

Autodesk®
Maya®

2011



Autodesk®

What's New

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Autodesk® Maya® 2011 Software

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Contents

Chapter 1	Overview of What's New	1
	What's New in Autodesk Maya	1
Chapter 2	What's New in General	7
Chapter 3	What's New in Performance	15
Chapter 4	What's New in Modeling	17
Chapter 5	What's New in Animation	21
Chapter 6	What's New in Rigging	27
Chapter 7	What's New in Paint Effects	33
Chapter 8	What's New in Dynamics	35
Chapter 9	What's New in Fluid Effects	37

Chapter 10	What's New in nCloth	47
Chapter 11	What's New in nParticles	49
Chapter 12	What's New in Rendering and Render Setup	55
Chapter 13	What's New in MEL and Python	61
Chapter 14	What's New In Documentation	83
Chapter 15	What's New in API	85

Overview of What's New

1

What's New in Autodesk Maya

Welcome to What's New in Autodesk® Maya® 2011.

Maya 2011 features a powerful new set of tools for creating and re-purposing character animation. With an updated interface that helps artists be more efficient, and a new 64-bit offering for Mac OS® X, Maya 2011 is more accessible. In addition, Maya 2011 addresses production pipeline challenges, with an accelerated viewport display for large scenes; a completely new UI toolkit; and new solutions for 3D editorial, color management, scene segmentation, and rotoscoping.

Refer to the following sections for details on all the new features in Maya 2011.

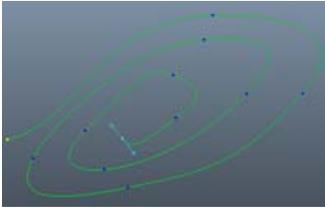
General and Performance



New to Maya 2011 is a fresh customizable interface with many enhanced windows and editors. Assets and File Referencing are enhanced to help modularize your scenes. Finally, Maya 2011 features a number of performance enhancements to improve your overall experience.

- [What's New in General](#) on page 7
- [What's New in Performance](#) on page 15

Modeling



Maya 2011 provides a number of modeling features to streamline your workflow. Bezier curves are now available so you can adjust curvature on the fly. In polygon modeling, you can now connect arbitrary components on a polygon mesh and spin edges along their midpoint to quickly change the topology of your mesh. Additional features such as object level soft selection and invisible faces give you more options for interacting with your models.

■ [What's New in Modeling](#) on page 17

Animation



Accelerate pre-visualization with new 3D editorial features. The new Camera Sequencer lets you import and export editorial content (including movie, audio, and timecode information), layout and manage camera shots in a sequence, and playblast movie footage for playback and review. Other enhancements for animators include multiple audio track support, scene timecode options with heads-up display, improved global timewarping effects, and several Graph Editor improvements that make it easier to view, select, and edit animation data.

■ [What's New in Animation](#) on page 21

Rigging



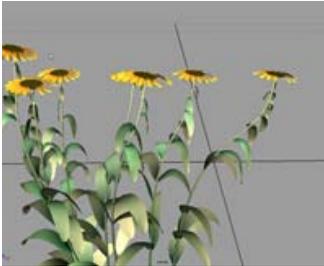
Create characters with realistic skin deformation in less time with new skinning tools and workflows: interactive skin binding, dual quaternion smooth skinning, enhancements to the Paint Skin Weights Tool, and improved weight normalization.

In addition, an improved non-destructive animation retargeting workflow lets you easily reuse, correct, and enhance your character animation. Based on the Autodesk® HumanIK® libraries and animation layers, you can easily transfer animation and adjust retargeting parameters live, without baking to see results.

You'll also find new Point on Poly and Closest Point constraints, new weight mirroring support for the blend shape, cluster, jiggle, and wire deformers, and several other deformer improvements.

- [What's New in Rigging](#) on page 27

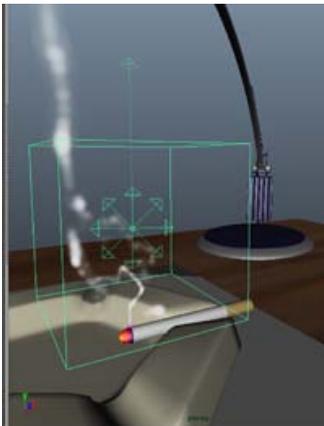
Paint Effects



Add phototropic effects to painted flowers and leaves using new Flower Face Sun, Leaf Face Sun, and Sun Direction attributes. Maya 2011 also offers a new Transfer All Strokes to new Object option that simplifies transfers of paint strokes from low to high resolution meshes.

- [What's New in Paint Effects](#) on page 33

Dynamics



Improvements to the Dynamic Relationship Editor let you view, create, and edit connections between multiple dynamics objects.

- [What's New in Dynamics](#) on page 35

Fluid Effects

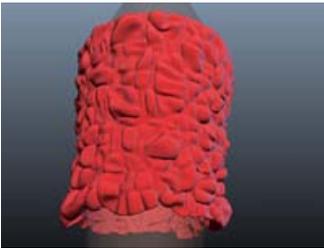


Several new Fluid Effects features enhance the realism of your fluid simulations. In Maya 2011, an Auto Resize option automatically resizes 2D and 3D fluid containers, reducing simulation and batch render time. Improved internal lighting features let you preview lighting and shadow effects in the scene view before rendering your fluid effect.

New fluid emission methods give you more control over how fluid is emitted into containers, including options for mapping emitted fluid to 2D textures. Additional fluid container property options, fluid solver enhancements, and new fluid behavior attributes are also included.

- [What's New in Fluid Effects](#) on page 37

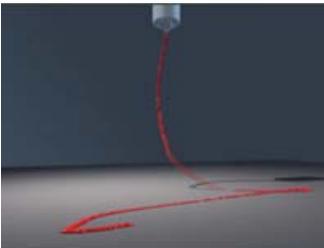
nCloth



Maya 2011 includes a Collide Strength attribute for controlling the force of nCloth collisions as well as paintable Rest Length Scale, which lets you easily create ruffles and flares in simulated clothing. A new option for nCaching improves results when simulating off the end of nCaches.

- [What's New in nCloth](#) on page 47

nParticles



In Maya 2011, you'll find a number of new per-particle attributes, including Rotation, Friction, Bounce and Stickiness. Create more realistic liquid simulations with new Surface Tension and Viscosity Scale attributes. Maya 2011 also has enhanced nParticle output mesh features, with per-vertex shading and velocity, as well as improvements to mesh quality and performance.

- [What's New in nParticles](#) on page 49

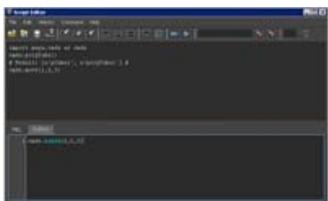
Rendering and Render Setup



New to Maya 2011 is the Viewport 2.0 that provides large scene performance optimization. The Hypershade has also been redesigned to allow for easier and faster render node creation. The new pan/zoom feature allows you to pan and zoom in 2D and the color management feature allows you to control the color profile associated with inputs to and outputs from rendering. You can even use color management on 32-bit floating point HDR images in the Render View. Other features include the multi-camera rig tool for stereoscopic cameras and new ambient occlusion pass attributes.

- [What's New in Rendering and Render Setup](#) on page 55

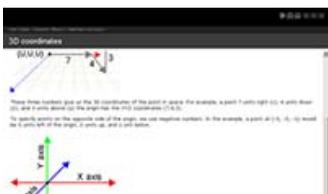
MEL and Python



PyMEL is now installed with Maya. New MEL and Python commands have been added, and new flags added to existing commands.

- [What's New in MEL and Python](#) on page 61

Documentation



The Maya Help now features a static navigation bar, phrasal search, and PyMEL reference documentation. This release also includes a new File Referencing tutorial, and updates to existing tutorials.

- [What's New In Documentation](#) on page 83

API



The screenshot shows a 'Class Index' page with a search bar at the top. Below the search bar, there is a list of classes and methods. The classes are listed in a table-like format with columns for class names and methods. The methods are listed in a separate column. The page is organized into sections, with each section starting with a small icon and a title. The classes listed include:

- AbstractClass
- AbstractMethod
- AbstractMethodReference
- AbstractMethodReferenceImpl
- AbstractMethodReferenceImpl2
- AbstractMethodReferenceImpl3
- AbstractMethodReferenceImpl4
- AbstractMethodReferenceImpl5
- AbstractMethodReferenceImpl6
- AbstractMethodReferenceImpl7
- AbstractMethodReferenceImpl8
- AbstractMethodReferenceImpl9
- AbstractMethodReferenceImpl10
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- AbstractMethodReferenceImpl100

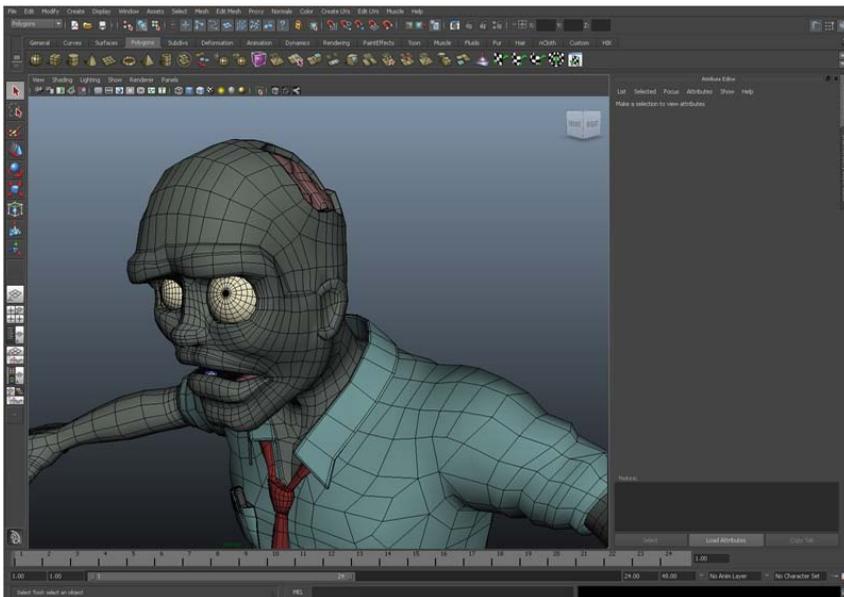
New API classes have been added, and new methods added to existing classes. For a list of new and updated API classes, as well as a list of new example plugins, see the following:

- [What's New in API](#) on page 85

What's New in General

2

Updated Interface



Maya's interface has now been enhanced with a new color scheme and functionality.

These enhancements include:

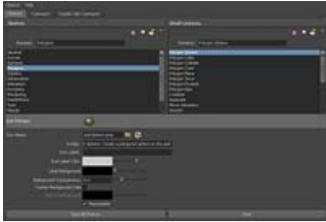


New File Browser

Maya now has a new File Browser window, which provides you with option box options in line with the file browser itself.

Other options include a streamlined display of your file system, more navigation options relative to your current folder, and a list of recently opened folder.

- File Browser in the *Basics* guide



New Shelf Editor

Maya now has a new Shelf Editor window. This window features a more streamlined layout that allows you to modify shelves and shelf items without navigating between tabs. The editor now supports double-click commands, and editable icon label colors and backgrounds.

