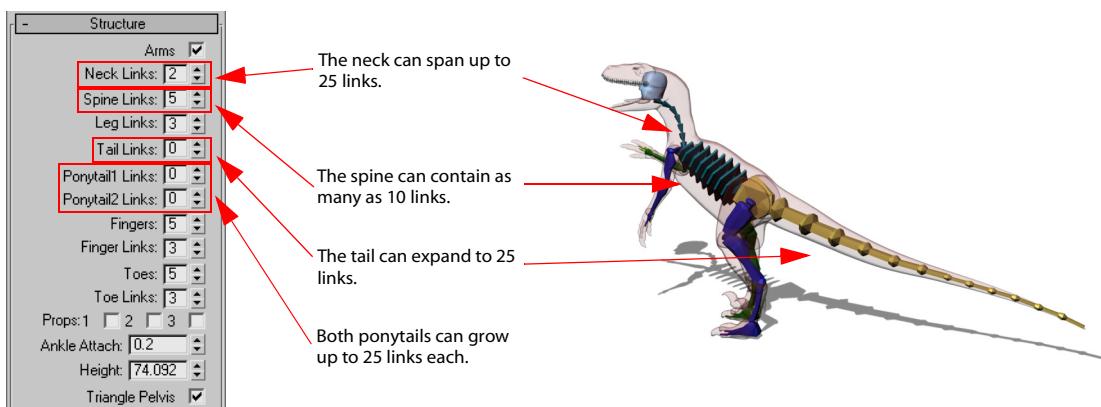
While the left biped has proportional body parts, the right biped has a different structure comprised of attributes such as smaller upper arms and three-link leg bones.



Although the biped has a different bone structure, its hands and feet placements are the same.

More Links in Neck, Tail, and Spine

Extra links have been added to the biped's structure to facilitate the posing of certain models.



Copy Collections

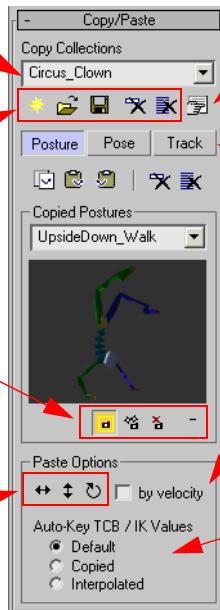
Managing copied posture, pose, and track information is now easier with the addition of copy collections. This new level of organization allows you to keep smaller sets of copied data together as well as transfer them between scenes within a single session.

Displays a list of the current copy collections.

Create/Load/Save Collection let you create, load, and save a copy collection, respectively. Delete Collection and Delete All Collections remove either the current collection or all collections in your list.

You have the option to take a snapshot of your copied biped selection from any 2D or 3D viewports. You can also minimize or maximize the snapshot view.

After you copy a biped pose or posture with the center of mass (COM) selected, you can choose which COM data (horizontal, vertical, and Rotation) to paste by clicking any of these three buttons.



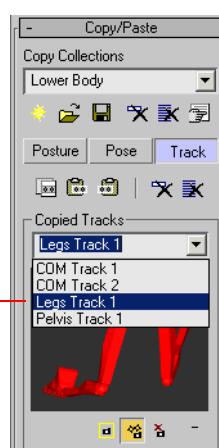
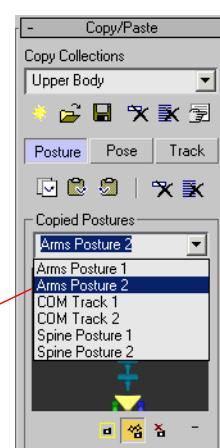
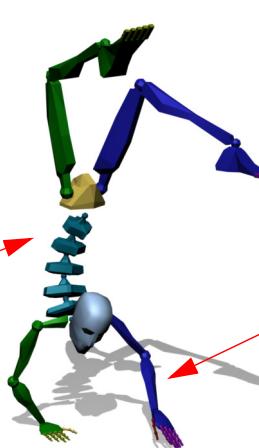
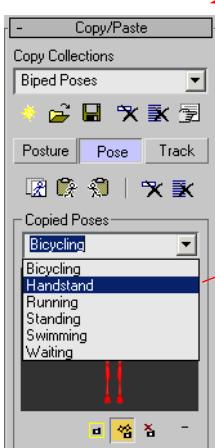
This opens up the Max File Loading dialog with options for actions to take upon opening MAX files.

Click one of these buttons to choose which kind of information to copy and paste.

Turn on this check box to calculate the offset value of the pasted COM data based on its previous trajectory.

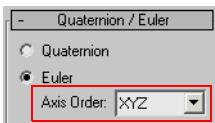
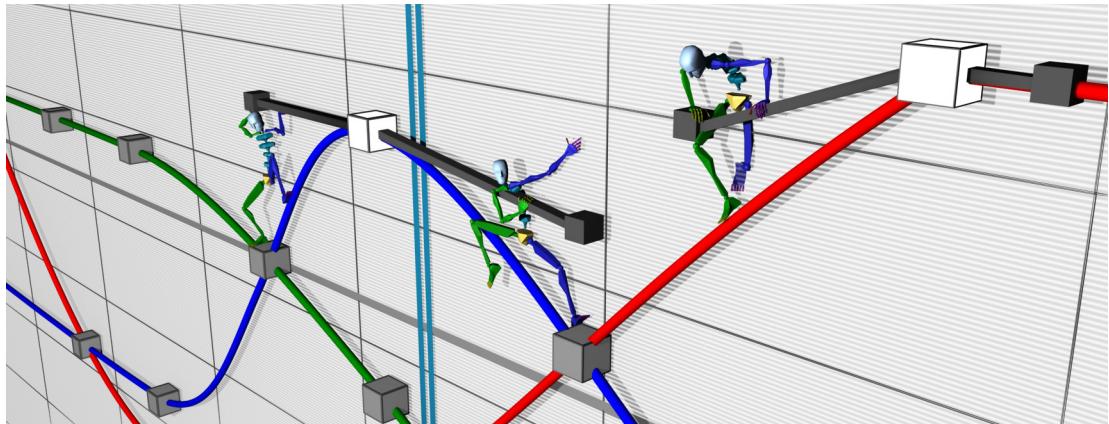
Choose one of these options to set the TCB and IK values of pasted information according to default, copied, or interpolated values based on the previous and next keyframes.

A scene can contain several copy collections, each with different information on posture, pose, and track.

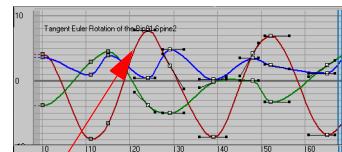
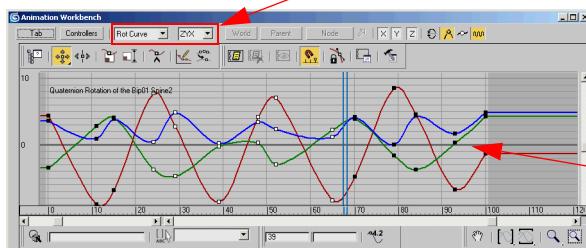


Animating Using Euler Curves

Bipeds can now be animated using Euler curves in the Workbench and Curve Editor. Using the Euler XYZ Controller is an efficient way to animate a biped because you can use Bezier tangents to change the interpolation of your animation curves.

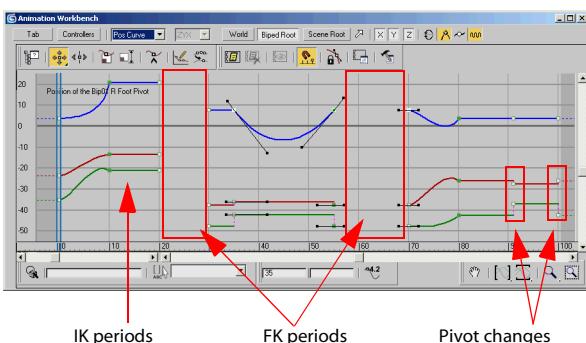


You can choose the order in which the rotation curves are calculated in both Euler and quaternion controlled curves.



When you switch between Quaternion and Euler controllers, your animation curves are re-interpolated while preserving the keyframed poses.

All biped rotation curves are now drawn in local space. This speeds up the curve manipulation due to less internal calculations.



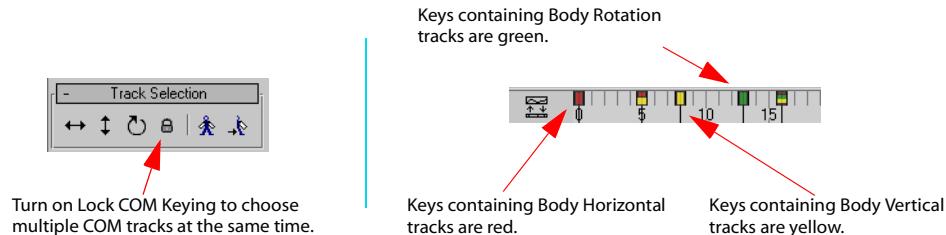
Euler position curves are available for the biped's hands, feet, and COM. They are set in world space (the COM is local to the world).

You can integrate Euler curves with high-level tools, such as Layers, Motion Mixer and Motion Flow. You can also copy and paste animation tracks of different types.

A biped (BIP) file stores both Euler tangents and Quaternion TCB control values.

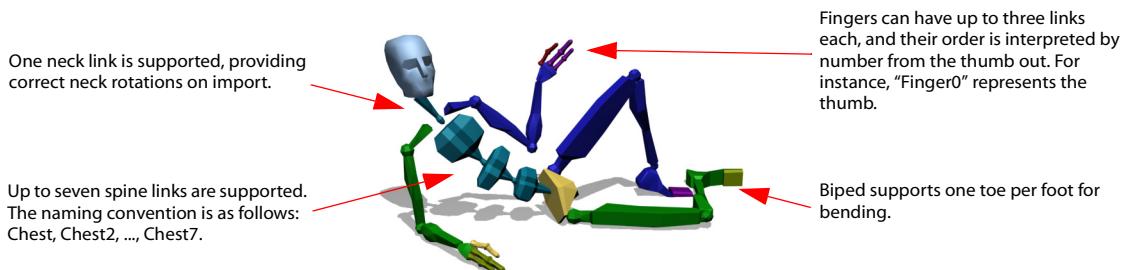
Multiple Center of Mass Tracks Selectable at Once

To provide a faster workflow when animating the center of mass (COM), you can lock any of the Body Horizontal, Vertical, and Rotation tracks at the same time.



Enhanced Support for BVH Motion Capture File Format

The biped figure now supports more links coming from the BioVision (BVH) format. This results in a better interpretation of the motion data once it is loaded onto the biped.



New Motion Capture Formats

You can import and export files in the Motion Analysis HTR/HTR2 (Hierarchical Translation-Rotation) format, which is an alternative to the BioVision (BVH) file format with improved flexibility in data types and ordering. The HTR2 format is nearly identical to HTR, except that it is better suited for a streaming data input.

Motion Analysis HTR/HTR2 Import

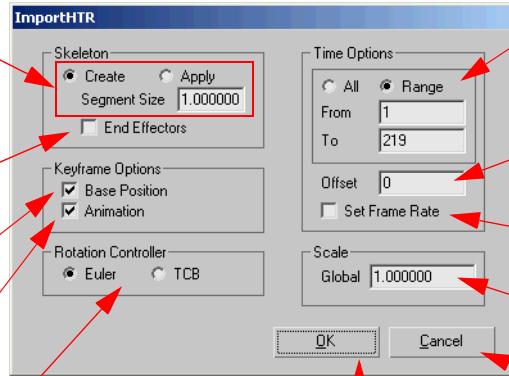
On import, you can choose to apply your motion data onto an existing skeleton rig in your scene or to create a new one. Segment Size acts as a scale factor for new bones.

