Autodesk® **Maya**® 2013

Autodesk®

What's New

Autodesk ® Maya® 2013

Contents

What's New in Autodesk Maya

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Welcome to What's New in Autodesk® Maya® 2013.

Image created by Jean-Marc Belloncik

Maya 2013 delivers new toolsets for dynamic simulation, rendering, and animation; implements an Open data initiative to facilitate non-linear workflows; and provides solutions to create and maintain open pipelines.

Enhancements to the Maya Nucleus framework, including the addition of a new Maya nHair module, combined with the new open source AMD Bullet Physics engine, help you create complex and realistic simulations.

With the high-performance and high-quality Viewport 2.0, new features have been added to expand the level of support, so artists can efficiently evaluate their work in a higher fidelity interactive environment.

Improvements to rigging tools, the ability to match Trax clips, enhancements to the Graph Editor, and a new Heat Map Skinning method offer an enhanced animation experience.

Additionally, improvements to file referencing workflows and the support of Alembic and Animation Transfer Object Model (ATOM) file formats make Maya 2013 easier to integrate into open pipelines.

General

Alembic files provide artists with a fast workflow for passing complex scene data between various areas of a production pipeline. The new **Pipeline Cache** tools let you save and load scene files as Alembic-based cache files, which provide performance improvements including accelerated loading of large scenes, faster play back of complex character animations, and real-time play back of geometry data with topology changes.

In addition, new single-step workflows let you send scene data between Maya and 3ds Max.

See What's New in General (page 7).

Basics

The new **Node Editor** lets you view, modify and create node connections using an editable schematic that displays nodes and the connections between their attributes. This interactive tool lets you build and edit networks of nodes using a simple click-and-drag method.

You can customize the **Attribute Editor** layout by creating custom views and attribute controls for node types and specific nodes. Customized XML-based templates are loaded by selecting new options in the **Attribute Editor Show** menu.

See What's New in Basics (page 11).

File Referencing
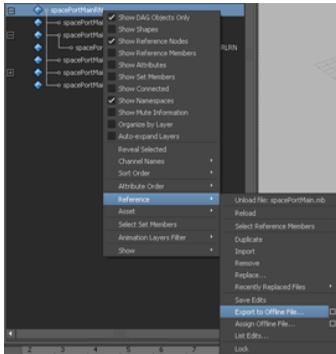
New File reference options in the **Outliner** make it easier to manage your file references outside of the **Reference Editor**. These options include new **Reference** menu items and a **Reference Node** display option that lets you locate and identify the loaded and unloaded file references in your scene.

Similarly, other new features and options improve a number of file referencing workflows. Now you can edit animation curves in referenced files, perform referencing operations on multiple references, view the contents of unloaded references in your scene, and include files associated with unloaded references in the scene archive.

See What's New in File Referencing (page 13).

Modeling
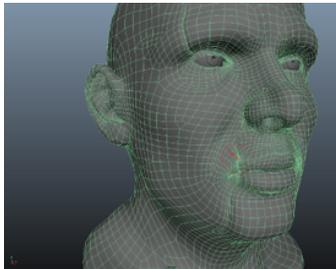
The **Extrude Tool** now has **Thickness**, **Offset** and **Divisions** values to allow for greater precision. Other tool improvements include the addition of a background colour for improved readability and the ability to use Ctrl and Shift to more quickly adjust values.

The new **Brush strength** slider in the **Sculpt Geometry Tool** lets you adjust the amount of pinching that is applied while sculpting.

See What's New in Modeling (page 29).

Animation
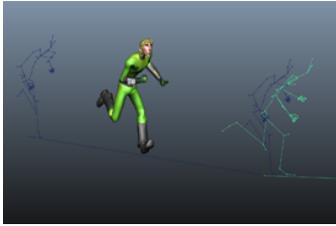
When blending between clips of animation in the **Trax Editor**, new clip matching manipulators and options let you define an offset to properly align the clips in an animation sequence. Updated **Trax Editor** options include clip **Offset** settings for absolute or relative offsets and **Rotation Blend** settings with simpler **Euler** and **Quaternion** options.

Maya's new ATOM file type gives animators a fast workflow for repurposing existing animation as new characters are created. The .atom file type and its associated import/export options let you save specific poses or animation sequences, then easily reload them onto other objects.

In addition, the new **Retime Tool** lets you directly adjust the timing of key movements in your animations. A new type of timing manipulator is available in the **Graph Editor** that lets you shift or warp animation. Similar animation retiming tools are available in other Autodesk applications. Other changes to the **Graph Editor** include updates to the **View** menu and toolbar icons.