- Shelf Editor in the *Basics* guide



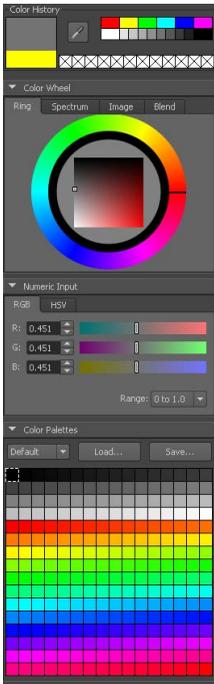
Tabbed browsing for Attribute Editor and Channel Box

You can now open the Channel Box/Layer Editor and Attribute Editor simultaneously as tabs which reside on the side of the panel.



Drag and Drop interactivity

You can dock and undock menus and UI elements around different parts of the UI by dragging and dropping their dotted edges. You can also manually resize UI elements by dragging them along their dotted edges.



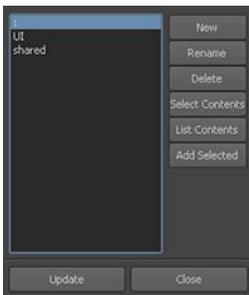
New Color Chooser

Maya now has a new Color Chooser window. This window features enhanced color history tracking, multiple color selection methods, the ability to sample colors directly from images, and customizable 256 color palettes that can be saved and loaded. The Attribute Editor also features a condensed version of the Color Chooser window to make color selection quicker and easier than before.

- Color Chooser in the *Basics* guide

For more information, see Interface overview.

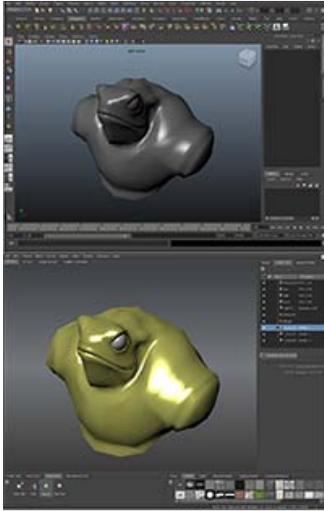
Namespace Editor



You can now create and edit namespaces from the Namespace Editor (Window > General Editors > Namespace Editor).

- Namespace Editor in the *Basics* guide

Export Maya to Mudbox



You can now export directly from Maya to Autodesk Mudbox with a single click. This makes cross-application interaction faster and easier.

- Export objects directly to Mudbox in the *Basics* guide
- File > Export Selected to Mudbox in the *Basics* guide

Relative namespaces

You can now refer to namespaces relative to a specific namespace. This allows you to streamline the Outliner and simplify MEL commands.

- Set relative namespace mode in the *File Referencing* guide

Asset and Container nomenclature

For Maya 2011, the term container has been simplified to assets for any and all instances.

- Asset overview in the *Basics* guide

Assets with Transforms

You can now create two types of assets in Maya. Assets with Transforms are asset nodes with associated transforms, meaning you can transform them in the scene and manipulate them in the DAG hierarchy like you would a group node. Advanced Assets do not have an associated group transforms and so you must publish nodes manually for them to interact with the DAG hierarchy.

- Types of Assets in the *Basics* guide

Publish, unpublish, bind, and unbind published nodes from the Attribute Editor

You can now publish, unpublish, bind, and unbind published nodes directly from the Attribute Editor by clicking the appropriate icon for each published node in the Published Nodes section.

- Publish or unpublish nodes in the *Basics* guide
- Bind/unbind an attribute or node in the *Basics* guide

Publish nodes

You can now publish nodes to a container that are not a Root Node, Parent Anchor, or Child Anchor.

- Publish or unpublish nodes in the *Basics* guide

Remove Reference Edits on a Loaded Reference

You can now use the Reference Editor to remove reference edits without having to unload the reference first.

- List, copy, or remove reference edits in the *File Referencing* guide

Export to and Assign Offline Files

You can now import and export reference edits from a scene in Maya to and from an offline file. This allows you to store edits of a source file in their own external files or apply them to another file. For example, you can edit a basic walk cycle into a strut, export the strut, and apply that strut to a different character's walk cycle.

- Export to an offline file in the *File Referencing* guide
- Assign an offline file in the *File Referencing* guide

Additional formats for custom icons

Maya now has expanded support for file formats when creating custom icons for the shelf, assets, the hypergraph, etc. The supported formats now include BMP, GIF, JPG, JPEG, PNG, PBM, PGM, PPM, XBM, SVG, or XPM. Additionally, images that are not the correct size are scaled now rather than cropped.

- Use a custom name or icon for a shelf item in the *Basics* guide

Maya 64-bit now supported on Mac OS X

Mac OS X users can access considerably more memory to handle larger and more complex scenes with the 64-bit version of Maya.

Maya uses IPv6 on Windows Vista

Maya now uses IPv6 on Windows Vista by default. To revert back to IPv4, set the environment variable `MAYA_IP_TYPE = ipv4`.

Script Editor auto-completion

The script editor now auto-completes recognized commands and object path names when you enable the Command Completion and Object Path Completion options.

- Get help on a MEL command in the *MEL and Expressions* guide

New user interface commands

There are a number of new UI related commands available. These include:

- `dockControl`
- `toolBar`
- `treeLister`
- `loadUI`

In addition, there are also a number of new flags for existing commands including:

- `-icon` for `confirmDialog`
- `-style` for `promptDialog`
- `-visChangeCommand` for all scripts
- `-saveMainWindowState` and `-restoreMainWindowState` for `windowPref`
- `-itemAt` and `-visualRectAt` for `iconTextScrollList`
- `-droprectCallback` for `iconTextScrollList`
- `-numWidgets` and `-dumpWidgets` for `IsUI`

A number of compatibility changes have also been made, including:

- `-parent` flag is editable now

- hotkey command can accept modifiers in the -key flag argument
- -backgroundColor flag is respected on all platforms for the control command
- -minimizeCommand and -restoreCommand are respected on all platforms for the window command
- tabLayout control has scroll buttons with right-click menus on all platforms if there is not enough space to display tabs.
- Get help on a MEL command

What's New in Performance

3

The following sections describe some performance improvements in Autodesk Maya 2011.

Artisan

- Faster skin weights painting in backface culling mode.
- Faster 3D painting on large NURBS surfaces.

Display and User Interface Components

- Faster texture load for heavy scenes with a lot of textures. Formats optimized are `.bmp`, `.jpg`, `.png`, `.tga`.

Rendering

- Significant performance improvement for scenes using global illumination with the `mia_material_x_passes` shader.

Constraints

- Faster constraint evaluation for the point, parent, and orient constraints based on optimized weight-checking.

Deformers

- Non-linear deformers are now multi-threaded.

Solvers

- Faster nParticle meshing.

Modeling

- Faster sculpting with Artisan for high polygon models.

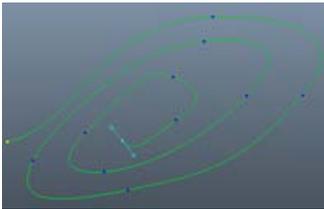
General

- Improvements to file input/output performance.
- New environment variable `MAYA_NO_PARALLEL_MEMCPY` that allows you to disable parallel memory copy. This may improve speed for some systems.

What's New in Modeling

4

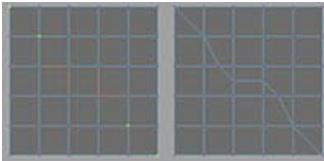
Bezier curves



You can now create Bezier curves in Maya using the Bezier tool. Bezier curves are a subset of NURBS curves that allow you to modify the curvature using a series of tangents attached to each anchor point on the curve.

- Bezier curves in the *NURBS Modeling* guide
- Create a Bezier curve in the *NURBS Modeling* guide

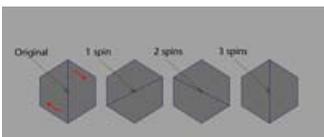
Connect arbitrary components



You can now connect vertices and edges in one operation with the Connect Components option. This allows you to quickly create edge paths from vertices to edge mid-points.

- Connect arbitrary components in the *Polygonal Modeling* guide

Spin Edge tool



You can now use the Spin Edge tool to spin an edge or series of edges around their respective centers, which changes the vertices they are connected to. Edge spinning allows you to quickly change the topology of your mesh.

- Spin polygonal edges in the *Polygonal Modeling* guide

Pinch Brush



You can now use the Pinch Brush in the Sculpt Geometry Tool to pull vertices toward each other. This is useful for making creases more sharply defined.

- Pinching in the *Polygonal Modeling* guide

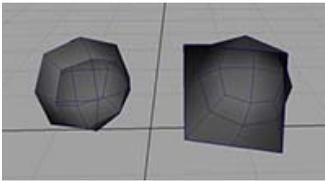
Object level Soft Selection



You can now set the Falloff Mode in the Soft Selection settings to Object. This allows you to select multiple objects in a scene and transform them with falloff, without warping the objects themselves. This is useful for densely packed objects that you want to space out, such as trees in a forest.

- Influence multiple meshes in the *Basics* guide

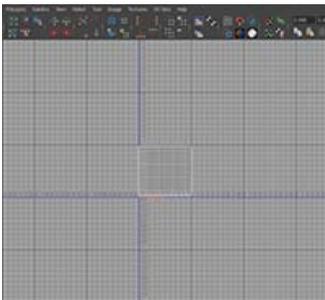
Assign Invisible Faces



You can now assign invisible faces to a polygon mesh. Faces assigned as invisible do not appear in the scene, yet still exist and can be manipulated. This is particularly useful when you need a face for smoothing or other polygon operations, but would otherwise like for it to appear empty in the scene view or render.

- Make a face invisible in the *Polygonal Modeling* guide

UV space tiles



UV Tiles allow you to divide the UV texture space into a series of 1x1 texture spaces, each divided by a bold border. This is useful to extend your texture space without losing sight of your border limitations.

- View > Grid in the *Basics* guide

Arbitrary Scale

The Scale Settings in the Scale Tool now allow you to scale along arbitrary axes (such as Object, Local, World, Normal, etc) similar to the Move Tool.

- Scale Tool in the *Basics* guide

Transfer Attributes by topology

You can now transfer attribute values from one mesh to another by matching the mesh's topology. This allows you to transfer attribute data even when the arrangement of component IDs of two identical looking meshes are not the same.

- Mesh > Transfer Attributes in the *Basics* guide

UV Edge Loop selection

You can now convert a selection from a Vertex, UV, or Edge selection to a UV Edge Loop selection. A UV edge loop is similar to an edge loop, but treats UV boundaries as the end of the loop selection.

- Select UVs in the *Mapping UVs* guide
- Select > Convert Selection > To UV Edge Loop in the *Basics* guide

What's New in Animation

5

Camera Sequencer



The new Camera Sequencer gives you tools to layout and manage camera shots, then produce movie footage of the animation in your scene. Even for large scenes, you can produce movies in the Camera Sequencer to achieve real-time playback.

With the Camera Sequencer, you can start to layout shots in Maya, or start by importing your own editorial files containing audio and video clip information in AAF or FCP format.

Refer to the following topics in the *Animation* guide for more information:

- Camera Sequencer overview
- Create camera shots

Multiple audio track support



You can now import, display, and playback multiple audio tracks in a scene.