Toggle to import end effectors from the incoming data, if they exists.

Enable to import only the keys of the base pose.

Enable to import all animation keys.

Apply Euler or quaternion (TCB) rotation controllers to the imported data.



You can import either the entire animation range from the motion capture file, or a defined portion.

Set the number of inserted frames before the imported animation starts.

Turn on to overwrite your scene's frame-rate setting with the one from the incoming data.

Set the size of the resulting skeleton.

Click to proceed with the import process using the current settings.

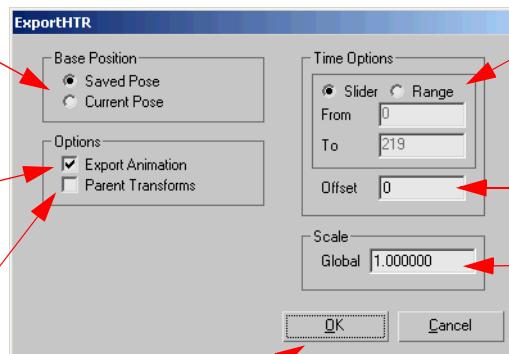
Click to cancel the import process.

Motion Analysis HTR/HTR2 Export

You can use as base position data the skeleton's pose at either frame 0 (Saved Pose) or the current frame (Current Pose).

Enable to export all animation keys. Otherwise, the export file contains only the base position data.

Enable to include the root object's animation data in the export file.



You can either export the active time segment or a defined range.

Set the number of empty frames to insert before starting the exported animation.

Set the bone-length scale factor in the export file.

Click to proceed with the export process using the current settings.

Click to cancel the export process.

Motion Analysis TRC Import

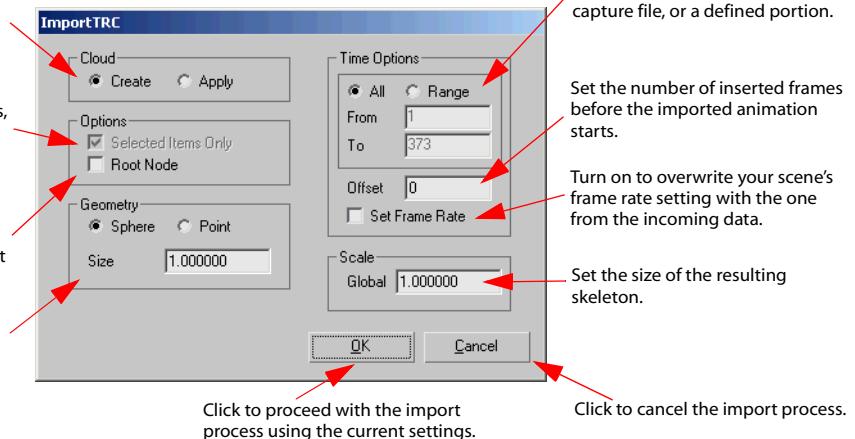
Another way of importing motion capture data is with the Motion Analysis TRC file format. On import, the incoming data is represented as a set of markers (spheres or points) containing all global positions.

On import, you can choose to apply your motion data to an existing set of markers (representing a cloud), or to create a new one.

If you use an existing set of markers, enable this option to import the motion data only relative to the selected objects in your scene.

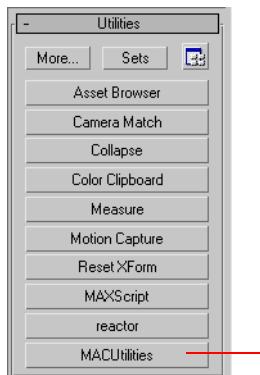
If you create a new set of markers, enable this option to include a root dummy on file import.

You can illustrate a new set of markers using either spheres or point helpers. The Size value sets the sphere diameter or point size, respectively.



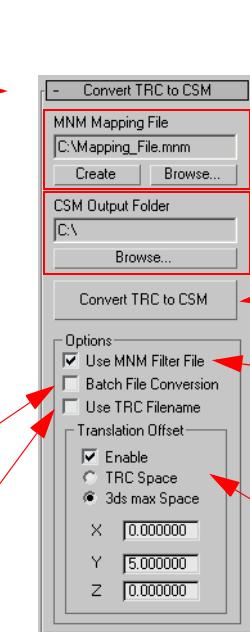
Convert TRC to CSM Rollout

This rollout lets you convert motion data originally recorded in TRC format into CSM format. Using this process, you can easily map the motion onto a biped afterwards.



Lets you pick multiple TRC files to convert.

When off, you can customize the resulting CSM file name. Otherwise, the CSM file is named after the TRC file.



Lets you pick a folder path where the CSM file is generated.

You can create a new MNM file or browse for an existing one. Click Create to open the MNM Creator/Marker Selection dialog, which builds the MNM file to use in the conversion process.

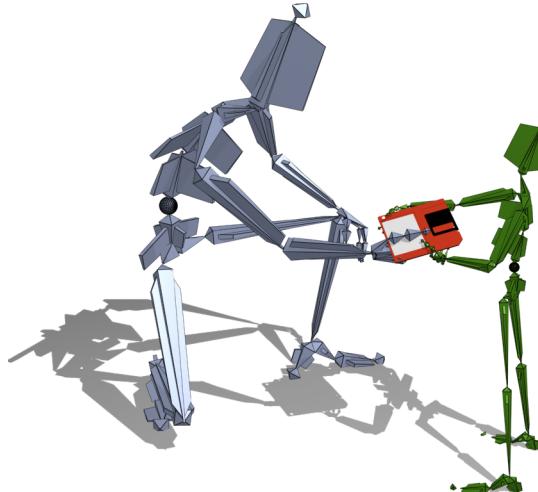
Lets you first pick the TRC file to convert, and then converts it into CSM.

Enable to use the MNM file in the conversion process. Leave off if the TRC marker names already follow the CSM standard naming convention.

You can add an offset on all three axes to the resulting data's position. The offset space can be relative to the TRC data's root or to your scene.

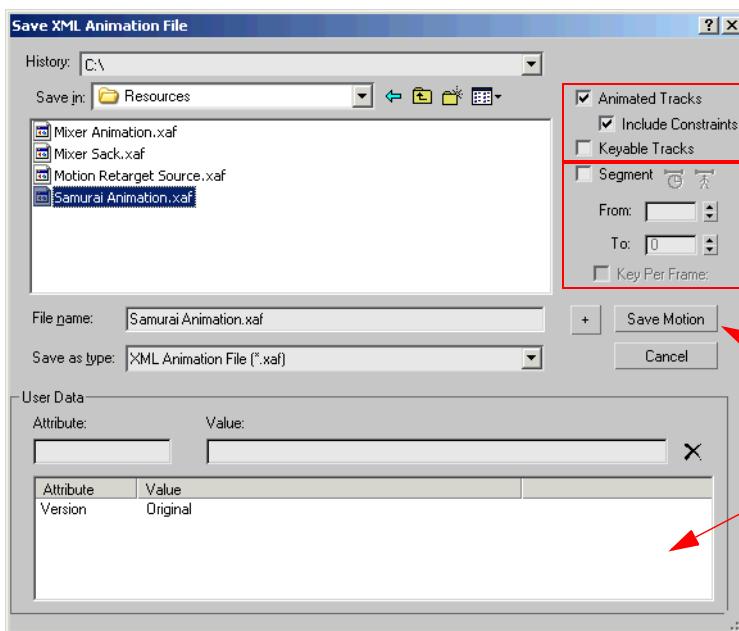
Load/Save Animation

You can save and load animation data for any number of objects separately from the actual scene.



Saving an Animation

You can store animation from your scene to disk in the XML Animation File (XAF) format. This brings up the following dialog in which you can specify your file name and set different options.



These options refer to whether or not keyable and/or animatable tracks are saved or not, as well as animations driven only by constraints.

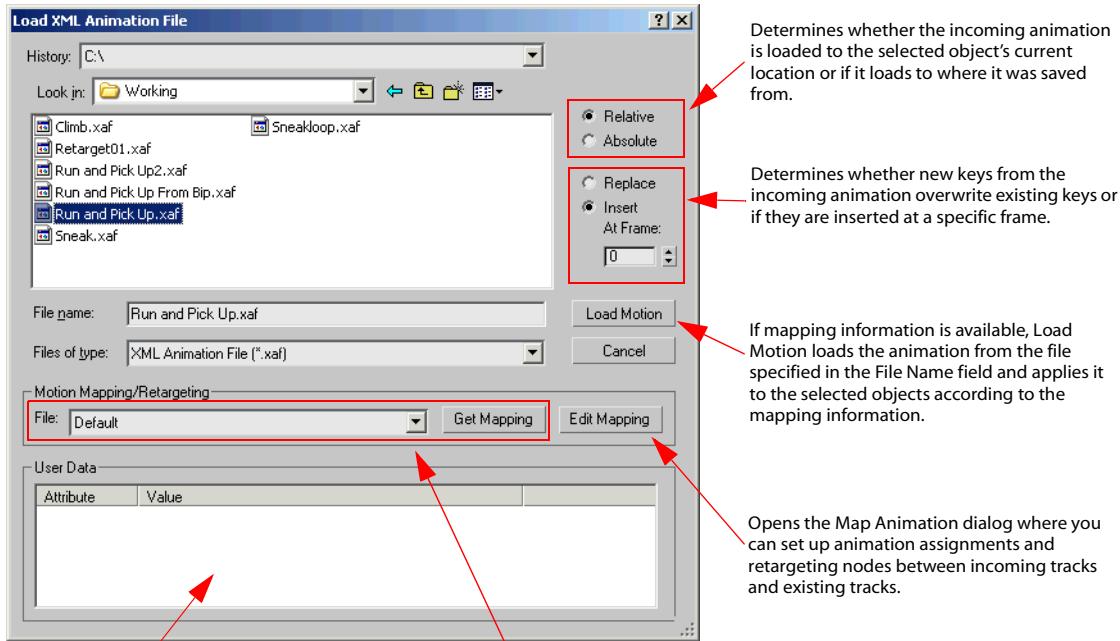
You can either save the entire length of your animation or just a specific range, which can be baked to your timeline.

Click to save the animation using the current file name.

These controls let you enter custom attributes and names. This could simply be notes about the animation file, or they could be actual data for use by plug-ins and utilities.

Loading an Animation

You can load animation from XAF (XML Animation File) files to objects in your scene. You can also choose an XMM (XML Animation Map File) file that contains mapping information.



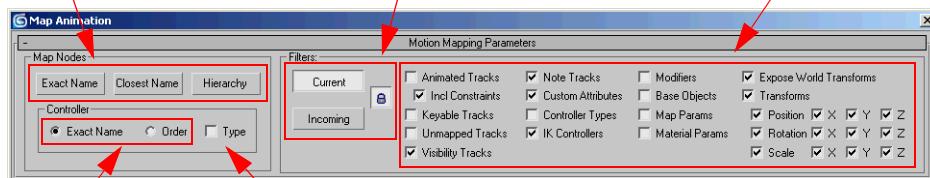
Displays the userdata entered in the Save Animation dialog.

Lets you choose a mapping file to apply to your incoming animation.

Mapping an Incoming Animation

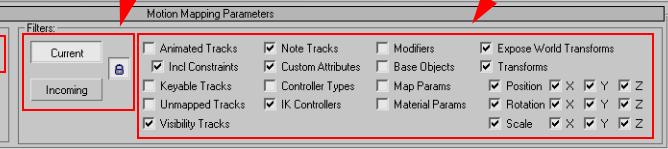
Once you have decided which animation file to assign to the objects in your scene, you can use the Map Animation dialog to map the incoming animation tracks to the selected objects in the scene.

Lets you perform automatic node mapping on highlighted tracks by name or hierarchical order.