See What's New in Animation (page 17).

Rigging
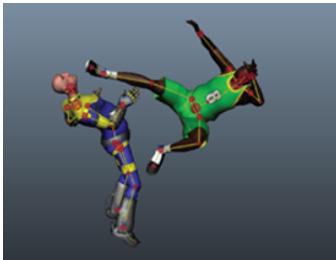
The new **Heat Map** binding method uses a heat diffusion technique to distribute weights, and gives you better results than the existing binding methods.

Updates to the HumanIK character setup tools increase usability and streamline common character setup workflows: a unified interface lets you perform multiple tasks in a single window; character layouts can be customized to fit specific requirements; and HumanIK animation is easily retargeted to and from a custom rigged character.

Additionally, new properties and options give you improved control over roll bone behavior and animation rigs.

See What's New in Rigging (page 23).

Dynamics and nDynamics

The nHair hair generation system is the newest addition to the Nucleus dynamic simulation framework. With the ability to self-collide and interact with other Nucleus objects, nHair has many advantages over the previous hair system. Improvements include faster performance with a large number of follicles, better collision accuracy and control, the ability to create nConstraints, and nCaching for saving and playing back hair simulations.

Maya now includes the MayaBullet physics simulation plug-in. Built from the Bullet physics library, the plug-in lets you use the Bullet physics engine to create large-scale, highly-realistic dynamic and kinematic simulations. MayaBullet simulations can include interacting soft body and rigid body objects, as well as constrained collision objects, all contained in a single dynamic system within Maya.

See What's New in Dynamics and nDynamics (page 31).

Rendering and Render Setup

Image created by Duncan Brinsmead

New **Viewport 2.0** features include support for image planes and animation and rigging features such as HumanIK, joints, motion paths, ghosting and playblast. New polygons, NURBS and dynamics features have been added. Improvements in tumble and animation performance of large scenes are also included.

The new Mandelbrot node allows you to texture your model with the Mandelbrot set. You can create a 2D version of this node (Mandelbrot), a 3D version of this node (Mandelbrot 3D), or shade a fluidShape node using the built-in Mandelbrot texture.

A new simplified workflow lets you automatically bake a substance texture to disk to render it with mental ray for Maya, IPR, or other 3rd party renderers. Several new substance textures have also been added.

See What's New in Rendering and Render Setup (page 33).

Documentation

Read about improvements to the search function in the Maya Help and the ability to share help topics by email directly from your web browser.

See What's New in Documentation (page 37).

MEL and Python

Read about commands that have been added, changed, and removed for this release.

See What's New in MEL and Python (page 39).

API

You can now easily create a distributable deployment of your plug-in. This way, making changes to the plug-in is simple even across multiple Maya versions and platforms. Additionally, a new module file syntax allows multiple versions of a plug-in to be supported.

See What's New in API (page 45).

What's New in General

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Pipeline caching

New **Pipeline Cache** tools let you load, save, and play back Maya scenes as Alembic cache files. The Alembic file format is an open-source format developed for exchanging complex 3D geometry data. Alembic files are highly portable and application-independent so they can be shared, processed, and played back by many content creation applications.

Alembic caches provide several performance improvements, including accelerated scene loading of large scenes, faster playback of complex character animation, and real-time play back of geometry data with topology changes. Alembic files also let you share large scenes between various areas of a production pipeline without the large memory overhead of fully editable scene files.

Options in a new **Pipeline Caching** menu let you configure settings for loading and saving Alembic files.

Interoperability with 3ds Max

Transfer data between Maya and 3ds Max using the new **Send to 3ds Max** command in the **File** menu. You can send various forms of data, including geometry, animation, materials, and textures, to 3ds Max. You must have matching versions of Maya 2013, 3ds Max 2013 and FBX 2013 to use this command.

Run Maya with a Simplified Chinese interface

Maya is now available with a Simplified Chinese interface. For instructions on how to run Maya with a Simplified Chinese interface on different operating systems, see Run Maya with a Japanese or Simplified Chinese interface.

Live update service

Check for updates including Service Packs and Hotfixes using the new Autodesk Maya Update Manager (**Help > Check for Updates**).

This window lists updates that are available for your version of Maya, and lets you check for updates using download codes.

New Bonus Tools

The new **Attribute Editor** Template Builder tool helps you build custom **Attribute Editor** templates. You can download Bonus Tools from the Autodesk website by selecting Help > Download Bonus Tools in Maya.