See the following topics in the *Animation* guide for updated information:

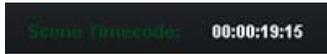
- Example audio workflow
- Add sound to your animation
- Audio variables
- Display audio on the Time Slider

In addition, Maya now includes a test application for tweaking and testing your sound configuration on Linux.

See the following topic for more information:

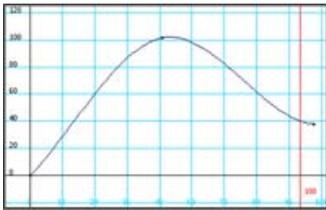
- Set up audio on Linux

Scene timecode



A new heads-up display item and scene timecode options in the Animate menu let you set and display a timecode in your scene. See Set and display timecode for the scene in the *Animation* guide.

Improved global timewarping effects



A new set of options in the Animate menu and in the Graph Editor let you set up global time warping effects in Maya. Time warping is also sometimes referred to as speed ramping, an effect where motion appears to speed up or slow down within a camera shot.

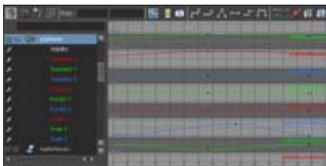
Using these options, you can create a timewarp curve – an animation curve that lets you warp the global time in your scene. Changing the shape of this curve lets you manipulate the global timing of other animation curves in your scene.

Refer to the following topics in the *Animation* guide for more information:

- Scene timewarp effects
- Create timewarping effects
- Animate > Scene Time Warp menu

Graph Editor improvements

The following improvements have been made to the Graph Editor.



Stacked curve display

A new display mode lets you view a stack of individual curves in the graph view, rather than viewing all curves overlapping.

Pre-selection highlight

You can now turn on pre-selection highlighting for curves, segments, tangents, and keys in the graph view.

Pin curves in the graph view

You can now pin and unpin channels in the Graph Editor. When you pin a channel, its curve displays in the graph area regardless of what is selected.

Improved normalized curve display

The curve normalization options are now located in the View menu instead of the Curves menu. These options have been improved so that no extra nodes are added to the scene when you display normalized curves. The Normalize icons in the Graph Editor toolbar have also been updated.

A new Renormalize option lets you manually refresh the display of normalized curves. (Curves are automatically renormalized when you turn on Display Normalized or the active curve list changes.)

Single-click editing

The Move Nearest Picked Key Tool lets you single click and drag to adjust tangent handles and keys on a selected curve. A new Selected only option in the Move Nearest Picked Key Tool options window lets you turn on single-click editing for all curves.

Display directly connected curves only

A new option in the List menu lets you limit which curves display in the graph view for a selected channel.

Improved curve color options

A new option in the Edit menu of the Graph Editor lets you set up a custom color scheme for curves. Select Edit > Set Curve Colors to open the Curve Colors window.

This new window lets you associate a curve color with the name of the attribute. For example, you can set a Translate X attribute to purple so that Translate X curves for all objects display in purple.

Improved filtering options

New filtering options have been added to the Show menu in the Graph Editor to give you added control over which attributes display in the graph area.

The new Select Attributes window lets you control which attributes display using a series of check boxes. To open this window, select Show > Select Attributes in the Graph Editor menu bar.

You can also filter the Graph Editor to display only attributes that are driven by a Driven Key. To see only attributes with Driven Keys, select an object animated with Driven Keys, then select Show > Attributes > Driven By Driven Key.

Pickwalk and view navigation hotkeys

You can now use the pickwalk hotkeys (Right and Left Arrow keys) to modify selected keys in the Graph Editor.

In addition, you can move to the previous or next view in the Graph Editor using the right and left square bracket keys [and]. These are the same hotkeys that let you move between camera views in the viewport.

To navigate through views using these hotkeys, click in the Graph Editor then press [to move to the previous view, or] to move to the next view.

For more information

Refer to the following topics in the *Animation* guide for new and updated information:

- Turn on Pre-selection highlighting in the Graph Editor
- Pre-Select Highlight
- Pinning channels
- Display stacked curves
- Stacked Curves
- Display normalized curves
- Display Normalized
- Renormalize
- Use single-click curve editing

- Move Nearest Picked Key Tool options window
- Display directly connected curves only
- Show Upstream Curves
- Associate curve colors with attribute names
- Filter curve display in the Graph Editor
- Navigate the Graph Editor graph view or Dope Sheet view area

Animation layer updates

Animation layers help to support the new HIK retargeting workflow. Refer to [What's New in Rigging](#) on page 27 and the following topics in the *Character Setup* guide for more information:

- Retargeting animation
- Example workflow: Non-destructive retargeting

Improved rotation interpolation options

The Curves > Change Rotation Interp menu in the Graph Editor and Dope Sheet windows now includes additional quaternion rotation interpolation options.

See the following topics in the *Animation* guide for updated information.

- Change Rotation Interp

What's New in Rigging

6

Smooth skinning workflow improvements

Several new tools and options in the Paint Skin Weights Tool enhance the smooth skin weighting workflow.

See Paint Skin Weights Tool in the *Character Setup* guide for updated information including the following improvements.



Tools to copy, paste, move, and fix weights

New buttons let you do the following tasks with one click:

- **Copy and paste:** Copy a weight value from one vertex, paste it to other vertices.
- **Weight hammer:** Re-assign selected vertices with weight values from neighboring vertices, fixing weights that cause spiky or otherwise undesirable deformation.
- **Move weights:** Re-assign the joint(s) that you want to influence selected vertices.
- **Show influences:** Easily identify which influences affect selected vertices.

Influences list improvements

- Updated Sort options let you display influences in a tree-view hierarchy that you can expand and collapse.
- Quickly edit the influence color by clicking new Influence color buttons.
- Reduce the number of influences displaying in the list using the new filter. This makes it easier to locate and select influences when working with a complex rig.

Selection options

- An Invert Selection button lets you quickly invert your selection in the Influences list.
- New selection modes let you quickly switch between painting skin weights and painting to select skin points. Toggle between Paint, Select, and Paint Select to accomplish tasks like Fix smooth weights, or Move weights to other influences.

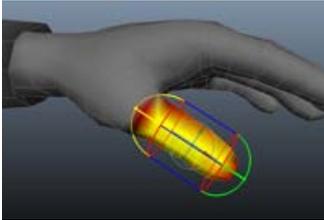
Ramp color feedback

Use a color ramp to assign color values for weights, making it easier to see small values when painting, and to determine if a joint is influencing unwanted vertices. Color swatches next to the color ramp let you quickly set colors to represent values of 0 and 1.

Refer to the following topics in the *Character Setup* guide for more information:

- Copy smooth skin weights
- Fix smooth weights
- Move weights to other influences
- Skin > Edit Smooth Skin > Move Weights to Influences

Interactive skin binding



This smooth binding method lets you quickly set initial skin weights using interactive volume manipulators. By adjusting the shape, length, and position of the manipulators in the viewport, you define the area of the mesh affected by each influence.

Interactive skin binding can help you achieve a quicker initial bind and better smooth skin deformation. Once you establish the rough weighting with the manipulators, you can refine weights using the weight painting tools.

See the following topics in the *Character Setup* guide:

- Interactive bind for smooth skinning
- Use interactive bind for smooth skinning

Dual quaternion skinning



Traditional smooth skinning in Maya uses linear skinning to make a mesh follow a character's joints. In areas such as a wrist or elbow, this method can result in a 'bow tie' or 'candy wrapper' effect where the mesh loses volume as a bone twists on its axis. Dual quaternion is a new method of smooth skinning designed to eliminate these undesirable deformation effects.

A new menu in the Smooth Bind Options window (and in the skinCluster) lets you select whether to use classic smooth skinning, dual quaternion skinning, or blend between both methods at a vertex level on the same character.

See the following topics for more information:

- Smooth skinning methods
- Blend smooth skinning methods
- Bind smooth skin
- Skinning Method

Non-destructive animation retargeting



The Autodesk® HumanIK® character solver is now integrated in Maya to provide an improved character animation retargeting solution.

Using the HumanIK plug-in with animation layers lets you retarget character animation and modify it non-destructively. The new retargeting workflow is a live process, letting you adjust various parameters and see the results immediately.

Refer to the following topics in the *Character Setup* guide for more information:

- HumanIK in Maya
- Retargeting animation
- Example workflow: Non-destructive retargeting

Joint drawing styles



New options in the joint node give you alternate ways of representing and visualizing a character's skeleton. You can change how joints are drawn using the Draw Style drop-down list. This list now includes options to draw joints as circles, squares, or sticks. See Draw Style and Change joint display options in the *Character Setup* guide.

Improved smooth skin weight normalization

A new Normalize Weights drop-down menu in the Paint Skin Weights Tool and in the skinCluster node has been added to improve the smooth skin weight normalization process. This menu lets you set how you want weights normalized, which can reduce the incidence of small weights unintentionally distributed across the mesh as you paint and smooth.

The Interactive normalization mode replicates the weight normalization from previous versions of Maya, while the new Post normalization mode gives you the improved normalization behavior.

See Smooth skin weight normalization and Set normalization mode and normalize weights for updated information.

New constraints

Point on Poly constraint

A new Point on Poly constraint lets you constrain an object to a mesh so that the constrained object sticks to the mesh as the mesh deforms. Using this constraint you can create effects such as a button on a jacket, where the button sticks in place as the jacket deforms.

See Point on Poly constraints in the *Constraints* chapter of the *Character Setup* guide.

Closest Point constraint

A new Closest Point constraint provides a quick way to calculate the closest point on a mesh, NURBS surface, or curve, relative to an input position. You can use the constraint for calculation purposes only, or create locators to mark the closest point.

See Closest Point constraint in the *Constraints* chapter of the *Character Setup* guide.

Deformer enhancements

Mirror deformer weights

A new item in the Edit Deformers menu lets you mirror weights for the blend shape, cluster, jiggle, and wire deformers.

See Mirror deformer weights and Edit Deformers > Mirror Deformer Weights in the *Deformers* guide.

Lattice deformer hotkeys

You can now use the pickwalk hotkeys to navigate along lattice deformer points. See Edit lattice deformers in the *Deformers* guide for updated information.

Wrap deformer enhancements

A new Falloff Mode for the wrap deformer lets you select from Volume and Surface options. The default Volume mode sets the wrap deformer to use direct distances to calculate weights for wrap influence objects, and the new Surface mode sets the deformer to use surface-based distances to calculate the weights.

See Falloff Mode in the *Deformers* guide.

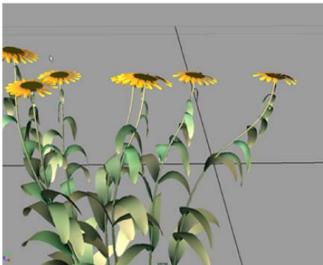
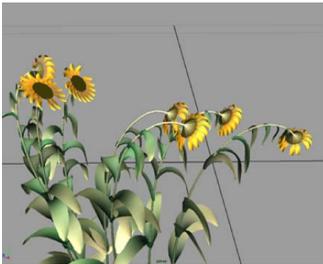
Support for negative weights in the Blend Shape deformer

A new Support Negative Weights attribute in the blendShape node lets you set whether you want to allow negative weight values. See Support Negative Weights in the *Deformers* guide.