Determines whether automatic mapping within nodes occurs by name or order.

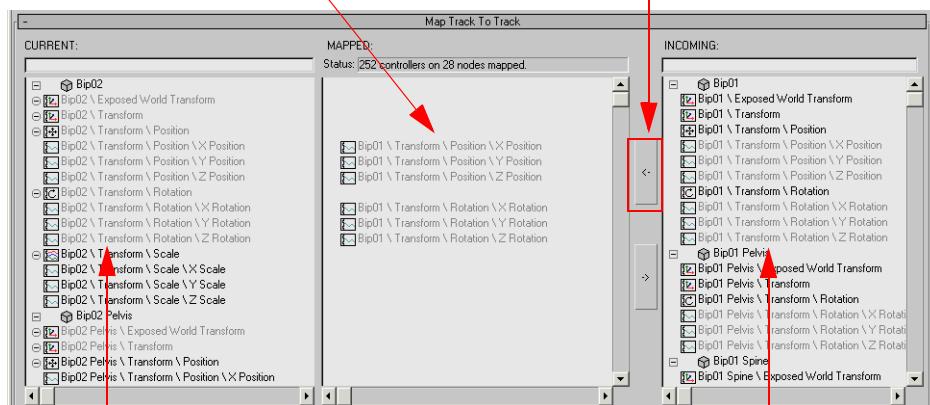
Toggles between the Current and Incoming lists in relation to the filtering options. Turn on the lock button to affect both lists.



These filters enable viewing only certain types of tracks in the current or incoming lists (or both). They help you focus on tracks of specific interest, ignoring the rest.

Displays a list of animation tracks from the Incoming list, which are assigned to be mapped to the corresponding tracks from the Current list.

Assigns the highlighted animation track in the Incoming list to the highlighted animation track in the Current list.

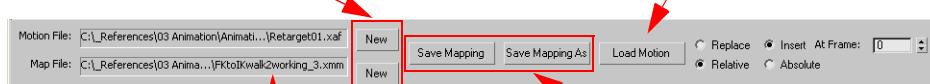


Displays a hierarchy list of the animation tracks for selected objects in the scene. Unassigned tracks use black characters, while assigned tracks use gray characters.

Displays a hierarchy list of the animation tracks in the loaded XAF file. Unassigned tracks use black characters, while assigned tracks use gray characters.

Lets you specify a new animation or map file to load without closing this dialog.

Loads the animation from the XAF file and maps the animation tracks as specified.



Displays the path and name of the current Motion File and Map File.

Saves the current mapping assignments to an XMM file using the current or a different file name.

Retargeting a Mapped Animation

If you map animation data from a loaded XAF file onto an object in your scene, you could get altered results leading to distorted motions. Possible causes for this could be differences between the current and incoming bone chains in either body proportions or animation constraints (for example, an FK track mapped to an IK-enabled object).

The Retargeting rollout lets you resolve this by setting up scale relationships between the nodes of the incoming animation, thus maintaining their scale ratios once they are loaded onto the current object. The key to a successfully loaded animation is an accurately preserved scale factor.

Use this field to search for particular objects. The results are highlighted in the list.

When on, the list shows only those mappings that have been retargeted. Otherwise, all mappings are listed.

Displays the tracks that have been mapped, along with related scale information. Each listed node can be retargeted.

Current Mapped Nodes	R	Scale (X,Y,Z)	Absolute	Scale Origin (Incoming/Current)	Incoming Chain (Start,End)	Current Chain (Start,End)	FK Extent
Bip02 > Bip01	X	(1.00, 1.00, 1.00)	X	Bip01, Bip02	Bip01 L Thigh, Bip01 L Toe0	Bip02 L Thigh, Bip02 L Toe
Bip02 Pelvis > Bip01 Pelvis	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 Spine > Bip01 Spine	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 Spine1 > Bip01 Spine1	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 Spine2 > Bip01 Spine2	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 Spine3 > Bip01 Spine3	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 Neck > Bip01 Neck	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 L Clavicle > Bip01 L Clav...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 L UpperArm > Bip01 L ...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 L Forearm > Bip01 L Fo...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 L Hand > Bip01 L Hand	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 L Finger > Bip01 L Fing...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 R Clavicle > Bip01 R Cl...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root
Bip02 R UpperArm > Bip01 R ...	(1.00, 1.00, 1.00)	X	Scene Root, Scene Root

Mapped Node: Bip02

Scale

Absolute Multiply Derived Scale

X: [1.0] Y: [1.0] Z: [1.0]

Scale Origin

Incoming: Bip01 Current: Bip02

Derive Scale Between Chains:

Resulting Scale Factor: 0.807

Incoming Chain

Start: Bip01 R Thigh End: Bip01 R Toe0

Current Chain

Start: Bip02 R Thigh End: Bip02 R Toe

FK Retargeting Extent

Enabled Parent Node: []

Get Set Clear

Displays the scale factor derived from the Scale Origin and Incoming/Current Chain settings. This value reflects the apparent difference in proportions between the objects or characters you are retargeting.

Lets you choose which objects to use as the start and end of the current chain. The End drop-down list is restricted to children of the current Start object. The Resulting Scale Factor depends on these values.

Lets you choose the object from which to derive the scaling origin, for both incoming and current chains.

Choose whether to scale the highlighted node using absolute values or by a multiplication factor based on calculations from the Derive Scale Between Chains group and, if needed, the FK Retargeting Extent group.

Displays the currently highlighted mapped node.

Resulting Scale Factor: 0.807

Incoming Chain

Start: Bip01 R Thigh End: Bip01 R Toe0

Current Chain

Start: Bip02 R Thigh End: Bip02 R Toe

FK Retargeting Extent

Enabled Parent Node: []

Get Set Clear

Erases the retargeting values for the highlighted node.

Applies the current settings to the highlighted node.

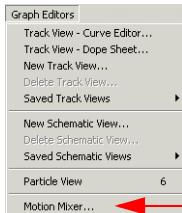
Retrieves settings from the highlighted node.

Lets you choose which objects to use as the start and end of the incoming chain. The Resulting Scale Factor depends on these values.

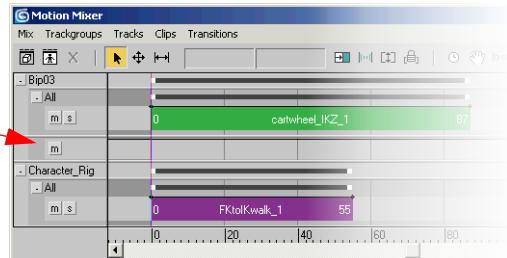
Turn on to choose the parent of the limb you are retargeting to calculate the extend of the chain to retarget. Use this only if the current chain uses FK.

Motion Mixer Support for Non-Biped Objects

In addition to the existing support for bipeds, you can now use Motion Mixer to create animation mixes for non-biped objects. This lets animators import motion clips for their custom skeleton rigs, which they can then blend to create new movements.



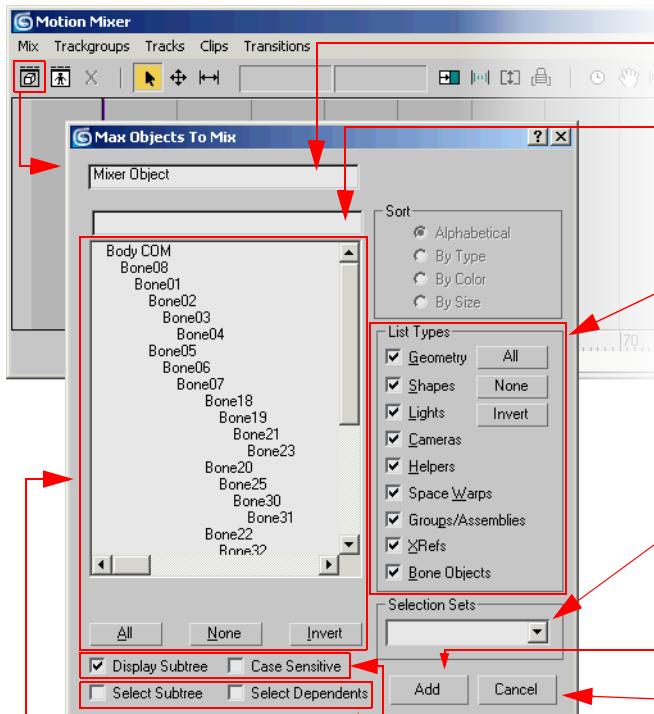
Although a non-biped mix has some differences (such as the lack of a balance track), the workflow remains the same.



The Motion Mixer is quickly accessible from the Graph Editors menu.

Adding Non-Biped Objects to a Mix

The first step when creating a mix is adding objects onto which you can import motion clips.



Displays the object mix name. By default, it is the root node with the most children in the list.

Enter a name to select that object in the list. You can use the asterisk (*) and question mark (?) as wildcards to select multiple names.

Toggle the List Types options to determine the types of objects to display in the list. Click the All, None, and Invert buttons to alter the pattern of activation of the List Types options.

Lists all named selection sets that you have defined in your scene. Choosing a selection set highlights the component objects in the main list.

Creates a new mix comprising the highlighted objects from the main list.

Cancels the current selection.

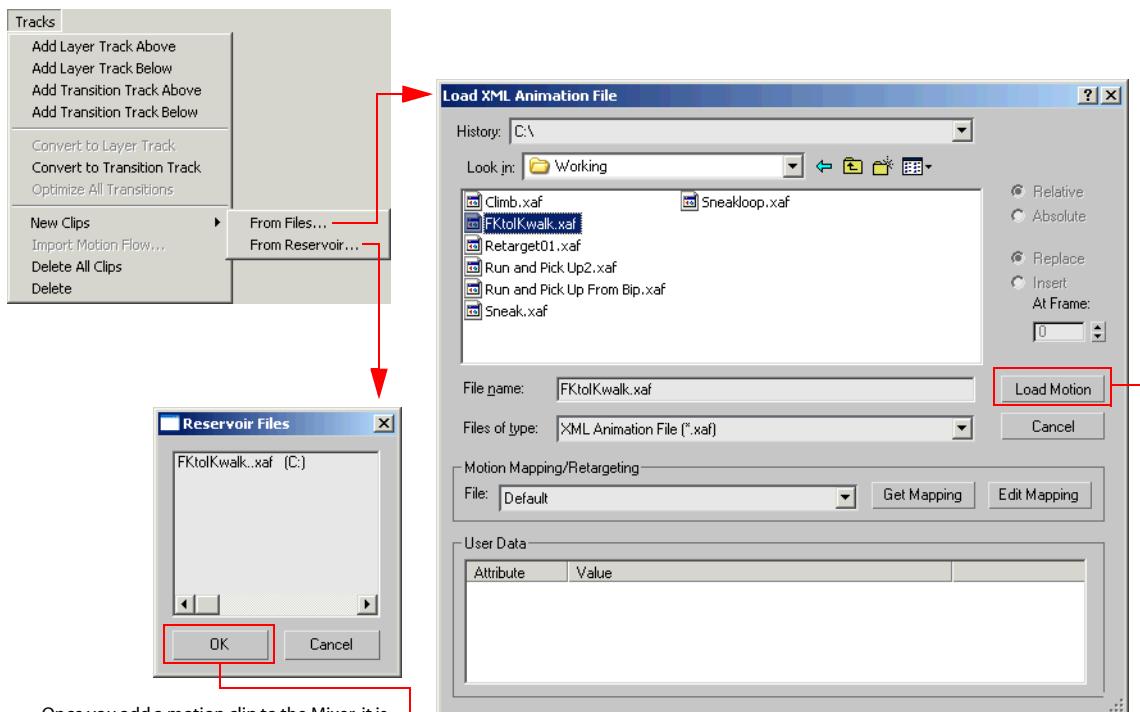
Lists all non-biped objects in your scene that can be added to the mix. An object can be added to only one mix at the time. Click the All, None, and Invert buttons to alter the pattern of selection in the list window.