New suites specific environment variables

Several new suites specific environment variables let you run Maya off a network when it is used as part of the Autodesk Entertainment Creation Suites. See Suites specific environment variables.

Autodesk MatchMover scripting support

Autodesk MatchMover now includes Python scripting support. Use MatchMover's **Script Editor** and **Script Manager** to create and load scripts that process input and output data as well as launch interface commands.

Autodesk Composite QuickTime™ movie support

You can now select the QuickTime movie (.mov) file format as a **Render** output for your Composite projects. By default, QuickTime uses the H.264 codec. You can select resolutions up to 1080P.

What's New in Basics

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Node Editor

The **Node Editor** presents an editable schematic of the dependency graph, displaying nodes and the connections between their attributes. It allows you to view, modify and create new node connections. You can access the **Node Editor** from the **Windows** menu. (**Window > Node Editor**).

You can graph the network of nodes of your choice, and build networks by using the Tab key and dragging lines from one node to another. Using this method, you can easily edit existing networks. All attribute ports and connection lines are represented by different colors so that connections can be easily read. In addition, you can create bookmarks to return to previous graph layouts for easy navigation.

Attribute Editor updates

Now you can customize the **Attribute Editor** window in several different ways:

Custom Attribute Editor templates

You can edit the way attributes are displayed in the **Attribute Editor** by creating XML-based template files for specific nodes and node types.

A template can have one or more views associated with it. Each view describes a particular display layout and can be used to tailor the interface for different purposes. After applying your custom template, you can access your views from the **Show** menu in the **Attribute Editor**.

Custom callbacks

You can use MEL or Python based callbacks to link an attribute to a control or a complex script. Using the `<description language ="cb">` tag in your custom **Attribute Editor** template lets you specify a callback command and links your callback to an attribute.

Use node type filtering to improve Attribute Editor performance

When making a selection in Maya, having the **Attribute Editor** open may cause performance delays if too many nodes related to the selection are displayed as tabs. To avoid a slowdown, you can use node type filtering to customize which related nodes are displayed in the **Attribute Editor**.

Creating attributes using attribute patterns

You can create dynamic or extension attributes using attribute patterns. An attribute pattern is a description of the dynamic or extension attributes that can be added to any specific node, or node type. Using this feature, you no longer need to create each attribute using individual addAttr or addExtension commands.

This feature is supported by the `pyJsonAttrPatternFactory.py` plug-in.

Editing the file path in the file browser

You can now edit the file path in the **Look in** field of the file browser and use its auto completion functionality.

What's New in File Referencing

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File referencing options in the Outliner
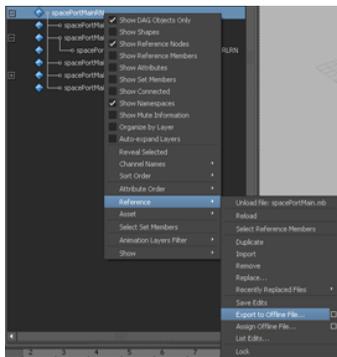
Reference node display

A new **Reference Node** display option in the **Outliner** makes it easier to locate and identify all the loaded and unloaded file references in your scene. You can access the option in the **Outliner** by selecting **Display > Reference Nodes**. The **Reference Nodes** display option is on by default.

Create and manage file references

New **Reference** menu items in the **Outliner** let you create and manage file references without opening the

Reference Editor. In the **Outliner**, -click a reference node or referenced object to access file referencing commands.

Allow Referenced Animation Curves to be Edited
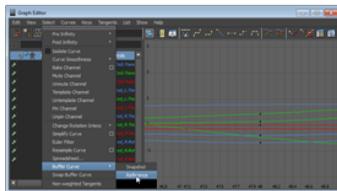
You can now edit animation curves from referenced files. These changes are managed by the reference node like other reference edits. You can modify an animation curve, such as changing tangent types or editing keyframes, then export the updates as reference edits to an offline file.

To edit animation curves in referenced files, you must turn on **Allow Referenced Animation Curves to be Edited** in the **Referenced Animation Curves** section of the **Animation Preferences**.

File referencing improvements

Maya 2013 includes a number of new file referencing features and options that improve file referencing workflows.

Updated reference node Attribute Editor

An updated reference node **Attribute Editor** displays information about reference nodes, such as file path, namespace, and sharing details.