What's New in Paint Effects

7

New Leaf and Flower attributes



Paint Effects now includes Leaf Face Sun and Flower Face Sun attributes that let you change the position of leaves and flowers so that they face toward or away from the sun. A Sun Direction attribute sets the sun's location in the scene.

Leaf Face Sun and Flower Face Sun are based on phototropism, which is the movement or growth of a plant in response to the direction of a light source. Leaf Face Sun and Flower Face Sun apply to the following 3D Paint Effects strokes:

- Flower and flower meshes
- Plants and plant meshes
- Trees and tree meshes
- Underwater (that have flowers or leaves)

Leaf Face Sun and Flower Face Sun have been added to the Leaf Curl and Petal Curl sections of the stroke's Growth attributes.

- Leaf Face Sun
- Flower Face Sun
- Sun Direction

Transfer All Strokes to New Object

A new Transfer All Strokes to New Object feature lets you transfer strokes from a painted object to another object. For example, you can use this feature to transfer painted eyebrows from a low resolution mesh character mesh to a high resolution mesh character.

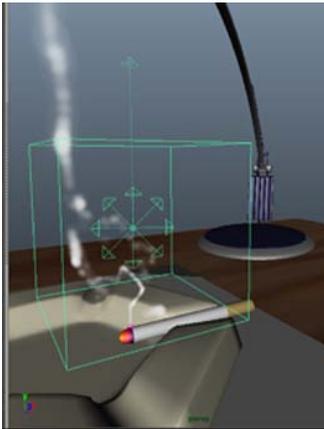
Transfer All Strokes to New Object transfers all the paint effects strokes that are present on the object. If both objects have paint effects strokes, then selection order is used to determine the source and target objects. Otherwise, the object without paint effects strokes gets the transferred strokes.

- Paint Effects > Curve Utilities > Transfer All Strokes To New Object

What's New in Dynamics

8

Dynamic Relationships Editor improvements



Maya has an improved Dynamic Relationships Editor that lets you select, view, and edit connections for multiple objects. You can then edit the dynamic relationships for each object individually.

- Dynamic Relationships Editor
- Connect and disconnect fields, emitters, and collision objects

Convert displacement to polygons with history

You can now convert a displacement to a polygon object that has construction history. When you use **Convert > Displacement to Polygons with History**, the new mesh retains the history of the displacement.

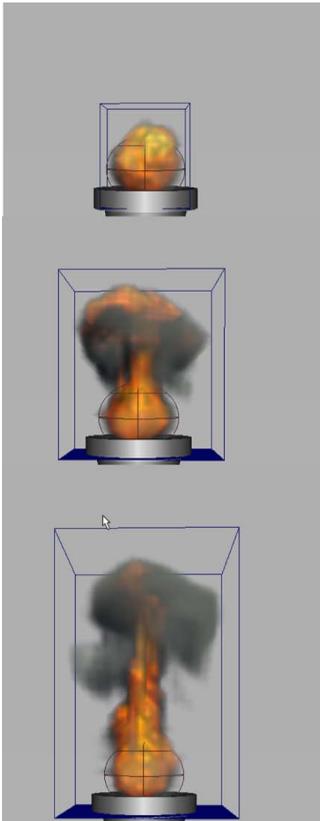
Displacement to Polygons with History is useful in Dynamics and nDynamics effects such as colliding nParticles with a Maya ocean.

- **Modify > Convert > Displacement to Polygons with History**

What's New in Fluid Effects

9

Auto Resize

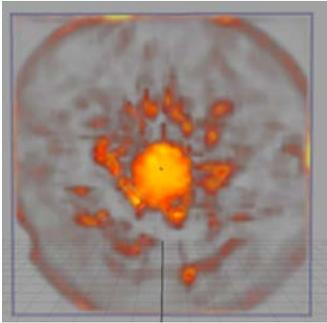


Maya Fluid Effects now includes an Auto Resize feature. Auto Resize dynamically resizes 2D and 3D fluid containers when the density near the edges of the fluid reaches the set Auto Resize Threshold value. With Auto Resize on, Maya allows the container to only extend to regions with density, rather than keeping the fixed resolution and offset that the grid started out with. The smaller simulation region increases simulation speed, reduces rendered times, uses less memory, and results in smaller fluid cache files.

Auto Resize works well with fluid effects that move, such as a missile vapor trail or the rolling smoke of an explosion, as it keeps the fluid container relatively small.

- Dynamically resize a fluid container
- Set a fluid container to dynamically resize
- Auto Resize

Self Attraction and Repulsion



Fluid Effects now includes Self Attraction and Repulsion attributes that generate attractive and repulsive forces between the voxels in 2D and 3D fluid containers. Using Self Attraction and Repulsion attributes, you can specify whether the forces use density or temperature grid values as well as control the strength of the attraction and repulsion force.

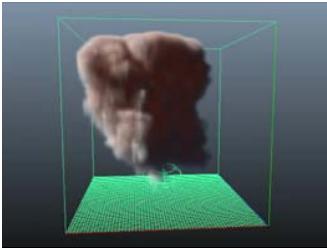
You can use Self Attraction and Repulsion to create effects such as swirling gas clouds and galaxies that contract and expand. Using a strong self repulsion force, you can simulate rapidly expanding gases to create the look of realistic explosion flashes.

- Using self attraction and repulsion forces
- Self Attraction and Repulsion

New Dynamic Simulation attributes

New Dynamic Simulation attributes improve the quality of fluid simulations.

The new attributes include the following:



Forward Advection

Forward Advection is a new method that you can use for calculating Density, Temperature, and Fuel grids. When on, these grids are solved using a mass conserving forward propagation technique that pushes density forward through the grid. Fluid effects solved using Forward Advection can produce fewer artifacts when the High Detail Solve option is used, and results in less diffusion than the default solve method. Forward Advection can also resolve instances where density remains static in voxels.

- Forward Advection



Substeps

Use Substeps to specify the number of times the solver performs calculations per frame. Substeps are useful for improving the stability and simulation results of fast-moving fluids, fluids with high density grids, and when the High Detail Solve option is used.

- Substeps

Output mesh per-vertex shading attributes



You can now generate per-vertex color, opacity, and incandescence data when you convert your fluid object to a polygon mesh. When on, Color Per Vertex, Opacity Per Vertex, and Incandescence Per Vertex generate per-vertex data which is derived from the fluid object's color, opacity, and incandescence values. The output mesh per-vertex data is color set data that can be applied to the polygon object like other color set data.

- Converting fluids to polygons
- Color Per Vertex
- Opacity Per Vertex
- Incandescence Per Vertex

Velocity Per Vertex for motion blur



You can now create motion blur when you render fluid output meshes. A new Velocity Per Vertex attribute generates velocity per vertex data when a fluid object is converted to an output mesh. When you render your fluid output mesh using mental ray for Maya, velocity per-vertex data generates motion blur in the rendered output.

- Create motion blur
- Velocity Per Vertex

Uvw Per Vertex



You can now generate a UVW coordinate system for your fluid output meshes. A new Uvw Per Vertex attribute outputs UVW coordinates when a fluid object is converted to an output mesh. You can use the Uvw per-vertex data to assign textures to fluid output meshes.

You can use the UV Texture Editor to modify the output mesh UVs like any other polygon surface.

■ Uvw Per Vertex

Fluids Lighting

A number of new Lighting attributes have been added to Fluid Effects that let you preview the lighting and shadowing of your fluid in the workspace before rendering. There are now more internal lights, including point, directional, and ambient lights, that you can use to light your fluid effect. Using internal lighting decreases fluid render times. See Lighting fluids with internal lights.

New fluid lighting features include the following attributes:



Shadow Diffusion

Controls the softness of the fluid's internal shadow, simulating local light scattering. Shadow Diffusion can only be seen in the workspace not in a rendered fluid. To use Shadow Diffusion effects in your finalized fluid, you can use Playblast to output simulated frames.

■ Shadow Diffusion

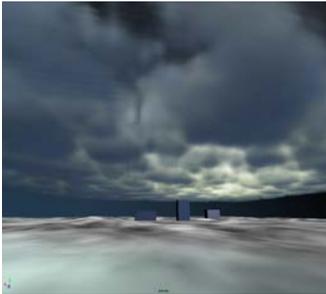


Light Type

Use Light Type to select the type of internal light you want to use with the fluid when displaying it in the workspace. You can now select an internal diagonal, directional, or point light. If Real Lights is off, the selected internal light is used to light the fluid for rendering.

The internal point light also includes a Point Light Decay attributes that let you control how quickly the light's intensity decreases with distance.

- Light Type
- Point Light Decay



Light Brightness and Light Color

You can use Light Brightness and Light Color to set the intensity and color of the selected internal light. Light Brightness and Light Color are similar to the intensity and color attributes that are used with scene lights.

- Light Brightness
- Light Color



Ambient lighting

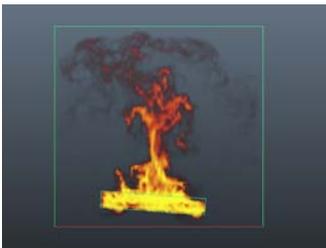
Fluid Effects now includes ambient lighting which you can preview in the workspace before rendering. Using ambient light attributes, you can control the intensity, color, and diffusion of the ambient light.

- Ambient Brightness
- Ambient Diffusion
- Ambient Color

New Dynamic Simulation attributes

New Contents Details attributes let you add more detail and turbulence to your fluid effects.

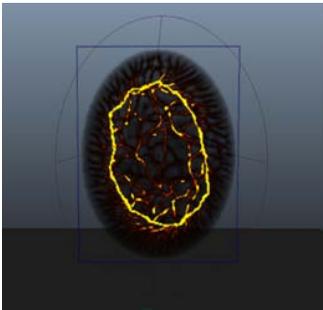
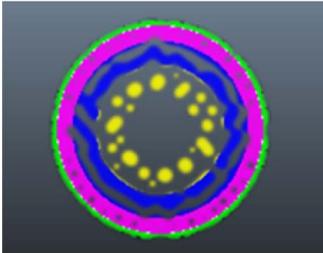
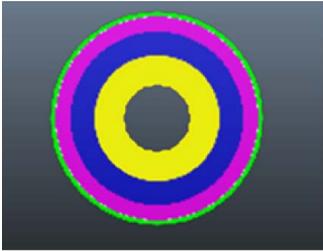
These new attributes include the following:



Noise

Density, Temperature, and Velocity now include a Noise attribute that randomizes density, temperature, and velocity grid values. You can use Noise to create turbulence as well as to add detail to a fluid effect.

- Noise



Tension

Density and Temperature now include a Tension attribute that lets you smooth ranges of density and temperature into round shapes, making the density and temperature boundaries more defined in the fluid. You can use Tension to create effects that are similar to the effect of surface tension in liquids.