Enable these options to display the list as a hierarchical tree (Display Subtree) and sort objects using case-sensitive character recognition (Case Sensitive).

When enabled, highlighting an object also highlights all its children (Select Subtree) or all its dependent objects (Select Dependents).

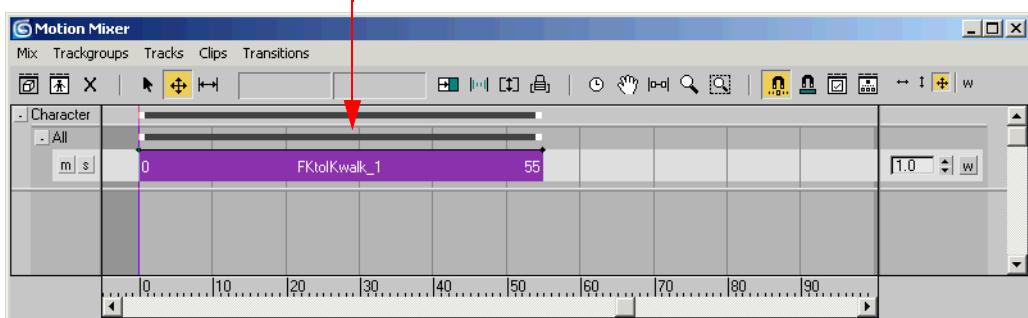
Importing Non-Biped Clips to the Mixer

The motions your character adopts depend on the clips you load in the Mixer. Non-biped objects require XAF asset files, which can be saved from the same or different objects. In some cases, you need an XMM file to map correspondences between both incoming and current tracks, and you might also need to use retargeting to preserve their respective scale ratio.



Once you add a motion clip to the Mixer, it is automatically added to the Reservoir. This is a quicker way to reuse common assets.

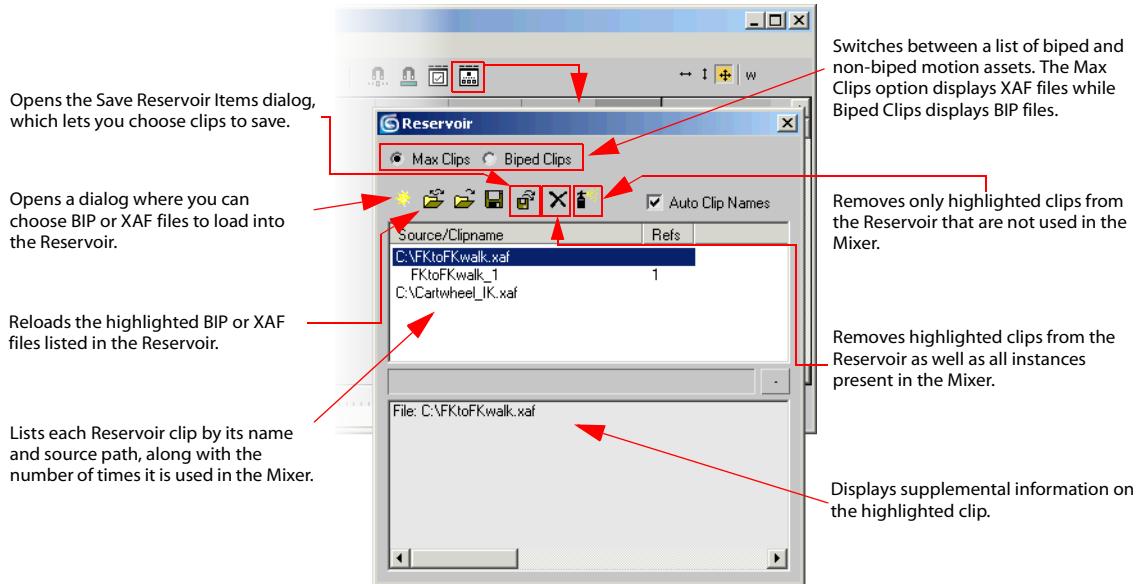
When you load a XAF animation clip, you may need to assign it a motion mapping file (XMM) if the incoming data do not match the current objects. In this case, you can either click Get Mapping to use an existing file or click Edit Mapping to open the Map Animation dialog, where you map and retarget tracks between incoming and current data.



Once you import an XAF animation clip, it is added to your mix.

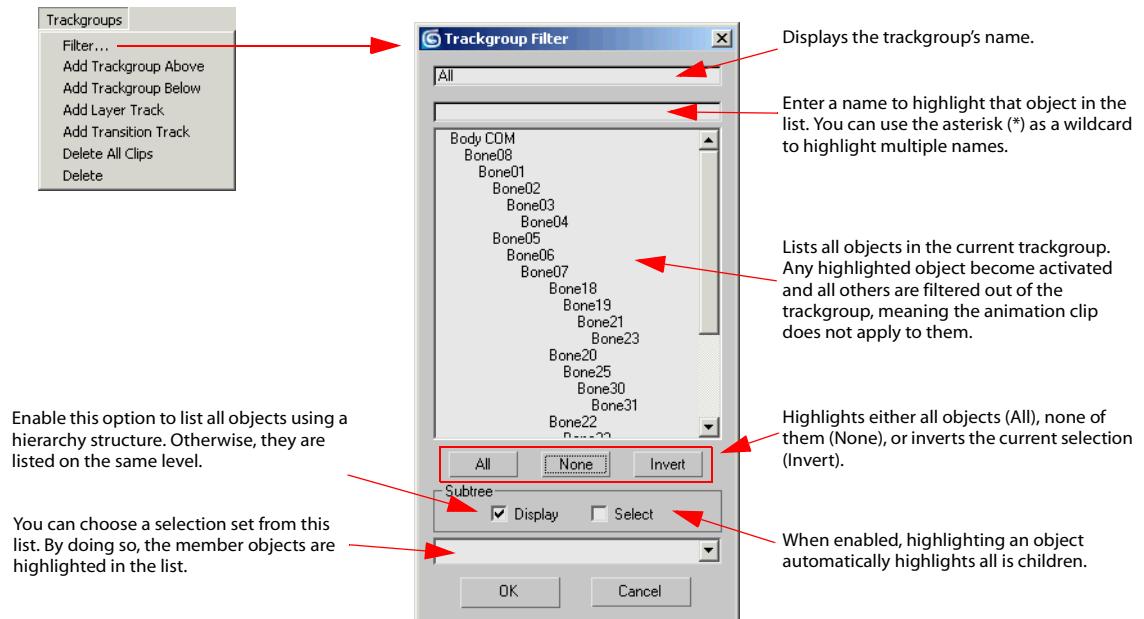
Using the Reservoir

The Reservoir serves as a storage facility for BIP and XAF motion files that you can use with the Motion Mixer. It provides useful information related to clips currently used in your mix.



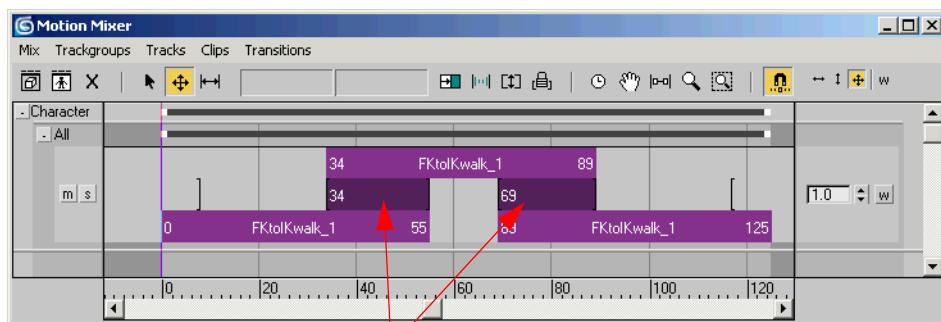
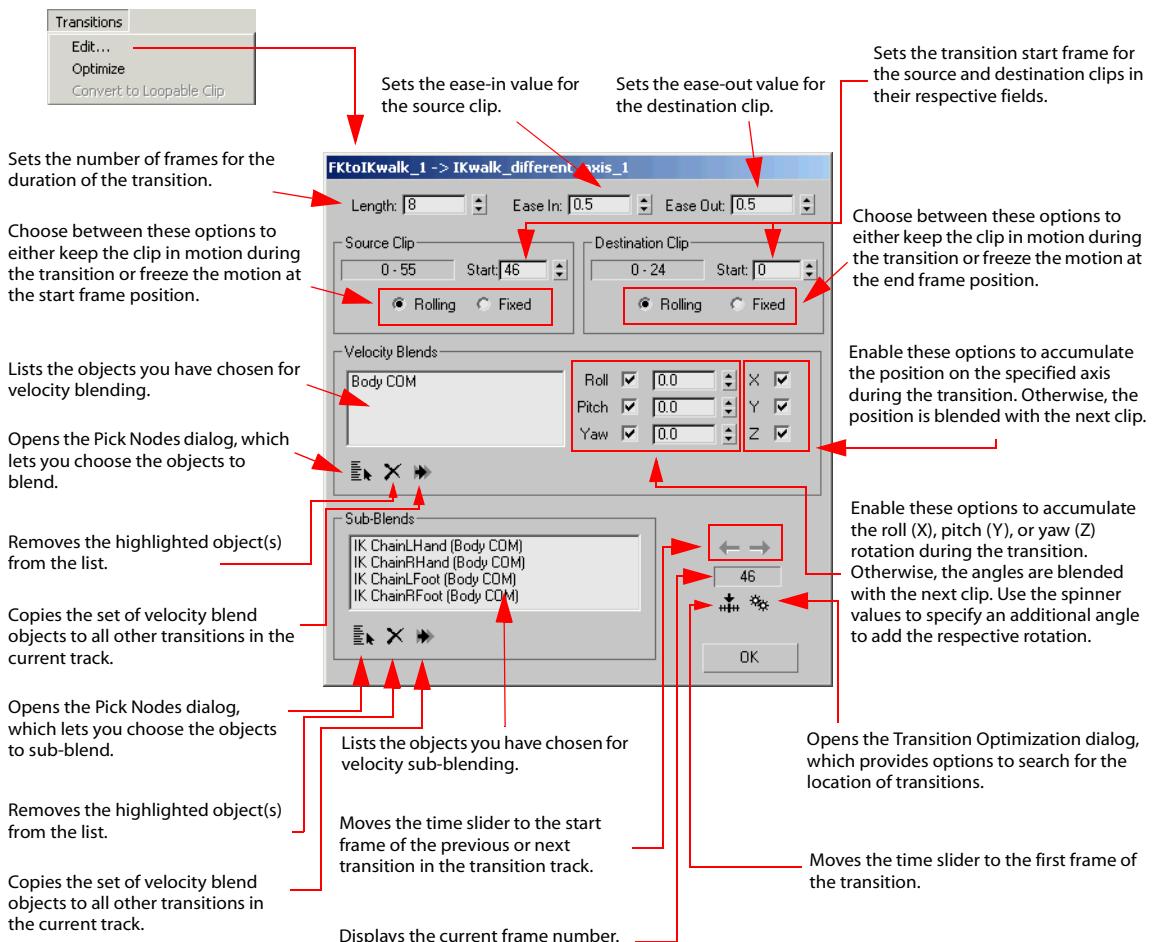
Filtering Non-Biped Trackgroups

Filtering lets you exclude any objects in a trackgroup from using their assigned animation clips. This is helpful when you need to use different motion files on distinctive body parts of a character.



Creating Transitions Between Non-Biped Motion Clips

A transition blends two clips together by creating a constant, gradual change from the first to the second clip. Using this feature, you can create continuous seamless movements for your character based on separate motion clips.