Operations on multiple references

Using the file referencing options in the **Outliner**, you can now perform referencing operations on multiple references including the following:

■ Loading, unloading and reloading

■ Importing

■ Locking and unlocking

Preview unloaded content

A new **Preview unloaded content** option lets you view the hierarchy of the unloaded references in your scene without loading the reference in the scene.

Archiving unloaded references

An option has been added to scene archiving that lets you include files associated with unloaded references in the scene archive.

Namespace updates and improvements

Merge into selected namespace

A new **Merge into selected namespace** option lets you choose to merge referenced or imported object namespaces with a namespace that exists in the parent scene. When duplicate namespaces occur, the namespaces are merged and duplicate object names are incrementally suffixed with a number.

This new option lets you keep duplicate namespaces and avoids an accumulation of new namespaces each time your referenced or imported objects have the same name.

You can access the **Merge into selected namespace** option in the **Reference Options**, **Import Options**, and **Assign Offline File Options** windows.

New MEL Commands

Namespace MEL commands have been updated to allow easier manipulation of namespaces.

These new command updates include:

- The `namespaceInfo` command has several new flags for querying information about a namespace. New flags allow for namespace names to be returned in various formats: `baseName`, `absoluteName`, and `fullName`. The `isRootNamespace` flag determines whether the namespace is the root namespace.

- The `namespace` and `file` commands have new operations for namespace management: `mergeNamespaceWithParent` and `mergeNamespaceWithRoot`. The namespace command also has a new `collapseAncestor` option.

- For `referenceQuery`, the flags `-namespace` and `-parentNamespace` query the full namespace path of a referenced node, file, or its `parentNamespace`.

- The `ls` command has additional functionality related to namespaces. The `-showNamespace` flag returns object/namespace pairs. The `-absoluteName` flag can be used with `ls -showNamespace`, to return the absolute namespace names regardless of current namespace or relative namespace state. For example: `ls -showNamespace -absoluteName`.

- You can now rename and create nodes using absolute namespace paths. For example: `:ns1:ns2:mySphere`.

What's New in Animation

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Live character streaming

The options in the new **Live Connection** window (

 > **Edit > Live Connection** or **File > Send to MotionBuilder > Live Connection**) are an extension of the **Send to** commands that were introduced in Maya 2012. Now you can send your HumanIK defined character to MotionBuilder and establish a live streaming connection.

This new workflow lets you drive your skeleton or Custom rig with motion capture data, so you can previsualize your retargeting result before baking the final animation from MotionBuilder into your Maya scene.

NOTE **Suite** This feature is only available if Maya is used as part of the Autodesk Entertainment Creation Suites.

Improved import and export with ATOM file format
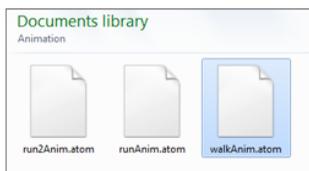
You can now share and reuse animation more efficiently using Maya's ATOM (Animation Transfer Object Model). The .atom file type and its associated import/export options let you save specific poses or animation sequences, then easily reload them onto other objects.

ATOM options let you set precisely which animation to reuse and how you want to import and export it. After exporting, you can import animation based on the character hierarchy, name matching, or using a template file as a filter.

NOTE The .anim file format, animImportExport.mll plug-in, and its related options remain available from the **File > Export Selection** and **File > Export All** menu items.

Nonlinear animation improvements

Clip matching

When manipulating clips of animation in the **Trax Editor**, new clip matching tools let you define an offset object to better align the movements in your animation sequence.

More easily set relative or absolute clip offsets

Updated clip **Offset** settings are now included in the Create Clip Options (**Animate > Create Clip** > ❑) and in the Trax Editor context-sensitive menu, letting you more easily view and set whether channels have an absolute or relative offset from the previous clip. See also Offset clip channels.

NOTE **Absolute** is now the default **Offset** option for new clips and imported clips.

Other updates

The **Rotation Blend** setting in the **Blend Clip Options** (**Create > Blend** > ❑) has been updated with simpler **Euler** and **Quaternion** options. **Quaternion** is now the default **Rotation Blend** setting when you create a blend between animation clips. See Trax menu bar for updated information.

Retime animation
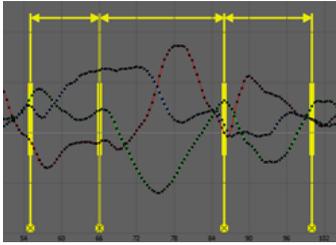
In the **Graph Editor**, the **Retime Tool** lets you directly adjust the timing of key movements in your animations. This tool provides a new type of timing manipulator in the graph view, letting you shift key moments in time, or warp entire sequences to make them occur faster or slower.