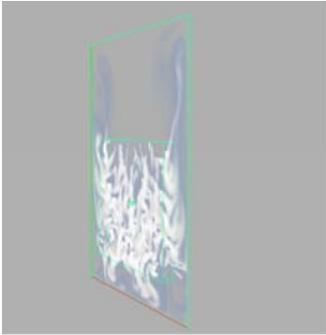
- Tension

Gradient Force

Density now includes a Gradient Force attribute that applies attractive and repulsive forces along the direction of the density gradient. Positive Gradient Force values push in the direction of increasing density, producing an attractive force. Negative values push density away from itself, producing a repelling force. Gradient Force is similar to Self Attraction and Repulsion, but the effect of Gradient Force is localized to the adjacent voxels and takes less time to calculate than Self Attraction and Repulsion.

- Gradient Force

Boundary Draw improvements



The Outline option for the Boundary Draw attribute has been improved on 2D fluid containers. A dotted line displayed around the container indicates the potential volume of the 2D fluid.

- Boundary Draw

Emit fluids from nParticles



You can now emit fluid from nParticle objects using Emit from Object. To control the fluid emission rate, you can either use fluid emitter attributes, or you can use nParticle per-particle rate and per-particle radius attributes.

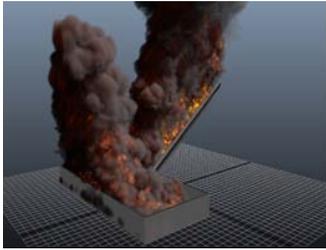
For example, you can use a per-particle ramp or an expression to control the radius of fluid emission based on the per-particle radius of nParticles. You can also emit fluid from Maya classic particles.

Emitting fluid from nParticles lets you combine fluid and nParticle effects in the same simulation. This provides better control over smoke, fire, dust, or debris clouds that result from nParticle collisions and explosions.

- Emit fluid properties with nParticles
- Use Per-Point Rate
- Use Per-Point Radius

New fluid emitter attributes

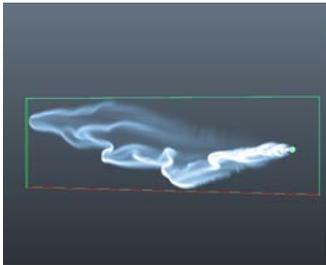
Maya 2011 includes the following new fluid emitter attributes:



Rate (Percent)

A new Rate (Percent) attribute lets you scale the individual emission rates of all fluid grids, including Density, Heat, and Fuel with one attribute. Rate (Percent) sets fluid emission rate as a percent.

- Rate (Percent)
- Emission rate and method

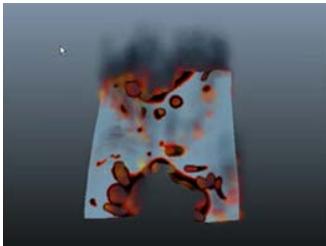


Emission method

New emission methods for Density, Heat, and Fuel let you specify how contents are emitted into fluids. The default Add method adds contents using a continuous emission rate. This is the same emission method used by fluids in previous versions of Maya.

A new Replace emission method lets you specify the total amount of contents emitted in the fluid. It can be used to obtain specific amounts of density, heat, and fuel without needing to reset the fluid's initial state from an advanced frame. This is useful for quickly simulating effects such as rising heat and wind tunnels.

- Fluid Attributes
- Emission rate and method

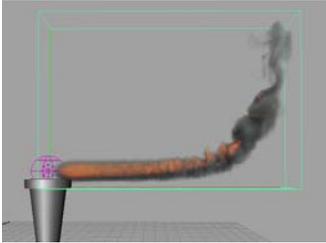


Emission maps

There are now emission maps for Density, Heat, and Fuel. Using the emission map attributes, you can map a 2D texture to control emitted density, temperature, and fuel. Texturing the emission is now supported.

- Emit fluids using emission maps

- Fluid Attributes



Motion Streak

When on, Motion Streak smooths emission stamps into a continuous fluid streak. Motion Streak is most useful for effects with fast moving emitters, which can cause emission stamping.

- Motion Streak

Keep Voxels Square

Use Keep Voxels Square to set a fluid container's resolution based on the fluid Resolution and Size values while maintaining square voxels in the local space of the fluid. Square voxels can provide better fluid simulation and rendering results.

When Auto Resize is on, voxels are kept square by default.

- Change fluid resolution
- Keep Voxels Square

Base Resolution

When Keep Voxels Square is on, you can use Base Resolution to simultaneously set the X, Y, and Z Resolution values of your fluid container.

- Change fluid resolution
- Base Resolution

Texture Rotate

A new Texture Rotate attribute lets you rotate the fluid's built-in texture.

- Texture Rotate

Normalized Dropoff

A new Normalized Dropoff attribute for volume emitters is now fixed relative to the emitter's scale, rather than to Worldspace. This ensures that fluid simulations remain consistent if the fluid container and emitter are scaled together. It also improves Fluid Dropoff for Cube

volume emitters by using a smooth dropoff towards the volume boundaries. In previous versions of Maya, a cylindrical shaped dropoff is used with Cube volume emitters.

- Normalized Dropoff

Use Distance

A new Use Distance attribute lets you use Min Distance and Max Distance with Surface and Curve emitters. In previous versions of Maya, to use Min Distance and Max Distance with Surface and Curve emitters, Min Distance has to be set to a value other than 0. You can now set Min Distance to 0 for Surface and Curve emitters.

- Use Distance

Emission Speed Attributes

A number of new Emission Speed Attributes let you control speed and velocity emission for all emitter types. For example, you can adjust emitted speed along the tangent of a Curve emitter or along the axis of a Volume emitter.

- Emission Speed Attributes

High Quality Solve improvements

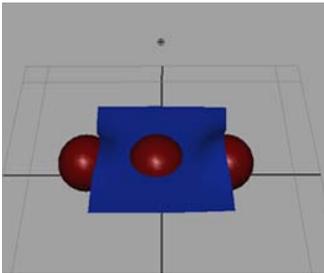
Fluid simulations solved with the High Quality Solve option are now more stable and have fewer artifacts when Forward Advection and Substeps are used.

- High Detail Solve
- Forward Advection
- Substeps

What's New in nCloth

10

Collide Strength

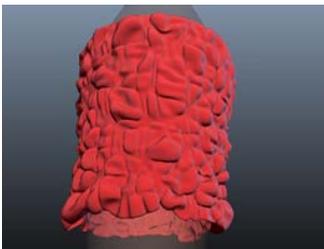


A new Collide Strength attribute lets you specify the strength of collisions between nCloth and other Nucleus objects. You can use the Paint nCloth Attributes Tool to create a Collide Strength vertex map or texture map to dampen or disable collisions on selected nCloth and passive collision object components. In previous versions of Maya, the easiest way to exclude selected vertices from collision is to create Exclude Collide Pairs constraints. Collide Strength Maps have also been added to nCloth objects.

Passive collision objects also have new Collide Strength and Collide Strength Map attributes.

- Collide Strength
- Collisions

Paintable Rest Length Scale



You can now use the Paint nCloth Attributes Tool to create a Rest Length Scale vertex map or texture map to set Rest Length Scale on selected nCloth object components. Painting Rest Length Scale values per-vertex is useful for creating ruffles and flares in nCloth, and for simulating textured fabrics, such as seersucker.

- Rest Length Scale Map Type / Rest Length Scale Map
- nMesh > Paint Vertex Properties
- nMesh > Paint Texture Properties

New Cacheable Attributes option

A new Dynamic State option for Cacheable Attributes provides improved results for resuming nCloth simulations off the end of an nCache. Dynamic State caches the X,Y, and Z positions of an nCloth object's vertices, the object's velocity, as well as internal state information.

- Dynamic State

Bend Solver

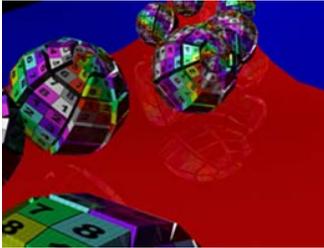
A new Bend Solver attribute lets you set the method used to solve Bend Resistance. Bend Solver methods can now better resolve instances of vertex cross-over and flipped geometry than the method used in previous versions of Maya.

- Bend Solver

What's New in nParticles

11

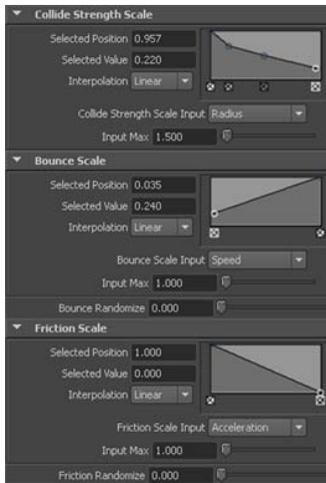
Per-particle rotations



New Rotation attributes let you control how Nucleus drives nParticle rotations on a per-particle basis. Rotation attributes can also be used to rotate instanced geometry. Rotation Friction and Rotation Damp attributes let you control the rate of particle rotations. Per-particle rotations are useful for creating realistic, randomly moving objects such as flying debris in an explosion effect.

- nParticle Rotation
- Rotation
- Rotate instanced geometry

Collision Ramps



nParticles now includes internal per-particle ramps for collision attributes. You can use Collision Ramps to set per-particle Collide Strength, Bounce, Friction, and Stickiness on nParticle objects, and scale attribute values based on nParticle properties such as age, radius, or speed.

- Collision Ramps
- nParticle internal ramps and per-particle attributes

Surface Tension

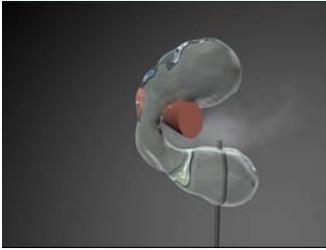


A new Surface Tension attribute lets you add realistic surface tension to your nParticle liquid simulations. In nature, surface tension is the attractive force between the molecules of liquids, and is most noticeable in phenomena such as the formation of water beads or liquid droplets on surfaces. Surface Tension mimics this characteristic by creating contracting and expanding behavior on the surface of a liquid nParticle object as it moves.

A Surface Tension Scale internal ramp lets you set Surface Tension on a per-particle basis.

- Surface Tension
- Surface Tension Scale
- Liquid Simulations

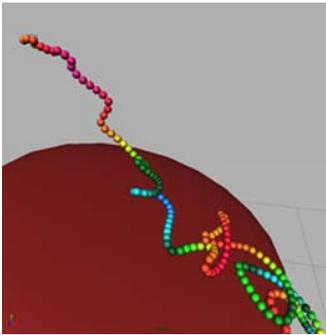
Viscosity Scale ramp



Maya 2011 includes a Viscosity Scale ramp that lets you set per-particle Viscosity values of your liquid simulation nParticles. Using the Viscosity Scale ramp, you can scale Viscosity values based on nParticle properties such as age, radius, or speed.

- Viscosity Scale
- Liquid Simulations

nParticles constraint improvements

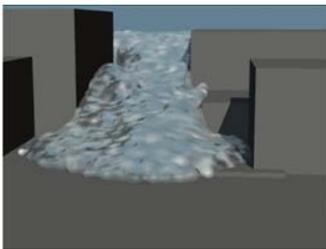


You can now add nConstraints to nParticles that are emitted into your scene after initial state. For example, you can add a Component to Component constraint to emitted nParticles to create a continuous chain of connected particles.

In previous versions of Maya, only initial state nParticles can have constraints.