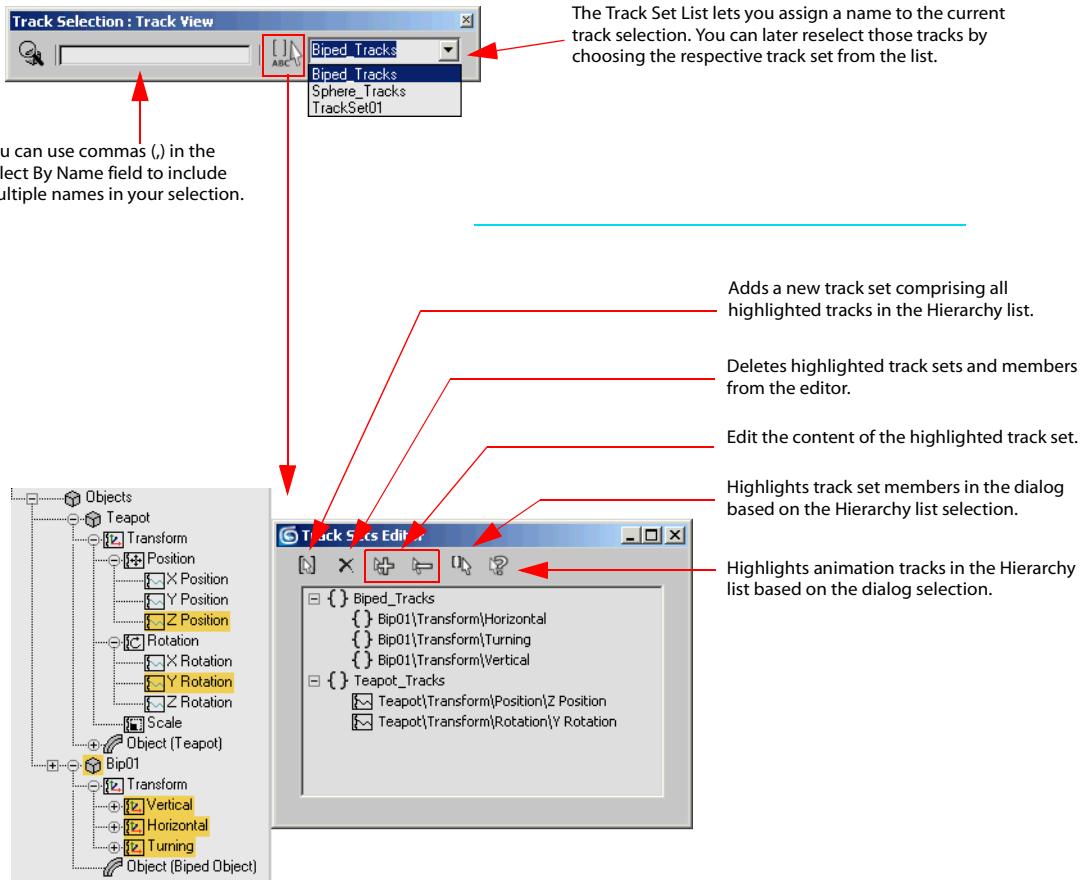


Transitions help blend separate animation clips together to create seamless movements.

Track View Enhancements

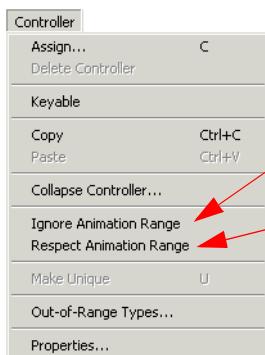
Track Sets

You can group animation tracks into sets so you can easily recall them later. You can use track sets to help organize your animations by regrouping them under themes or version dates.



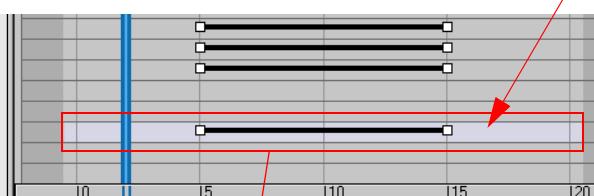
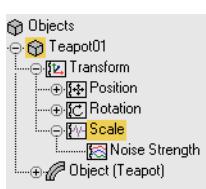
Controller Range to Infinity

You can set parametric controller tracks such as Noise either to respect or ignore their animation range. If a track respects the range, the track is active only within its respective animation range. Otherwise, it becomes independent from the range. This gives animators more freedom to decide on which behavior to use on a per-track basis.

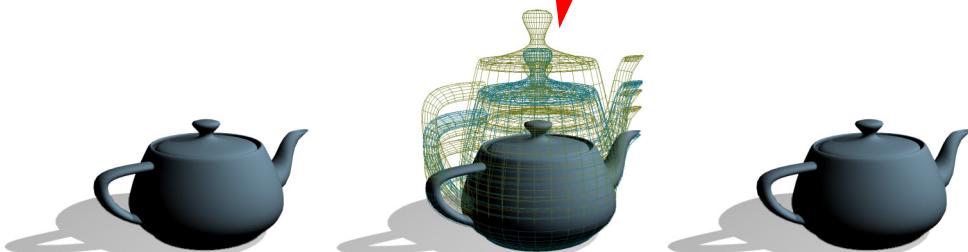


When enabled, the highlighted parametric controller track becomes active throughout the entire animation, independent of its current animation range.

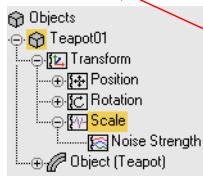
When enabled, the highlighted parametric controller track is constrained to be active only within its current animation range.



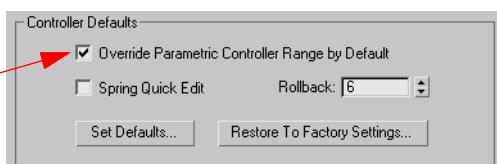
When a controller track is set to ignore its animation range, its background uses a distinctive color.



When a controller track is set to respect its animation range, the animation occurs only within the range.

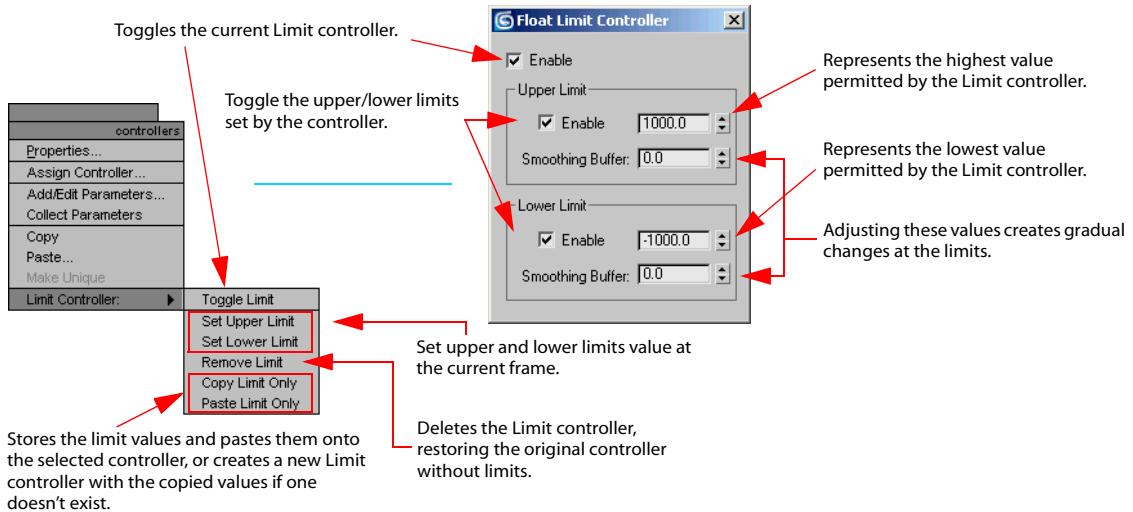


Enable this option in the Animation Preferences to apply Ignore Animation Range by default.

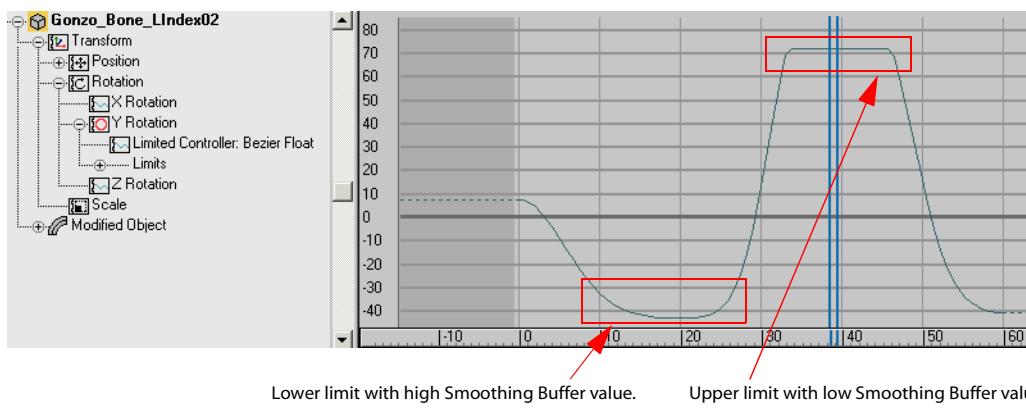
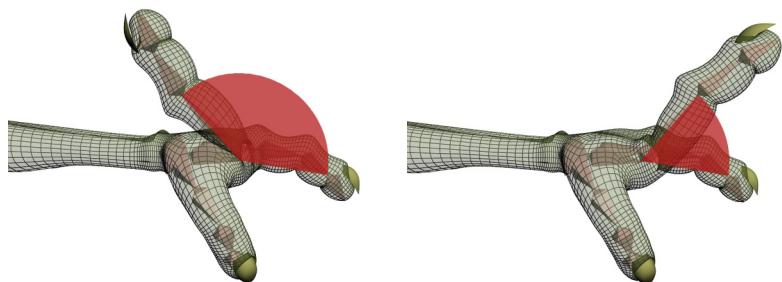


Limit Controller

You can impose a value range on controller tracks, which limits their upper and lower limits. You can use limit controllers to set up automation in hierarchies and rigs without the need for expressions or scripts.



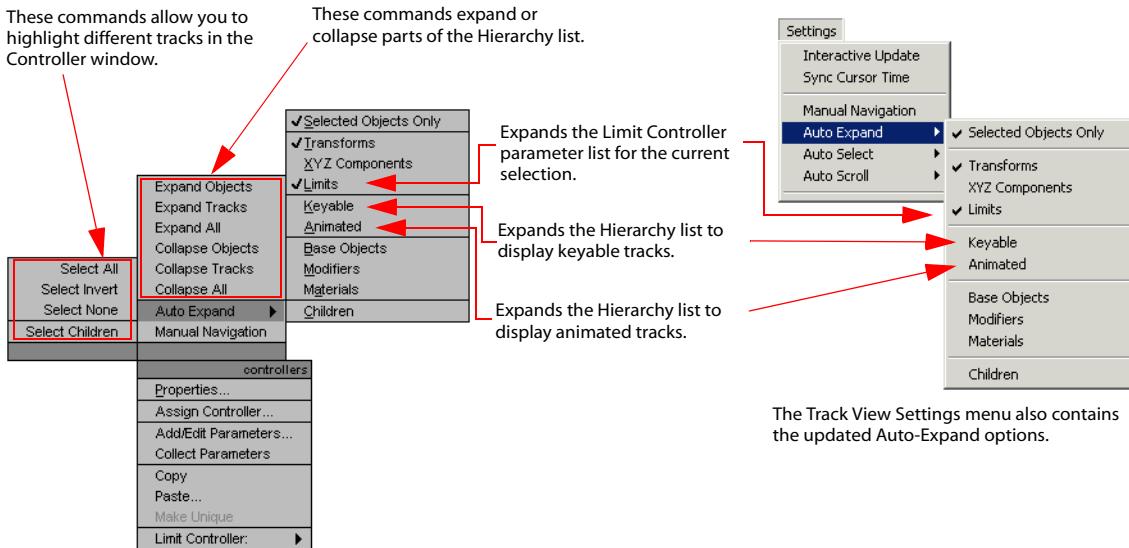
The index finger from the hand on the left does not have a Limit controller to restrict its rotation. The one on the right has a Limit controller constraining it from reaching extreme rotations.