For animators working in a pipeline with multiple Autodesk applications, similar animation retiming tools are available in 3ds Max, Softimage, and Motion-Builder.

Converting CAT to HumanIK
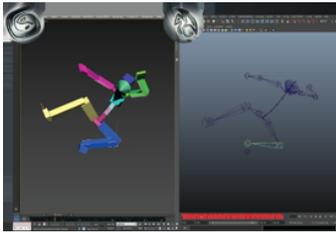
The new **Send to** commands in Maya and 3ds Max let you convert a CAT bipedal character into a Maya compatible HumanIK character. This direct connection lets you transfer your character structure, definition, and animation from 3ds Max into an FK representation on a HumanIK skeleton in Maya. Any changes or new animation that you create in Maya can be updated on your original CAT character, so you can continue to animate in the context of your 3ds Max scene.

NOTE **Suite** This feature is only available if Maya is used as part of the Autodesk Entertainment Creation Suites.

Other Graph Editor updates
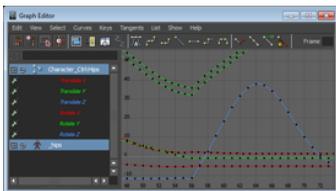
- Updated **Buffer Curve** options Graph Editor Curves menu now let you create a snapshot of referenced curves. See Edit animation curves in referenced files.
- The **Add Key Tool** (originally available in the **Graph Editor** toolbar) is now only available from the **Keys** menu. The original **Add Key** icon now represents the Insert Keys Tool. See also Add keys to a curve.

■ View framing options (**Frame All**, **Frame Selection**, **Frame Playback Range**) are now grouped in a **View > Frame** menu.

Stepped Tangent preview mode

The new **Stepped Tangent** preview playback mode lets you temporarily set all keys to display with Stepped tangents, switching easily from Spline to Stepped and back. Play your animation in this mode to get a quick view of object positions as they hit each keyframe.

To turn the playback mode on and off, right-click the **Time Slider** and toggle the **Enable Stepped Preview** option.

NOTE The original tangents are preserved and restored when you turn **Enable Stepped Preview** off.

Keyframe and Tangent marking menu updates

The marking menus available for editing keyframes and tangents have been updated to allow manipulation of motion trails, keys, and tangents directly in the scene view. To access the updated marking menus, press Shift + S + , then select the **Keys** or **Tangents** menu for more options. For example, the **Keys** menu contains options to let you copy and paste keys on a motion trail, while the **Tangents** menu lets you quickly change the tangent type for a selected key.

NOTE The **Tangents** menu available from Shift + S + replaces the former Shift + S + marking menu.

Camera Sequencer improvements

You can now create an ubercam for camera shots that are keyed with weighted curves. In addition, sequences with gaps between camera shots are now handled correctly. See Create a single camera for all shots in a sequence.

Improved baking options

New options in the **Character ControlsBake** menu let you bake animation to a HumanIK skeleton, Control rig, or Custom rig. The **Bake** menu updates dynamically to display options that reflect the current character's state.

New Playblast features

Maya now supports H.264 Quicktime output on Windows 64-bit. In addition, audio and multi-track audio are supported.

What's New in Rigging

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Updates to the character setup tools
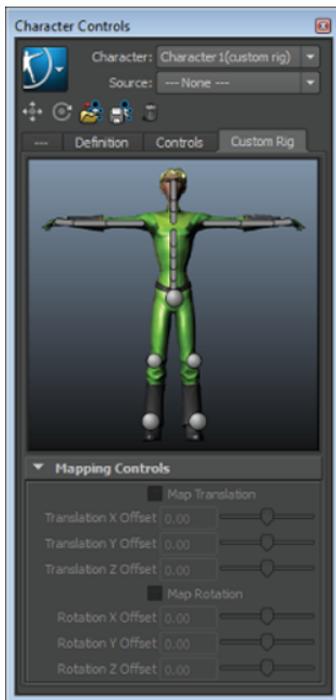
Unified Character Controls

The new Character Controls let you perform multiple character setup tasks in a single window.

As you set up your character, the previously independent HumanIK tools appear as tabs in the consolidated **Character Controls**, simplifying the character set up process.

The **Skeleton**, **Definition**, **Controls**, and **Custom Rig** tabs appear as you select options from the **Start pane**, **Source menu**, or **Character Controls menu button**.