- Constraining Nucleus objects
- Create and Edit nParticle Constraints

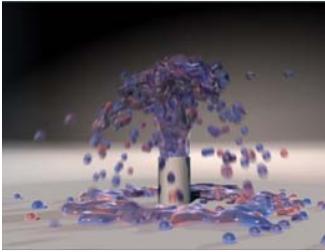
nParticles output mesh improvements



Maya 2011 includes performance improvements when converting an nParticle object to a polygon object. These improvements are most noticeable when using Triangle Mesh or Quad Mesh as the Mesh Method. In Maya 2010, meshes output as quads (Mesh Method set to Quads) may have issues with non-manifold geometry or spikes in the areas joining the separate lobes of the isosurface. Many of these problems have been fixed in Maya 2011. Also, the initial quad surface generated by the mesh conversion is now smoother, even when Mesh Smoothing Iterations are set to 0.

- nParticle output meshes
- Convert nParticles to polygons

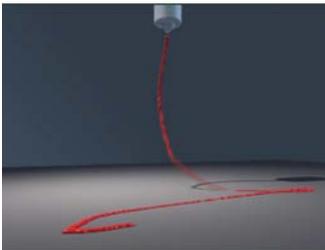
Output mesh per-vertex shading attributes



You can now generate per-vertex color, opacity, and incandescence data when you convert an nParticle object to a polygon mesh. When on, Color Per Vertex, Opacity Per Vertex, and Incandescence Per Vertex generate per-vertex data which is derived from the nParticle object's per-particle color, opacity, and incandescence values. The output mesh per-vertex data can be used as color set data and applied to the polygon object like other color set data.

- Output mesh per-vertex shading
- Set nParticle output mesh properties
- Output Mesh

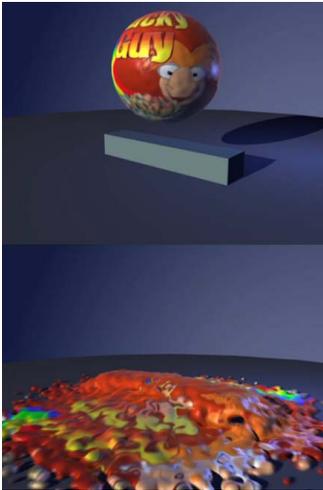
Velocity Per Vertex for motion blur



You can now create motion blur when you render nParticle output meshes. A new Velocity Per Vertex attribute generates velocity per vertex data when an nParticle object is converted to an output mesh. When you render your nParticle output mesh using mental ray for Maya, velocity per-vertex data is used for rendering with motion blur.

- Create motion blur
- Velocity Per Vertex

Uvw Per Vertex



You can now generate a UVW coordinate system for your nParticle output meshes. A new Uvw Per Vertex attribute outputs UVW coordinates when an nParticle object is converted to an output mesh. You can use the coordinates to assign textures to nParticle output meshes.

You can use the UV Texture Editor to modify the output meshes' UV topology like any other polygon surface.

- Uvw Per Vertex

Collide Strength

A new Collide Strength attribute lets you specify the strength of nParticle collisions, including self-collisions and collisions with other Nucleus objects. Using Collide Strength, you can specify if an nParticle object fully collides, partially collides, or does not collide with other objects.

A new Collide Strength Scale ramp lets you set Collide Strength on a per-particle basis. Using a Collide Strength Scale ramp, you can dampen or disable collisions on individual nParticles based on properties such as age, speed, or radius.

- Collide Strength
- Collide Strength Scale

What's New in Rendering and Render Setup

12

New Viewport 2.0



The new Viewport 2.0 provides large scene performance optimization and higher quality lighting and shaders. It allows for higher interactivity: you can tumble complex scenes with many objects as well as large objects with heavy geometry.

To switch to Viewport 2.0, select **Renderer > Viewport 2.0** from the Panel Menus.

- Visualize interactively in Viewport 2.0
- **Renderer > Viewport 2.0**
- Limitations of Viewport 2.0
- Visualize interactively in the scene view

New Hypershade design



You can now use the new Hypershade design for an easier and faster way to create render nodes. The new design provides a search feature and allows for easy navigation.

You can also create a favorites list in order to easily access your most commonly used shaders.

The Create Render Node window and the Assign New Material window also feature this new design.

Furthermore, the Assign New Material window has additional features that simplify your workflow when you assign a shader to surfaces.

Additional utility nodes, such as Add Matrix, Choice, and Decompose Matrix, are now also available through the Hypershade.

- Create bar
- Hide, resize or customize the Create bar
- Create a node
- Creating and using favorites
- Create Render Node window
- Assign New Material window
- Utilities

New 2D Pan/Zoom feature available



You can now use this feature to pan and zoom in 2D and view the results in your scene view for detailed tracking and rotoscoping work. Using this feature, you can easily toggle in and out of pan/zoom mode.

The pan/zoom mode does not render by default and therefore you have the option of rendering the full camera view or the pan/zoom view. In addition, you can also create 2D Pan/Zoom bookmarks.

You can access this feature by selecting View > Camera Attribute Editor > Display Options > 2D Pan/Zoom or by selecting View > Camera Tools > 2D Pan/Zoom Tool.

- Panning and zooming in 2D
- Display Options

- Ignore 2D Pan/Zoom
- View > Camera Tools
- 2D Pan/Zoom Tool
- Panel toolbar
- Maya Hotkeys

New stereoscopic camera features

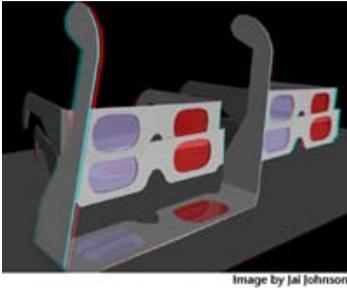


Image by Jai Johnson

New Multi-Camera Rig Tool

Use the Multi-Camera Rig Tool to create a multi-camera rig of two or more stereoscopic cameras. You can customize the default multi-camera rig or define your own. You can customize the number of layers in your rig as well as the rig type for every layer. Choose between the standard stereo camera or any custom rig that you have registered.

- Multi-Camera Rig Tool
- Create a multi-camera rig
- Stereo > Editors > Custom Multi Rig

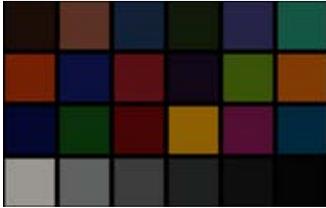
Linking a stereo camera with a set of objects

You can link your stereo camera with a group of objects as a set. This feature is most useful when you have multiple stereo cameras in your scene and you want to have different stereo settings for different objects.

Select Stereo > Make Links to link your camera with a set of objects.

- Linking a stereo camera with a set of objects
- Stereo > Make Links
- Stereo > Break Links

Color management support



Color profile support

You can now control the color profile associated with inputs to and outputs from the rendering process. Using this feature, you can specify a color space for input textures and specify to the renderer a color space for use with shaders and color calculation. You can associate color profiles with these elements:

- file textures
- render passes
- mentalrayTexture nodes
- mentalrayOutputPass nodes

To enable color management, use the Render Settings: Common tab. Then, you can select the color space for each of your individual nodes via its Attribute Editor.

- Using color management in your scene
- Render Settings: Common tab
- Render pass Attribute Editor
- File
- Color Profile



Displaying HDR images in the Render View

You can now display 32-bit floating point HDR images in the Render View. This way, you can use color management to control the color profile associated with the image file and the display output. You can also apply color grading and preview it in the Render View window, as well as specify a custom calibration file.

Furthermore, with this feature, you can adjust the image contrast and exposure, allowing you to view details in over-bright and over-dark regions of an HDR image.

You can access the color management options from the Render View window by selecting Display > Color Management.

- Displaying HDR images in the Render View

- Using color management in the Render View: sample workflow
- Render View color management node
- Rendering preferences

New ambient occlusion pass attributes



You can now customize your ambient occlusion pass by tweaking these attributes: number of ambient occlusion rays, Spread, Output Mode, Maximum Distance and so forth. You can access all of these attributes through the ambient occlusion pass Attribute Editor.

- Ambient Occlusion render pass attributes

New render passes supported by mia_material_x_passes shader

The mia_material_x_passes shader now provides support for additional render passes such as: Diffuse Without Shadows, Direct Irradiance Without Shadows, Raw Shadow, Shadow, Specular Without Shadows, Translucence Without Shadows.

For a list of all the passes that are supported by the mia_material_x_passes shader, see:

- mi_metallic_paint_x_passes, mia_material_x_passes, miss_fast_shader_x_passes, mi_car_paint_phen_x_passes shaders

New final gather attributes available

A new No FG Caching option has been added to the Render Settings: Indirect Lighting tab that enables you to disable final gather caching completely and always perform the full and accurate final gather computation. This option may reduce rendering times, depending on your scene complexity.

The new Normal Tolerance option allows you to specify the maximum angle up to which a final gather point normal may deviate from the surface normal for the final gather point to be considered for interpolation. A higher value reduces rendering time while a lower value may slow down rendering.

- Final Gather Quality
- Final Gather Tracing

Optimization for single objects now available for ambient occlusion and custom transfer maps

You can now choose between optimization for multiple objects and for single objects when creating ambient occlusion and custom transfer maps. Select Lighting/Shading > Transfer Maps to open the Transfer Maps editor and select between these two options under the Optimization drop-down box.

- Lighting/Shading > Transfer Maps

New mental ray shaders added

Two new mental ray shaders are now included: `mia_photometric_light` and `mia_ciesky`.

The `mia_photometric_light` shader balances the photon energy and density with the light intensity and the `mia_ciesky` shader can be used for lighting analysis.

- `mia_photometric_light`
- `mia_ciesky`

Backburner now supported for use with Maya on Mac OS X

You can now use Backburner with Maya on the Mac OS X platform.

- Network rendering using Maya with Backburner

New shadowmap camera for directional lights

You can now use the new shadow map camera to control the area of focus for directional lights.

- Use Shadow Map Camera (directional lights only)

What's New in MEL and Python

13

New startup flag to enable compatibility warnings

A new Maya startup flag, `-3`, has been added to enable Python 3000 compatibility warnings.

- Additional Maya startup flags

New advanced techniques section added

The Python book has a new advanced techniques section that provides guidelines for creating an editor window using Python.

- Creating an editor window using Python

PyMEL installed with Maya

PyMEL is now installed with Maya. For more information about PyMEL, see the PyMEL documentation.

- Using PyMEL

New commands

The following commands have been added:

- `aaf2fcp`
- `adskAsset`
- `adskAssetLibrary`
- `adskAssetList`
- `adskAssetListUI`

- *audioTrack*
- *autoSave*
- *bezierAnchorPreset*
- *bezierAnchorState*
- *bezierCurveToNurbs*
- *bezierInfo*
- *cameraSet*
- *componentBox*
- *containerBind*
- *containerPublish*
- *copyDeformerWeights*
- *curveBezierCtx*
- *curveRGBColor*
- *dbcount*
- *dbmessage*
- *deformerWeights*
- *deviceManager*
- *dockControl*
- *exportEdits*
- *fileDialog2*
- *flowLayout*
- *interactionStyle*
- *loadUI*
- *movieInfo*
- *nodeTreeLister*
- *nurbsCurveToBezier*
- *ogs*

- *ogsdebug*
- *ogsRender*
- *panZoom*
- *panZoomCtx*
- *pointOnPolyConstraint*
- *polyConnectComponents*
- *polyHole*
- *polySpinEdge*
- *polyUVRectangle*
- *relationship*
- *resourceManager*
- *sequenceManager*
- *shot*
- *shotTrack*
- *shotRipple*
- *skinBindCtx*
- *timeCode*
- *toolBar*
- *treeLister*
- *volumeBind*

Obsolete commands

The following commands have been removed:

- *characterOutlineEditor*
- *dgcount*
- *dynRelEdPanel*
- *dynRelEditor*

- finder
- imageElement
- lightListEditor
- lightListPanel
- listerEditor
- newPanelItems
- rangeElement
- renderLayerButton
- sceneViewer
- setEditor
- shellField
- textElement
- xpmPicker

Changes to existing commands

Almost all flags which take MEL scripts now support Python scripts as well.