Lower limit with high Smoothing Buffer value. Upper limit with low Smoothing Buffer value.

Hierarchy Right-Click Quad Menu

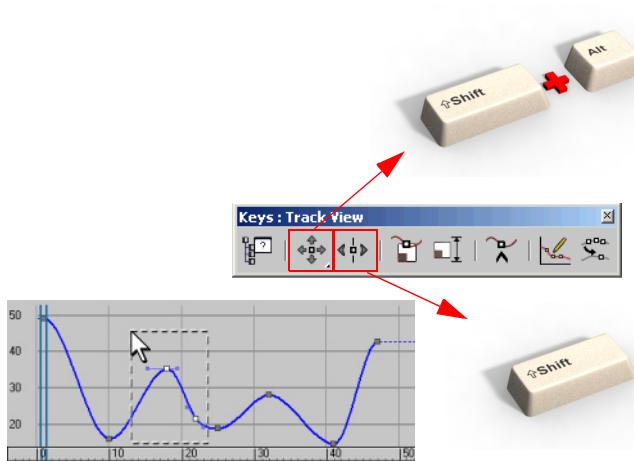
To accelerate the animation workflow, tools for navigating, expanding and collapsing the Hierarchy list of the Controller window are now integrated within the right-click quad menu.



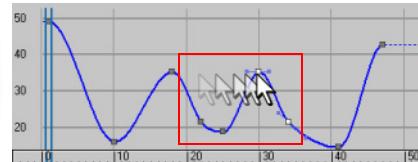
Curve Editor Improvements

Copy-Pasting Keys

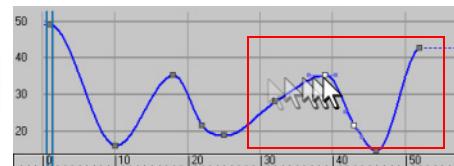
When you copy and paste animation keys by dragging them, you can choose to replace existing keys.



Select keys in your animation curve.



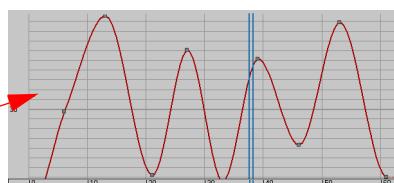
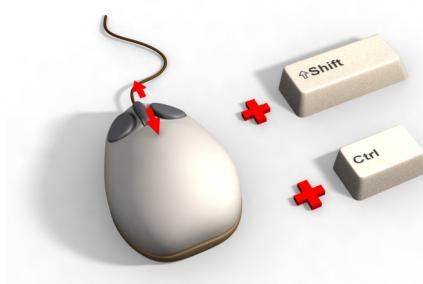
You can replace existing keys temporarily by holding down SHIFT+ALT while you drag your selected keys. As you continue to drag, the previously replaced keys are automatically restored.



You can insert cloned keys elsewhere in your animation curve while offsetting the existing keys by holding down SHIFT as you drag the selected keys.

Track View Zoom

Using your mouse wheel, you can zoom the Curve Editor window independently by time or value.



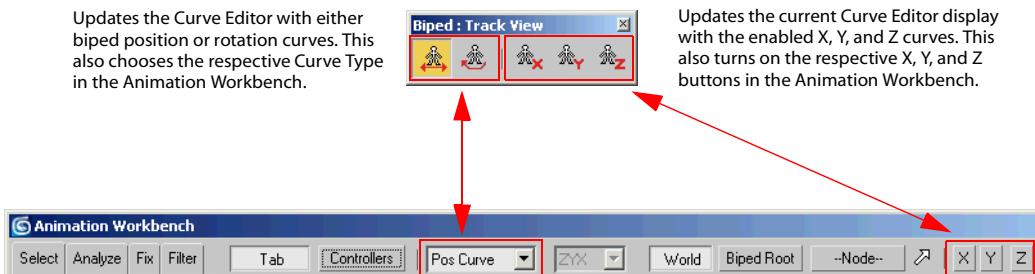
You can zoom by value only (vertically) by holding down the SHIFT key as you turn the mouse wheel.



You can zoom by time only (horizontally) by holding down the CTRL key as you turn the mouse wheel.

Biped Toolbar

You can use the Biped toolbar in the Curve Editor to specify which biped animation curves to display. You can choose between position and rotation curves, and toggle the separate X, Y, and Z curves of the current biped selection. Changing the curve display synchronizes the Animation Workbench accordingly.



Rendering

<i>Render Dialog</i>	96
<i>Batch Render</i>	101
<i>mental ray Satellites</i>	102
<i>Radiosity</i>	103
<i>Object Properties Dialog</i>	105
<i>Render To Texture</i>	106



Render Dialog

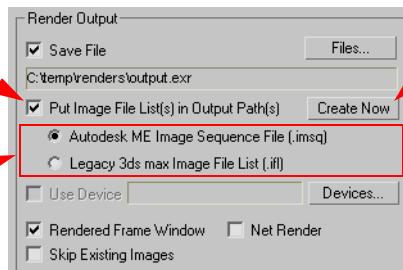
This topic summarizes changes to the panels of the Render Scene dialog.

Common Panel

Common Parameters Rollout

Enable this option to create a list of the rendered files in the output directory.

Choose the format of the list: the Autodesk products format (.IMSQ), or the standard 3ds Max IFL format.



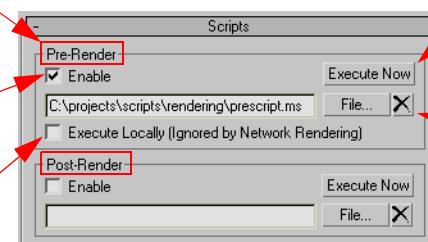
Use Create Now to force the creation of the file list at any time. Otherwise, the file list is created at render time.

Scripts Rollout

You can specify two scripts to be executed: one before and one after the rendering (not each frame).

Each script can be enabled or disabled.

The pre-render script can be disabled for Network Rendering only.



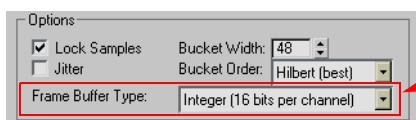
You can manually force the execution of the scripts at any time.

Use this button to delete the script.

The Pre-Render MAXScript option on the Network Job Assignment dialog > Advanced Settings sub-dialog has been removed and replaced by this new rollout.

mental ray Renderer Panel

Sampling Quality Rollout



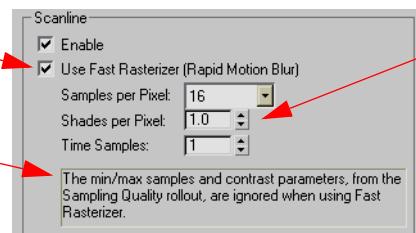
[Integer (16 bits per channel)
Floating-Point (32 bits per channel)]

You can now specify the type of frame buffer to use. The new 32-bit floating-point format supports high-dynamic-range image formats such as the new OpenEXR.

Rendering Algorithms Rollout

Fast Rasterizer is a new and better version of Rapid Motion Blur.

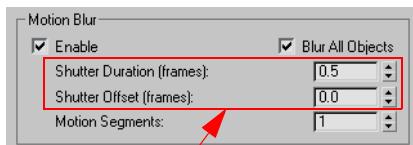
This warning reminds you that Fast Rasterizer does not compute the image samples the same way as the standard Scanline.



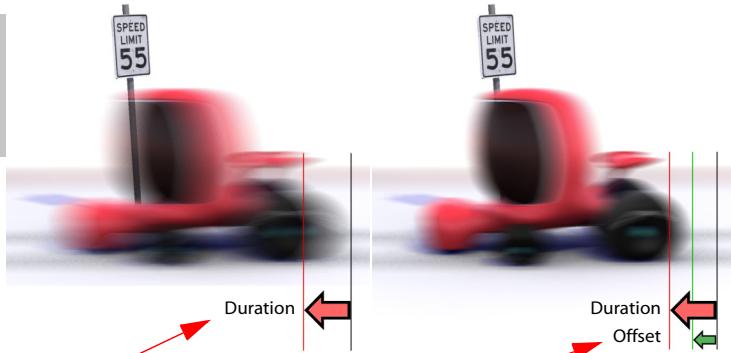
Shades per Pixel controls the number of shading calls to be collected.

Camera Effects Rollout

Note that the Depth of Field settings for the Perspective view have been moved to the bottom of the rollout.

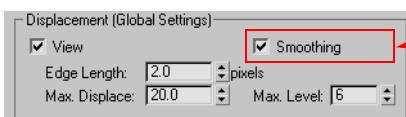


The Shutter settings have been enhanced; you can now set duration and offset, even beyond the duration of a single frame.



Duration controls the number of frames the shutter remains open. This is the same setting found in prior versions of 3ds Max.

The new Offset parameter delays the opening of the shutter and the blur effect. Note that if Duration and Offset have the same value, motion blur is disabled.



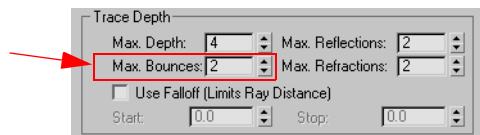
The new Smoothing option works together with height maps. Height maps are generated using specific normals. Smoothing affects normals and it can adversely affect the way displacement works if the normals do not match.

This is a scene-wide setting. If your scene has some objects that use height maps and other ones that use other displacement maps, you should set Smoothing on a per-object basis. See the Object Properties Dialog topic in this guide.

mental ray Indirect Illumination Panel

Final Gather Rollout

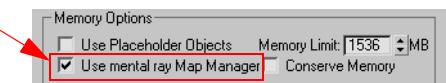
Multiple diffuse bounces are now supported for Final Gather. This feature is an alternative to photon mapping. It is a bit slower and less accurate, but is much easier to setup.



mental ray Processing Panel

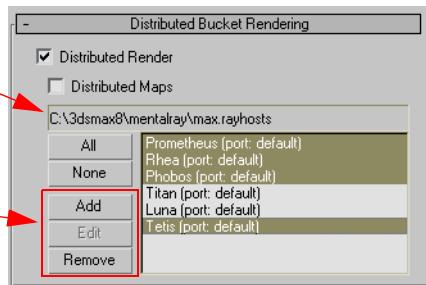
Translator Options Rollout

The former option "Manage Maps" is now "Use mental ray Map Manager." When off, textures are managed by 3ds Max. When on, mental ray uses its own memory-mapping system.



Note the removal of the button for the selection of the rayhosts file. The path is now hard coded and can be modified through the MAX8_MI_ROOT environment variable.

Add, Edit, and Remove buttons have been added. These buttons modify the hosts list in the rayhosts file.

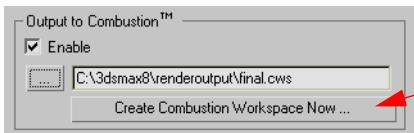


In 3ds Max 8 you will also find mental ray satellite, an installable version of mental ray that allows up to eight additional CPUs to be used for distributed bucket rendering.

See the topic *mental ray Satellites* for more information.