Start pane

Begin the character setup process using the Start pane in the **Character Controls** window. Whether you are creating a new HumanIK skeleton from scratch, defining an existing skeleton, or adding a Control rig or Custom rig mapping to your character, this pane is designed to guide you through the setup process.

Source management

The new Source menu provides feedback about the type of source driving your character. The **Source** menu is available in the **Character Controls** window at all times, regardless of the HumanIK tool that is active.

This menu updates dynamically as you work to reflect changes to the character state. You can also set your character's source type by manually selecting an option from the drop-down menu.

Custom Rig Mapping

The new Custom Rig tool gives you a visual interface for mapping your non-HumanIK rigs.

Designed to streamline the mapping and retargeting process, this tool lets you map and retarget bipedal HumanIK character animation to and from a Custom rigged character. You can define your rig using the familiar click-and-assign workflow.

Other controls let you save and load mapping templates and adjust the offsets between a Custom rig and the character's skeleton joints.

Customizable character layout

You can now customize the character layout in the **Character Controls** to fit your character.

The layouts for the **Controls** and **Custom Rig** tabs are available as user-editable XML files, located in the new `CharacterControls` directory. Editing these files lets you create custom layouts. For example, you can replace the background image or change the position, quantity, color, and size of cells.

Heat Map binding
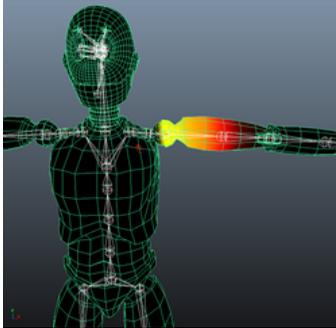
In the **Smooth Bind Options** window, the **Bind Method** options now include a **Heat Map** method.

This method uses a heat diffusion technique to distribute weights, and generally gives better default results than the existing **Closest Hierarchy** and **Closest Distance** binding methods.

Heat Map binding sets initial weights based on each influence object inside the mesh acting as a heat source, emitting weight values onto the surrounding mesh. Higher (hotter) weight values occur closest to the object, and dissipate to lower (cooler) values as you move away from the object.

Paint weights for nonlinear deformers
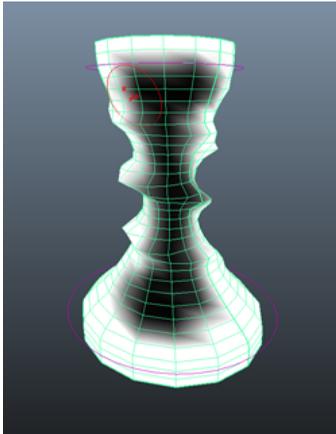
You can now paint weights for the Bend, Flare, Sine, Squash, Twist, and Wave deformers. Select the new **Edit Deformer > Paint Nonlinear Weights Tool** menu item to use a Maya Artisan brush and paint point weights on your deformed geometry.

Improved controls for roll bone behavior
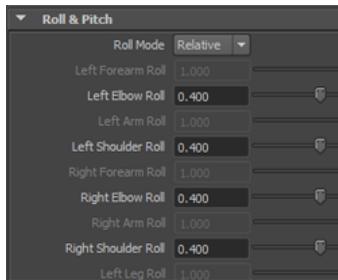
Updated **Roll** properties for the HumanIK skeleton definition are now available in the **Attribute Editor** to give you improved control over roll bone behavior as you rotate character limbs. See Define roll bone behavior.

Improved Control Rig manipulation
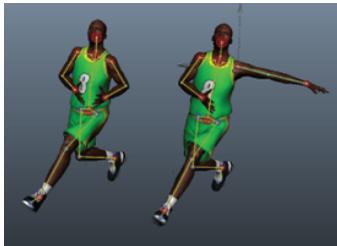
Stance pose on body parts

Now you can force a stance pose (> **Edit > Controls > Stance Pose**) on selected body parts. This functionality is useful during pose-to-pose character animation when only specific body parts need to be reset to create a new pose.

Continuous rig align

When manipulating your character in **Full Body** or **Body Part** mode, the IK and FK effectors of your character's Control rig now appear synchronized. By default, the IK and FK solutions visually merge to show the final solving of the character's skeleton.

This feature replaces the **Align Rig After Time Change** option.

Move Weights improvements

When moving weights (using the Move Weights button in the **Paint Skin Weights Tool** or **Skin > Edit Smooth Skin > Move Weights To Influences**), the first selected influence now acts as the source influence and all other selected influences act as targets.