All commands for creating controls and layouts have added the following flags:

- -enableBackground/ebg
- -fullPathName/fpn
- -visibleChangeCommand/vcc

All constraint commands have added a -layer/l flag.

All artisan paint contexts have added the following flags:

- -colorRamp/cr
- -rampMinColor/rmc
- -rampMaxColor/rxc
- -useColorRamp/ucr
- -useMaxMinColor/umc

Controls can now be reparented (-parent flag is editable).

The following flags have been added to the *iconTextButton*, *iconTextCheckBox*, *iconTextRadioButton*, *iconTextStaticLabel*, *nodeIconButton* and *shelfButton* commands:

- -overlayLabelBackColor/olb
- -overlayLabelColor/olc

For the *dynPaintEditor*, *imageWindowEditor*, *renderWindowEditor* and *textureWindow* commands, their -scaleBlue/db, -scaleGreen/dg and -scaleRed/sr flags now take `float` arguments rather than `int`.

For the *manipMoveContext*, *manipRotateContext* and *manipScaleContext* commands, their -activeHandle/ah flag now takes an `int` rather than `float`.

In addition, there have been the following changes to individual commands:

about

Flags added:

- -fontInfo/foi
- -qtVersion/qt
- -windowManager/wm

allNodeTypes

Flags added:

- -includeAbstract/ia

animCurveEditor

Flags added:

- -displayNormalized/-dn;
- -preSelectionHighlight/psh;
- -renormalizeCurves/rnc;
- -stackedCurves/sc;
- -stackedCurvesMin/scm;
- -stackedCurvesMax/scx;

- -stackedCurvesSpace/scs;
- -showUpstreamCurves/suc

animView

Flags added:

- -nextView/nv
- -previousView/pv

artAttrSkinPaintCtx

Flags added:

- -paintSelectionMode/spm
- -skinPaintMode/spm

button

Flags changed:

- -align flag is now ignored
- -actionIsSubstitute flag is now ignored.

checkBox

Flags changed:

- -align flag is now ignored

control

Flags changed:

- -backgroundColor flag is respected on all platforms

camera

Flags added:

- -horizontalPan/hpn
- -panZoomEnabled/pze

- -renderPanZoom/rpz
- -verticalPan/vpn
- -zoom/zom

cameraView

Flags added:

- -bookmarkType/typ

clipEditor

Flags added:

- -clipStyle/cs
- -manageSequencer/ms

Flags removed:

- -characterOutline/co

cmdScrollFieldExecuter

Flags added:

- -commandCompletion/cco
- -objectPathCompletion/opc
- -spacesPerTab/spt
- -showTooltipHelp/sth
- -tabsForIndent/tfi

commandLine

Flags added:

- -holdFocus/hf

commandPort

Flags added:

- -sourceType/stp
- -pickleOutput/po

confirmDialog

Flags added:

- -icon/icn

container

Flags added:

- -includeNetworkDetails/ind
- -isContainer/isc
- -type/typ
- -unbindChild/unc
- -unbindParent/ubp

containerProxy

Flags added:

- -fromTemplate/ft
- -type/typ

containerTemplate

Flags added:

- -addBindingSet/abs
- -bindingSetList/bsl
- -childAnchor/can
- -parentAnchor/pan
- -publishNodeList/pnl

- -removeBindingSet/rbs
- -rootTransform/rtn
- -updateBindingSet/ubs

copySkinWeights

Flags added:

- -noBlendWeight/nbw
- -normalize/nr
- -sampleSpace/spa

curveCVCtx and curveEPCtx

Flags added:

- -bezier/bez

cycleCheck

Flags added:

- -firstCycleOnly/fco
- -firstPlugPerNode/fpn
- -lastPlugPerNode/lpn
- -listSeparator/lis

directKeyCtx

Flags added:

- -selectedOnly/so

editorTemplate

Flags added:

- -addAdskAssetControls/aac

error

Flags added:

- `-showLineNumber/sl`

file

Flags added:

- `-applyTo/at`
- `-compress/cmp`
- `-exportUnloadedReferences/eur`
- `-mapPlaceholderNamespace/mns`
- `-mergeNamespacesOnClash/mnc`
- `-preserveName/pn`

Flags changed:

- `-command/c` now takes a second parameter which is the restore script

findType

Flags added:

- `-deep/d`
- `-type/t`

Flags removed:

- `-all`

frameLayout

Flags changed:

- `-labelAlign` and `-labelWidth` flags are now ignored.

getPanel

Flags added:

- -atPosition/ap

group

Flags added:

- -useAsGroup/uag

hotBox

Flags added:

- -noClickPosition/ncp
- -position/pos

hotkey

Flags changed:

- -key flag can accept modifiers

iconTextButton

Flags changed:

- -actionIsSubstitute flag is now ignored.

iconTextScrollList

Flags added:

- -dropRectCallback/drc
- -itemAt/ia
- -visualRectAt/vra

ikSystem

Flags changed:

- -solverTypes/st no longer takes an argument

itemFilterAttr

Flags added:

- -hasDrivenKey/hdk

ls

Flags added:

- -containers/con
- -lockedNodes/ln
- -persistentNodes/pn
- -referenceNodes/rn
- -undeletable/ud

lsThroughFilter

Flags added:

- -item/it

lsUI

Flags added:

- -dumpWidgets/dw
- -numWidgets/nw

Flags removed:

- -filters/f

manipOptions

Flags added:

- -rememberActiveHandle/rah

manipRotateContext

Flags added:

- -useManipPivot/ump

manipScaleContext

Flags added:

- -alignAlong/aa
- -mode/m
- -orientAxes/oa
- -orientTowards/ot
- -useManipPivot/ump

menu

Flags added:

- -fullPathName/fpn

modelEditor

Flags added:

- -cameraSet/cst
- -ignorePanZoom/ipz
- -modelPanel/mp
- -viewType/vt

nParticle

Flags changed:

- -dynamicAttrList/dal no longer takes an argument

namespace

Flags added:

- -query/q
- -recurse/r
- -relativeNames/rel
- -rename/ren

namespaceInfo

Flags added:

- -recurse/r

nodeOutliner

Flags added:

- -showPublished/sp

outlinerEditor

Flags added:

- -pinPlug/pin
- -showPinIcons/spi
- -showUpstreamCurves/suc
- -unpinPlug/unp

paneLayout

Flags changed:

- -staticWidthPane/swp
- -staticHeightPane/shp

particle

Flags changed:

- -dynamicAttrList/dal no longer takes an arg

playblast

Flags added:

- -combineSound/csd
- -indexFromZero/ifz
- -quality/qlt
- -replaceAudioOnly/rao
- -replaceEndTime/ret
- -replaceFilename/rf
- -replaceStartTime/rst
- -sequenceTime/sqt
- -useTraxSounds

pluginInfo

Flags changed:

- -cacheFormat/cf
- -dragAndDropBehaviour/ddb
- -dependNode/dn
- -device/dv
- -iksolver/ik
- -translator/t

These flags no longer take any args.

polyAutoProjection

Flags changed:

- -pivot/pvt
- -pivotX/pvx
- -pivotY/pvy
- -pivotZ/pvz

These flags all take floats instead of lengths.

polyOptions

Flags added:

- -displayInvisibleFaces/dif

polySelect

Flags added:

- -edgeUVLoopOrBorder/euv

polySlideEdge

Flags added:

- -edgeDirection/ed now takes float instead of length

polySplitEdge

Flags added:

- -operation/op

preloadRefEd

Flags changed:

- -selectFileName/sf no longer takes an arg

promptDialog

Flags added:

- -style/st now takes a string rather than an int

radioButton

Flags changed:

- -align flag is now ignored

referenceEdit

Flags changed:

- -editCommand/ed and -onReferenceNode/orn are now multi-use

referenceQuery

Flags added:

- -child/ch
- -isExportEdits/iee
- -isLoading/il
- -liveEdits/le

Flags changed:

- -editCommand/ec and -onReferenceNode/orn are now multi-use

refresh

Flags added:

- -suspend/su

renderWindowEditor

Flags added:

- -colorManage/com

scale

Flags added:

- -localSpace/lc
- -orientAxes/oa
- -objectSpace/os
- -worldSpace/ws

scriptNode

Flags added:

- -sourceType/stp

select

Flags added:

- -containerCentric/cc

selectPref

Flags added:

- -autoSelectContainer/asc

separator

Flags changed:

- -style flag now has valid values of "none", "single", "in" and "out" (double, doubleDash just creates single dash).

skinCluster

Flags added:

- -addToSelection/ats
- -forceNormalizeWeights/fnw
- -normalizeWeights/nw
- -removeFromSelection/rfs

- -selectInfluenceVerts/siv
- -skinMethod/sm
- -volumeBind/vb
- -volumeType/vt

skinPercent

Flags added:

- -zeroRemainingInfluences/zri
- -transformMoveWeights/tmw

sound

Flags added:

- -mute/m
- -sourceEnd/se
- -sourceStart/ss

stereoCameraView

Flags added:

- -ignorePanZoom/ipz
- -modelPanel/mp
- -stereoDrawMode/sdm
- -viewType/vt

Flags removed:

- -stereoCmd/sc
- -stereoCmdDefault/scd

stereoRigManager

Flags added:

- -cameraSetFunc/csf

surface

Flags changed:

- -degreeU/du and -degreeV/dv now take ints instead of floats

tabLayout

Controls now have scroll buttons on all platforms if there is not enough space to display all the tabs. There is a right-mouse button menu attached to each button, listing all the tabs and making it possible to quickly select any tab.

text

Flags added:

- -wordWrap/w

textureWindow

Flags added:

- -drawSubRegions/dsr

timer

The old command has been completely replaced with a new one with different flags.

transferAttributes

Flags added:

- -matchChoice/mch

translator

Flags added:

- -loaded/ld

treeView

Flags added:

- -allowHiddenParents/ahp
- -enableKeys/enk
- -itemSelected/isl
- -showItem/shi

Flags removed:

- -drawSelectionBackground

Flags changed:

- -borderHighlite/bh, -expandItem/ei, -highlite/hl, -itemVisible/iv, -reverseTreeOrder/rto and -selectItem/si now take booleans instead of floats or ints;
- -children/ch, -itemIndex/idx, -itemExists/iex, -isItemExpanded/iie, -isLeaf/il and -itemParent/ip are all now query-only.

warning

Flags added:

- -showLineNumber/sl

window

Flags changed:

- -minimizeCommand and -restoreCommand flags are now respected on all platforms
- -interactivePlacement flag is now ignored.

windowPref

Flags added:

- -restoreMainWindowState/rms
- -saveMainWindowState/sms

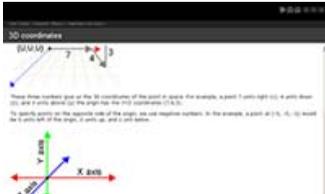
Flags changed:

- `-parentMain/pm` takes a boolean rather than an int

14

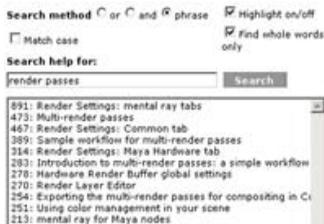
What's New In Documentation

Improved Navigation Bar



The navigation bar in the Maya Documentation now remains at the top of your browser window as you scroll down, letting you easily access the navigation controls as you browse.