Render Elements Panel

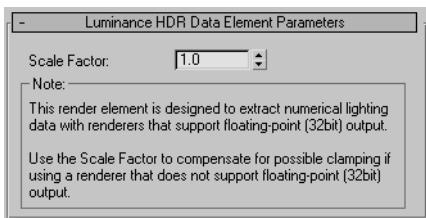
A new option has been added to the Combustion output parameters.



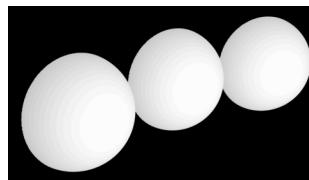
Click on this button to create a Combustion workspace at any time, without the need to render.

Also, the following Render Elements have been added or updated:

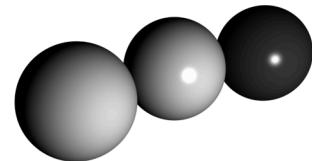
Illuminance/Luminance HDR Data



Use the Scale Factor to bring the HDR data into the desired range. But, as the warning says, this data should be kept unclamped and saved to floating-point data files such as OpenEXR.



Illuminance is the light reaching the surface. The amount is the same no matter what the surface looks like.



Luminance is the reflected light, so color and diffuse/specular characteristics of the surface affect it.

Velocity



The Maximum Velocity sets the scale for the velocity data.

During the first rendering, check the Update option, and the Maximum Velocity will be set to the highest velocity recorded. You can disable Update and adjust it as needed.

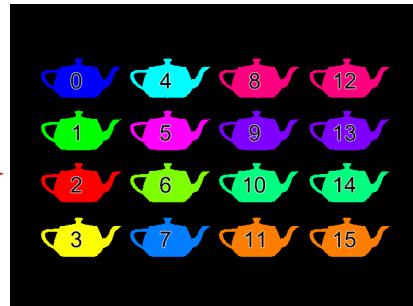
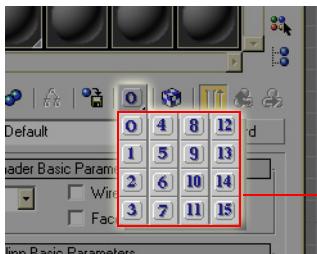


The Velocity channel uses color to record direction and speed of every pixel.



With the Velocity data, you can add motion blur during post processing.

Material ID

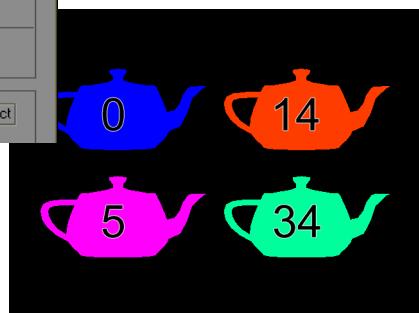
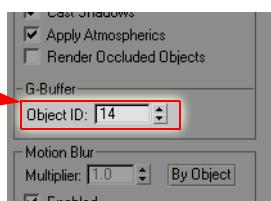
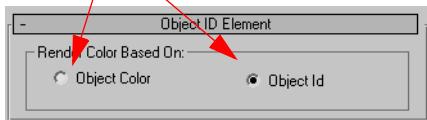


This element has no parameters. The colors rendered are only representative of the actual channel, which contains integer numbers matching the Material ID Channel set on the Material Editor toolbar.

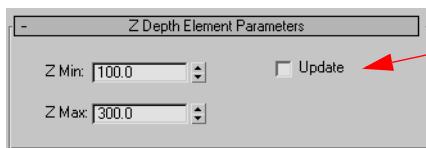
Object ID

This element generates a channel containing integers as set in the Object ID parameter of the Object Properties dialog.

You can choose to color the objects with colors representative of the ID, or with the color of the object wireframe.



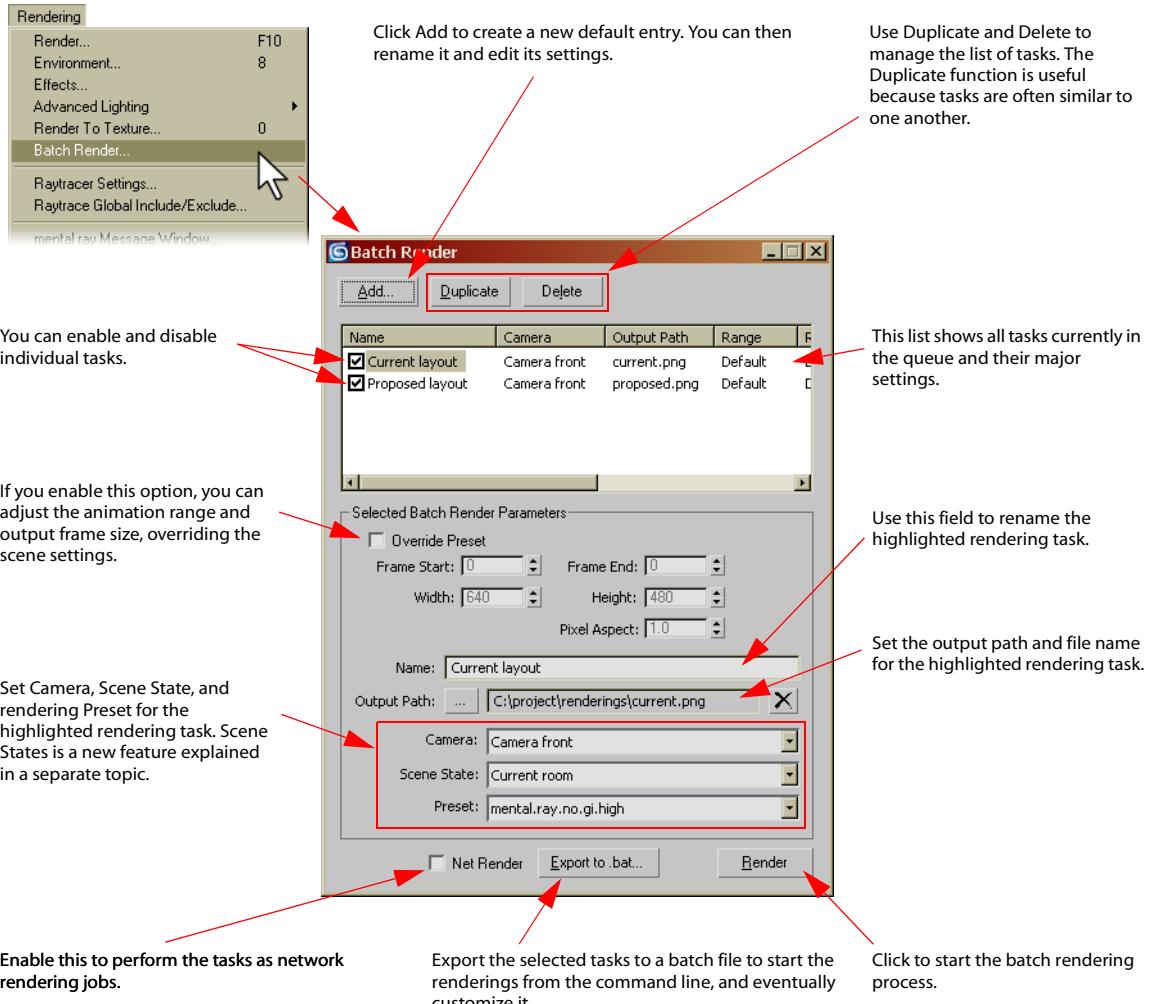
ZDepth



If you turn on the new Update option during the first rendering, the Z Min and Z Max values are set based on the minimum and maximum depths in the scene. You can then disable Update and set them as preferred.

Batch Render

The Batch Render tool lets you create a list of rendering tasks for the current scene to be performed sequentially. Each task has its own specific settings for rendering, using scene states, and rendering presets.



The rendering queue and its settings are saved with the scene. The ability to enable or disable individual tasks allows you to keep a comprehensive list of tasks and enable only the ones you need, or the ones that need to be re-rendered.

The progress is tracked and the result of each task reported (completed, canceled, or failed) on a separate dialog.

mental ray Satellites

3ds Max 8 gives you the ability to render with up to eight additional processors using Distributed Bucket Rendering (DBR) with mental ray.

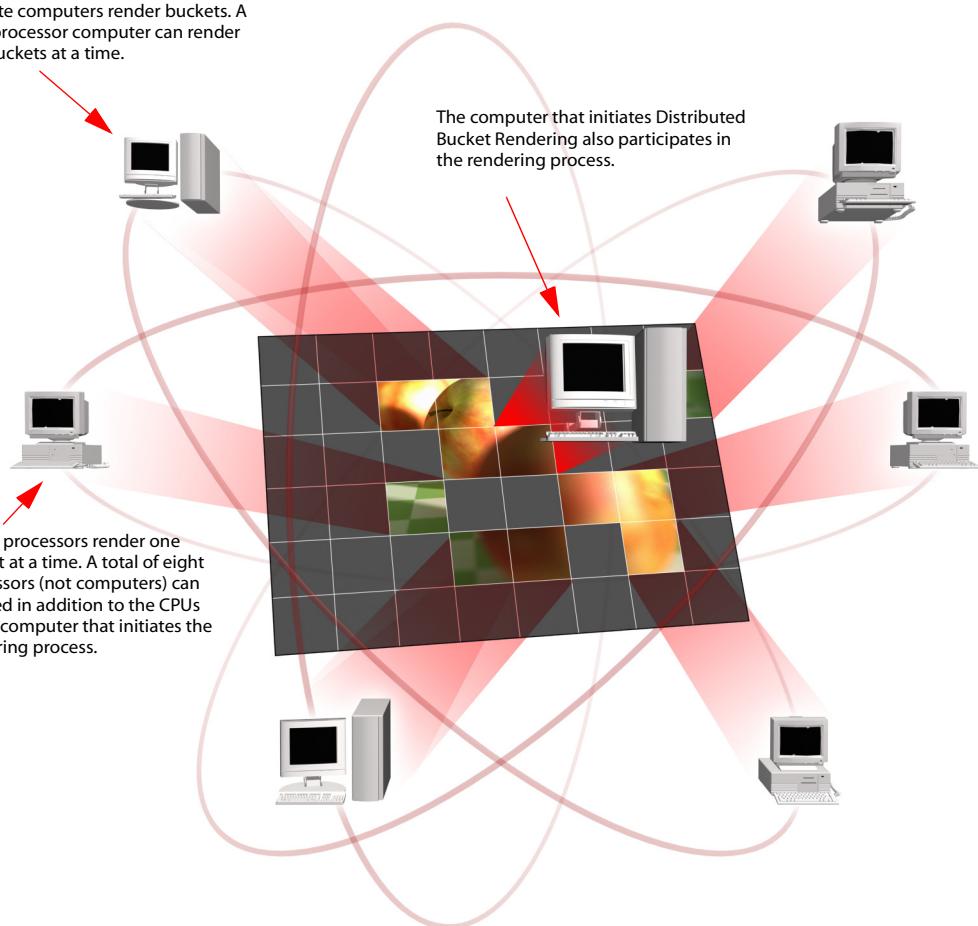
After you install host systems that can run the mental ray renderer on your network, you can use all of them, up to eight processors, for rendering a single frame.

This feature is not a substitute for network rendering, where each computer renders an entire frame. It is normally used for rendering single, high-resolution images, or to speed up test renderings of individual frames while working on scene materials or lighting.

Satellite computers render buckets. A dual-processor computer can render two buckets at a time.

The computer that initiates Distributed Bucket Rendering also participates in the rendering process.

Single processors render one bucket at a time. A total of eight processors (not computers) can be used in addition to the CPUs of the computer that initiates the rendering process.



You can use DBR to render an animation, but the whole process will probably not be any faster than a standard network rendering with the same number of CPUs.