If an influence is locked in the **Paint Skin Weights Tool**, it will not receive weights when you move weights from neighboring influences.

What's New in Modeling

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Extrude tool improvements

The following improvements have been made to the extrude tool. Select **Edit Mesh > Extrude** for the tool.

- Allows for more precision with the **Thickness**, **Offset** and **Divisions** values.
    - Uses the same precision settings as the **Channel Box**. Select **Edit > Settings > Change Precision** to set.

- Sliders have been removed so you are no longer limited to a maximum or minimum value.

- Background color added for improved readability.

- Respects the use of Ctrl and Shift to adjust the speed of changing the values.

Sculpt Geometry Tool improvements

The following improvements have been made to the Sculpt Geometry Tool (**Edit NURBS > Sculpt Geometry Tool > ▢** or **Mesh > Sculpt Geometry Tool > ▢**).

- The new **Brush strength** slider lets you achieve more pronounced pinching while sculpting your NURBS and polygon surfaces.
- The **Pinch** brush algorithm has been improved to provide smoother results.

What's New in Dynamics and nDynamics

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nHair

Head geometry courtesy of Hiroki Kawasaki

The nHair hair generation system has been added to the Nucleus dynamic simulation framework. As part of a Nucleus system, dynamic nHair curves can self-collide and interact with other Nucleus objects, including nParticle, nCloth, and passive collision objects.

nHair has many advantages over the previous hair system including:

- Performance improvements especially for hair systems with a large number of follicles.

- Nucleus-based solving for collisions and self-collisions that provide better collision accuracy and control.

- nConstraints that let you create constraints between Nucleus object components.

- nCaching for saving and playing back hair simulations.

You can create and modify nHair systems from the **nHair** menu located in the **nDynamics** menu set.

MayaBullet physics simulation plug-in
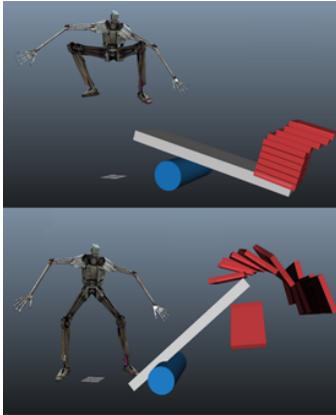
Maya now includes the MayaBullet physics simulation plug-in. Built from the Bullet physics library, the plug-in lets you use the Bullet physics engine to create large-scale, highly-realistic dynamic and kinematic simulations. MayaBullet simulations can include interacting soft body and rigid body objects, as well as constrained collision objects, all contained in a single dynamic system within Maya.

MayaBullet automatically installs with Maya on Windows 64-bit, Mac OS, and Linux systems. MayaBullet is not available for Windows 32-bit systems.

For documentation on MayaBullet, see *http://www.autodesk.com/mayabullet-docs*.

Fluid nCaching improvements

The **Create Fluid Cache Options** window now includes a **One file per geometry** option, which lets you can select multiple fluid objects in your scene and create individual fluid nCache files for each object.

nParticle

A new **Post Cache Ramp Evaluation** attribute lets you determine how ramp attribute data is evaluated. When on, the ramp output is re-evaluated using the cached input attribute rather than the cached data. This attribute is off by default.

Particle count heads-up display

A new **Particle Count** heads-up display option lets you display the total number of particles and the number of selected particles (including nParticles and classic particles).

To turn on **Particle Count**, select **Display > Heads Up Display > Particle Count**.

What's New in Rendering and Render Setup

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New Viewport 2.0 features

Viewport 2.0 now supports animation and rigging features such as HumanIK, joints, motion paths, ghosting and playblast. Image plane support is also included as well as a new depth peeling transparency algorithm. In addition, support for several other shaders and tools, and polygons, NURBS and dynamics features have been added.

Furthermore, Viewport 2.0 now includes widespread improvements in tumble performance of large scenes and in animation performance with large or complicated scenes.

New render passes added
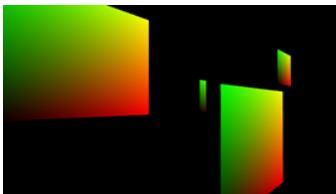
Two new multi-render passes have been added: UV pass and world position pass.

A UV pass converts UV values to R/G values and creates a rasterized version of UV space. Using a UV pass, you can replace textures in 3D renderings as a post-process without the need to track new textures in place.