Improved Search



The search field of the Maya Help now supports phrasal search. You can search for a precise combination of words by changing the Search method to phrase. For more information, see Maya Help in the *Basics* guide.

New and updated Tutorials and Advanced Tutorials



You can now find a number of new and updated tutorials in the documentation. These tutorials are designed to introduce users to some of the uses and workflows of the more recent features introduced in Maya. A new Advanced Techniques tutorial for nParticles is now available from the *Autodesk Maya Services & Support*

section of the Autodesk website. This tutorial is designed for intermediate and advanced users and concentrates on specific, complex topics, and techniques.

- File Referencing in the *Basics* guide.
- *Maya Advanced Techniques*

List of recommended mental ray shaders added



A list of recommended mental ray for Maya shaders, for example the `mia_material_x` shader, have been added to the Shading Nodes chapter of the Shading guide.

- Recommended mental ray for Maya shaders

PyMEL Documentation

The Maya documentation now includes PyMEL technical reference documentation.

Working with Qt chapter added to API Guide

The API Guide now includes a chapter on how to work with Qt to create Maya UI.

- Working with Qt

New or updated API classes

M3dView

- The MWindow and M3dWindow types have been merged into a single MNativeWindowHdl type. The applicationShell and window methods both return this new type.
- A widget method has been added to return the QWidget associated with the view.
- **setObjectDisplay** and **objectDisplay** methods added to set and query the types of objects displayed in the view.
- **DisplayObject** enumeration expanded to include more types of objects.
- A Mac64 version of the **display** method has been added which returns a void pointer to an `NSOpenGLContext`.
- **beginXorDrawing** and **endXorDrawing** methods added to provide non-destructive line drawing which doesn't require hardware overlays, for things such as selection marquees.
- **usingDefaultMaterial** method added to quickly determine if the view's *Use default material* setting is enabled.
- Methods added to support multiple draw passes:
 - **multipleDrawEnabled**
 - **setMultipleDrawEnable**
 - **multipleDrawPassCount**
 - **setMultipleDrawPassCount**
- **beginProjMatrixOverride** and **endProjMatrixOverride** methods added to override a view's projection matrix.

- **updateViewingParameters** method added to force changes to the camera's projection and viewing matrices to be applied to the view.
- ColorIndex mode is no longer supported so the **isColorIndexMode** method has been removed.

MCameraSetMessage

- This is a new class for registering callbacks for cameraSet messages.

MDrawInfo

- The **setMultiPath** method has been added to allow setting of the DAG path of the object to be drawn.

MDrawRequestQueue

- Copy constructors have been added to allow copies of request queues to be made.

MEvent

- The calling signatures of the **setPosition** and **setModifiers** methods have been fixed to make them accessible from Python.

MFileIO

- **getReferences** method given an optional *wantUnresolvedNames* parameter to control whether the returned filenames should be prior to path resolution or after.
- **getFiles** method added to return the names of all files in the scene. Parameters can be used to control whether only references are returned and whether resolved or unresolved names are returned.
- Second version of **getReferenceNodes** added to return the nodes in an **MSelectionList**.

MFnCamera

- The following methods have been added to support pan and zoom:
 - **panZoomEnabled**
 - **setPanZoomEnabled**
 - **renderPanZoom**

- **setRenderPanZoom**
 - **horizontalPan**
 - **setHorizontalPan**
 - **verticalPan**
 - **setVerticalPan**
 - **zoom**
 - **setZoom**
- The **getFilmFrustum**, **getViewParameters** and **getViewingFrustum** methods have all acquired an optional *applyPanZoom* parameter to control whether pan and zoom should be applied.

MFnCameraSet

- This is a new class to create and modify camera sets.

MFnContainerNode

The following methods have been added:

- **getPublishedNames**
- **getRootTransform**
- **getPublishedNodes**

MFnDagNode

The following methods have been made `const`:

- **getPath**
- **getAllPaths**
- **fullPathName**
- **partialPathName**

MFnDependencyNode

- **kGlobalDynamicAttr** has been removed from the **MAttrClass** enum since its functionality was never implemented.

MFnDirectionalLight

- **useLightPosition** and **setUseLightPosition** methods have been added to control whether objects positioned behind the light should cast shadows.

MFnMesh

- **setInvisibleFaces** and **getInvisibleFaces** methods added to set and query the visibility of individual faces (for example, as per the *polyHole* command).

MFnNidData

- New class for passing Nucleus id data along connections between nodes.

MFnObjectData

- Support added for MnRigid and MnParticle objects.

MFnNonExtendedLight

- More methods added for controlling depth maps:
 - **depthMapFocus**
 - **setDepthMapFocus**
 - **useDepthMapAutoFocus**
 - **setUseDepthMapAutoFocus**
 - **depthMapWidthFocus**
 - **setDepthMapWidthFocus**

MFnParticleSystem

- **setCount** method added

MFnSet

- The **getMembers** method now clears the selection list passed to it before adding members.

MFnSkinCluster

- **setBlendWeights** and **getBlendWeights** methods added to set and query the skinCluster's blend weight array, which is used to blend between classical linear skinning and dual quaternion bases skinning on a per-vertex basis.
- A version of **getWeights** has been added which only retrieves weights for a specified subset of the deformer's influences.

MItDependencyGraph

- **setTraversalOverWorldSpaceDependents** and **isTraversingOverWorldSpaceDependents** methods added to support world-space attribute dependencies in the traversal.

MGeometryPrimitive

- A copy constructor has been added.

MGeometryRequirements

- **addFaceOffsets** method added to request that face offset information be included as a required element.

MMaterial

- A new constructor has been added which takes a shader set's **MObject**. This allows you to instantiate **MMaterials** for individual components such as faces.
- **defaultMaterial** method added to return the default material. This is the material used to shade scene objects when the view's *Use default material* setting is enabled.

MMeshSmoothOptions

- **setBoundaryRule** and **boundaryRule** methods added to control how boundary edges and vertices are creased.

MNamespace

- This is a new class to create and modify namespaces.

MNativeWindowHdl

- New type definition to represent a native window handle on all platforms. This replaces **M3dView::MWindow** and **M3dView::M3dWindow**.

MnCloth

- The following methods have been added to provide more information about the simulation:
 - `getThickness`
 - `getInverseMass`
 - `getBounce`
 - `getFriction`

MnObject

- This new class is the base class for all Nucleus objects, such as `MnCloth` and `MnRigid`.

MnParticle

- This is a new class to create and modify Nucleus particle objects.

MnRigid

- This is a new class to create and modify Nucleus rigid objects.

MnSolver

- This is a new class to create and modify Nucleus solvers.

MPlug

- `isSource` and `isDestination` convenience methods added. It is no longer necessary to fiddle with `connectedTo` just to find out if you have any incoming connections.

MPx3dModelView

- The following methods have been added to provide support for camera sets:
 - `setCameraSet`
 - `getCameraSet`
 - `setCurrentCameraSetCamera`

- **getCurrentCameraSetCamera**

- ColorIndex mode is no longer supported so the **setColorIndexMode** and **isColorIndexMode** methods have been removed.
- The *set* parameter of the **setViewSelectedSet** method has been made `const`.

MPxCacheFormat

- **writeIntArray** and **readIntArray** methods added.

MPxCameraSet

- This is a new class for creating user-defined cameraSet nodes.

MPxDeformerNode

- **setDeformationDetails** and **getDeformationDetails** methods added to control which additional components (currently just UVs and colors) the deformer will deform.

MPxFileTranslator

- **allowMultipleFileOptimization** virtual method added to allow translators to specify whether they are compatible with optimizations performed by Maya when the same file is referenced multiple times.

MPxNode

- **_setDoNotWrite** and **_doNotWrite** methods added to provide Python with access to the corresponding protected C++ methods.

MPxSurfaceShapeUI

- **surfaceShapeUI** static method added to allow retrieval of a custom surface shape's **MPxSurfaceShapeUI** from its DAG path.

MPxTransform

- **treatAsTransform** virtual method added to allow custom transform nodes to specify whether they want to be treated like normal transform nodes or not. For example, normal transforms are not included in a viewFit operation, but joints, which are derived from transform nodes, are.

MQtUtil

- New class providing methods to work with the Qt controls underlying Maya's UI elements.

MRenderView

- The **updatePixels** method has acquired an optional *isHdr* parameter. When set, this parameter indicates that the pixel values are in linear CIE XYZ colorspace rather than the usual standard RGB colorspace.

MSceneMessage

- To provide finer control over reference handling, the **kBeforeReference** callback has been replaced by **kBeforeCreateReference**, which is only called when a reference is being created, not every time it is loaded. Similarly, the **kAfterReference** callback has been replaced by **kAfterCreateReference**. The old callbacks will remain available for a couple more versions of Maya to provide time to transition plug-ins to the new ones.

MSelectionList

- The **add(const MString& matchString)** method has acquired an optional *searchChildNamespacesToo* parameter.

MString

- The **expandEnvironmentVariablesAndTilde** method has been restored to its Maya 2009 functionality, meaning that it no longer performs file-path-specific expansion on the string passed to it.
- **expandFilePath** method added to perform file-path-specific expansions.

MTimerMessage

- The **addTimerCallback** method has been fixed so that the callback no longer fires immediately after set but waits until the specified time period has elapsed.
- Timer callbacks no longer require Maya to run its idle loop continuously, so the **setSleepCallback** and **sleepCallbackPtr** methods are no longer required and will be removed in a future version of Maya.

MTransformationMatrix

- The calling signature of the **reorderRotation** method has been fixed so that it is now usable from Python.

MUIMessage

- **add3dViewPreMultipleDrawPassMsgCallback** and **add3dViewPostMultipleDrawPassMsgCallback** methods added to set callbacks for the start and end of each pass when multiple draw passes are enabled. See the **lensDistortionCallback** plug-in for an example of their usage.

Example Plugins

- **lensDistortionCallback** added to show how to handle multiple draw passes in a normal model panel (as opposed to a custom MPx3dModelView).
- **cvColorShader** updated to work with faces assigned to different shaders. Also made threadsafe.
- **helixMotifCmd** has been replaced with **helixQtCmd** to reflect the fact that Maya is now Qt-based. The new plug-in works on all platforms.
- **qtForms** added to show how to create Qt UI from within a plug-in, including the use of forms created in Qt Designer.
- **saveSwatchesCmd** added to show how to grab images from controls.