Scene-dependent factors such as memory usage and network traffic can influence the two types of renderings in different ways. You will need to experiment and find the best solution in each specific case.

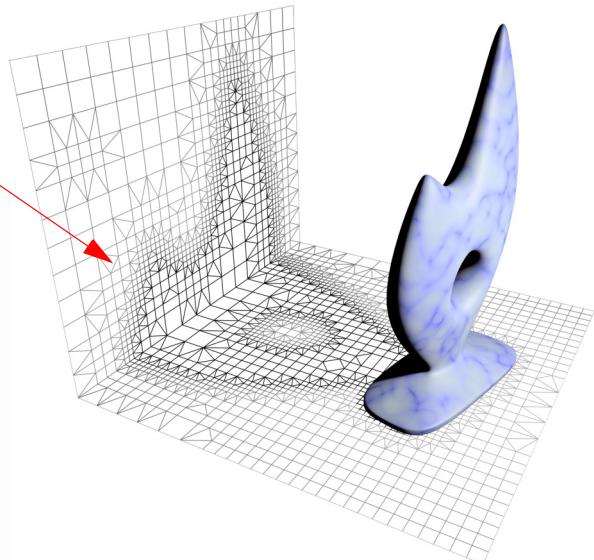
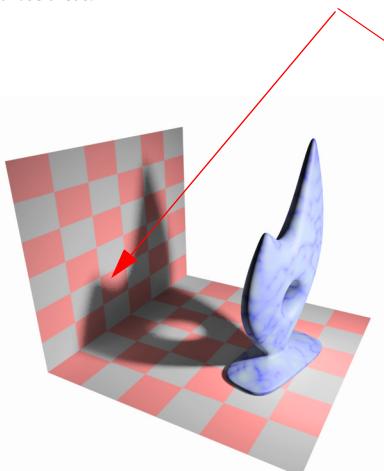
Radiosity

The radiosity engine has been improved and now allows adaptive meshing and better solutions. As a result, you might not be able to load old radiosity solutions, and recalculating solutions from existing scenes might give you different results.

Adaptive Subdivision Meshing

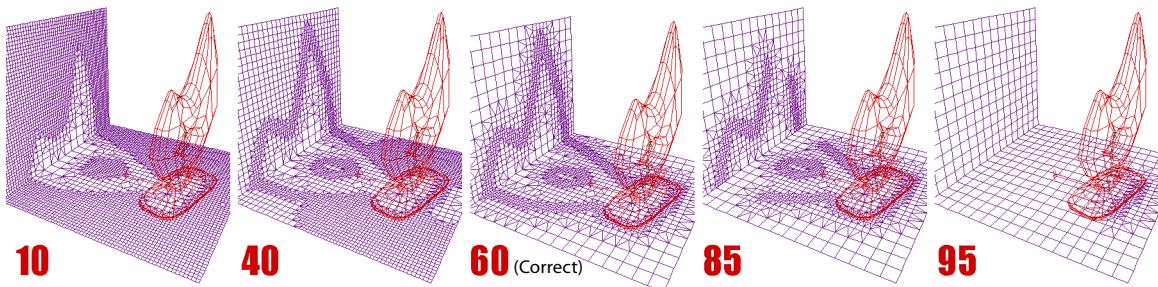
With this feature, the radiosity mesh is subdivided based on the variation of surface lighting, such as shadow edges, falloff, and other changes in light intensity. Where these changes occur, the mesh subdivision is increased to provide more accurate results while keeping memory usage and radiosity calculation time to an acceptable level.

In this example, the edge of the object shadow causes a change of light intensity on the background objects, and the radiosity mesh is automatically subdivided more to improve the solution quality in those areas.



Adaptive subdivision is based on Minimum and Maximum Mesh Size values, and a Contrast Threshold value that is used as a light-change-sensitivity level. The correct values are scene dependent and changes to lights or materials might require adjustments.

To find the correct values, calculate a few low-quality solutions just to see the radiosity mesh, and try different contrast settings until the subdivision appears balanced.



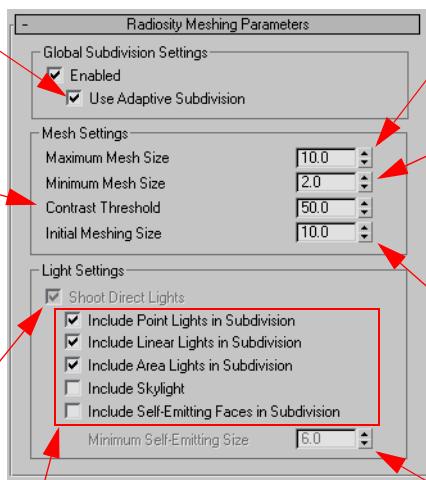
Mesher Options

The Radiosity Meshing Parameters rollout has been completely redesigned to add Adaptive Subdivision options and other features of the new radiosity engine.

Use Adaptive Subdivision is enabled by default, but can be turned off for uniform subdivision, as in previous versions.

The Contrast Threshold, as explained earlier, establishes the sensitivity of the subdivision to the variation of light on the surface.

This checkbox is unavailable when Adaptive Subdivision is off. It allows you to calculate the illumination at vertices directly without subdividing objects. With adaptive subdivision, this is the default behavior.



Maximum Mesh Size is the size to which the mesh is subdivided initially. This parameter is available whether Adaptive Subdivision is on or off.

Minimum Mesh Size is the lower subdivision limit. Subdivision is iterative, but stops if the mesh size gets smaller than this limit, even if the light contrast would require more subdivision iterations.

Faces smaller than this value are not further subdivided to improve their shape.

For self-illuminated objects, this setting controls the minimum subdivision size.

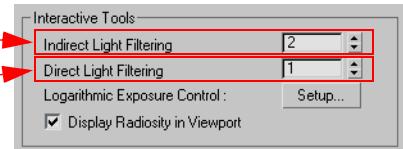
The Use Adaptive Subdivision option can be enabled or disabled on a per-object basis from the Object Properties dialog > Advanced Lighting panel.

Light Filtering

The interactive radiosity solution filtering on the Radiosity Processing Parameters rollout can now filter direct and indirect light separately.

Filtering indirect light helps smooth irregularities in the light intensity of the solution.

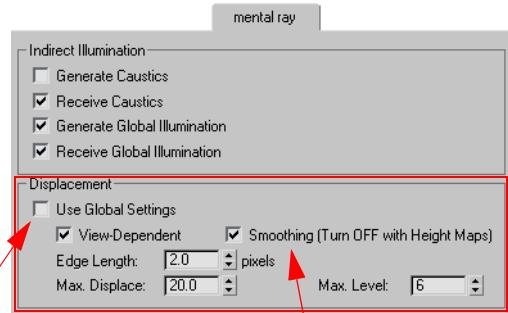
Filtering direct light softens the edges of the direct-light shadows.



Object Properties Dialog

Displacement options for the mental ray renderer are now available on a per-object basis.

On the mental ray panel of the Object Properties dialog, you can find the same options as on the Render Scene dialog, but here they apply only to currently selected objects.



By default, all objects use global settings; that is, the settings on the Render Scene Dialog. To set specific parameters for the current selection, first turn off this option.

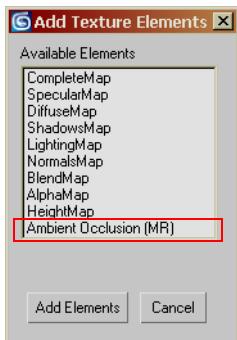
Enable or disable Smoothing as appropriate. Smoothing alters the surface normals, and this can adversely affect the direction of displacement when height maps are used. Height maps need the original, unsmoothed normals.

Render To Texture

This topic describes enhancements to the Render To Texture feature.

Ambient Occlusion Element

This new element is available only when the current renderer is mental ray. Its parameters are similar to the Ambient/Reflective Occlusion material map.



Number of samples of the conical volume above the surface point.

Spread of the cone: 0.0=no spread; 1.0=180-degree spread.

Bright is the color of non-occluded points. Dark is the color of fully occluded points. Partially occluded points are a mixture of the two.

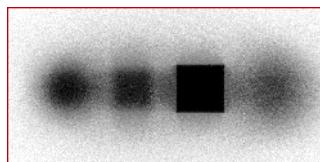
Selected Element Unique Settings	
Samples	16
Spread	0.8
Bright	<input type="color"/>
Dark	<input type="color"/>
Max Dist	0.0
Falloff	1.0

Max Dist and Falloff limit the sampling range and influence over distance. Max Dist of 0.0 means no range limit.

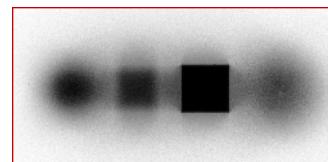
Here are examples of the Samples and Spread settings:



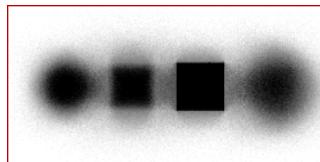
This is the original scene. To the right you see renderings to texture of the occlusion map of the floor object.



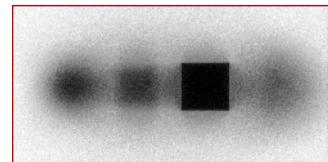
Samples=8, Spread=0.8



Samples=32, Spread=0.8



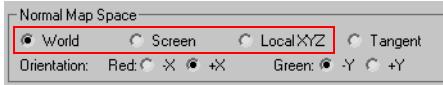
Samples=16, Spread=0.5



Samples=16, Spread=0.99

Normal Map Space

The Projection Options dialog settings for Normal Map Space have been improved.



For World, Screen, and Local Normal Map Space, you can now set the Red and Green channels to indicate positive or negative values.



For Tangent Normal map Space, you can set the Red to Left or Right, and Green to Up or Down.

Network Rendering

New in 3ds Max 8 is the ability to use the Split Scan Lines option when rendering to textures with a render farm. However, if you enable projection mapping and turn on Sub-Object Levels, this option is unavailable.

Additional Resources

Autodesk Learning Resources

- **Autodesk Authorized Training Centers for Media and Entertainment:** Autodesk has authorized more than 100 training centers in over 30 countries worldwide. You can take intensive courses with flexible schedules to meet your needs. To find a center near you, visit: www.autodesk.com/me_training, and then click Training Centers.
- **Autodesk Learning and Training Materials:** Check out Autodesk's latest learning and training materials: go to www.autodesk.com, click Store, and then click Learning and Training. Here, you can get training manuals designed for the instructor-led training environment, purchase books, and download individual E-courses to view off line. Training DVDs are also available for our most popular products.
- **Autodesk Online Support World-Wide:** The Autodesk Support web site www.autodesk.com/3dsmax-support provides access to a wide range of product information and support resources: searchable Knowledgebase, FAQs, technical bulletins, tested hardware information, and product downloads.
- **Discussion Forums:** Information and assistance are also available on the peer-to-peer online discussion forum. To visit the discussion forums, go to www.autodesk.com/3dsmax-discussion, or from the 3ds Max Help menu, choose 3ds Max on the Web > Online Support.
- **3ds Max 8 User Reference:** The online reference covers fundamental concepts and strategies for using the product, as well as details about the features of 3ds Max. Access the User Reference online by choosing Help > User Reference.
- **3ds Max 8 Tutorials:** The online Tutorials contain information and detailed procedures to walk you through increasingly complex operations. Access the online Tutorials by choosing Help > Tutorials.
- **Additional Help Files:** A number of additional Help files are installed with the software. For details, see the topic "3ds Max Documentation Set" in the User Reference.
- **Other Resources:** There is a wealth of information written about using 3ds Max. There are third-party books that specialize in teaching the software for various industries. There are magazines devoted to 3D design and animation, as well as user groups and mail lists. Communities of users trade secrets daily, and if you ask a question, you're likely to get answers from experts all around the world.