A world position pass converts position (x,y,z) values to R,G,B values. Use the world position pass for relighting workflows in compositing.

NOTE You must save to the openEXR file format when rendering the UV pass and world position pass.

Mandelbrot 2D and 3D textures
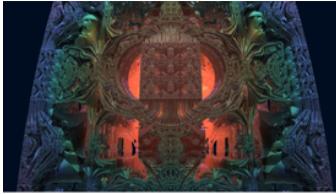
Image created by Duncan Brinsmead

The new Mandelbrot node allows you to texture your model with the Mandelbrot set. You can create a 2D version of this node (Mandelbrot), a 3D version of this node (Mandelbrot 3D), or shade a fluidShape node using the built-in Mandelbrot texture.

The Mandelbrot set is a set of mathematical points in the complex plane, the boundary of which is an interesting fractal shape. Through this node, you can select the Mandelbrot Set, the Julia set, the Mandelbox set and other hybrid evaluations. Using this node, you can add interesting effects to your Mandelbrot set fractal, such as circles, leaves, points, checker patterns, and Pickover stalks.

Choose among different shading methods and customize the range of the color values used to represent your Mandelbrot set points.

New substance textures and functionality

You can now automatically bake a substance texture to disk to render it with mental ray for Maya, IPR, or other 3rd party renderers.

The following new substance textures have also been added:

- Clouds_2_Animated
- Impact_01
- Make_It_Tile
- metal_plate_009
- Plasma_Animated
- Space_Ship
- Sunshine
- Water_Drips
- Waves
- Windscreen_Glass_01

In particular, the new Make_It_Tile substance texture allows you to easily and seamlessly tile a file texture.

New callbacks command added

The new `callbacks` command allows you to extend the Maya UI with your own components. Use this command to add your own callbacks to standard Maya hooks without the need to overwrite Maya MEL files. Currently, Maya hooks are provided for the **Hypershade**, the **Create Render Node** dialog, and **Attribute Editor** templates.

See the `callbacks` command documentation for more information about this command.

Free image planes

You can now create a free image plane. A free image plane is an image plane that is not attached to the camera; one that you can select and transform in your scene. Select **Create > Free Image Plane** to create one.

mental ray rendering support for GPU cached Alembic files

mental ray supports the rendering of GPU cached Alembic files, including baked diffuse color information if the GPU cache was used to create the Alembic file.

New mental ray BSDF shaders

Built in BSDF (bidirectional scattering distribution function) shaders from NVIDIA mental images are now exposed in Maya. You can find them by selecting **Window > Rendering Editors > Hypershade > mental ray > Materials**. For more information about these shaders, please see the *mental ray shader documentation*.

mental ray version 3.10

Maya now uses mental ray version 3.10.

What's New in Document- ation

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Improved search in the Maya Help
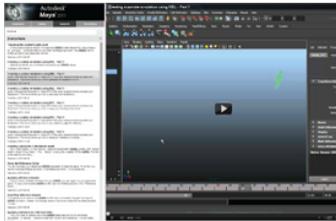
The Maya Help now includes an improved search that queries a wider variety of sources with greater efficiency than ever before.

Matches from the Maya Help documentation and other websites, like the Autodesk YouTube channels and forums, are included in your search results. Each match includes an excerpt of text, the name of its source, and the date it was last updated, so you can quickly navigate your results.

NOTE If you search with the locally installed Help, you do not get results from online sources.

Updated Navigation Buttons

Clicking the new **Share** button lets you send a link to the currently viewed topic. This button launches your default email application and places the link in the body of a new email message.

What's New in MEL and Python

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New commands

The following commands have been added:

- **applyAttrPattern**
- **baseTemplate**
- **baseView**
- **callbacks**
- **clipMatching**
- **createAttrPatterns**
- **deleteAttrPattern**
- **getModulePath**
- **imagePlane**
- **listAttrPatterns**
- **maxfloat**
- **maxint**
- **minfloat**
- **minint**
- **nodeEditor**
- **retimeKeyCtx**
- **saveViewportSettings**
- **stringArrayRemove**
- **suitePrefs**
- **timeWarp**

Obsolete commands

The following command has been removed:

■ projFileViewer

Changed commands

The following commands have been changed:

Command	Changes
about	Flag added: installedVersion
	Flag added: liveUpdate
	Flag added: preferences
animDisplay	Flag added: refAnimCurvesEditable
artPuttyCtx	Flag added: brushStrength
attrCompatibility	Flag added: pluginNode
attributeQuery	Flag added: affectsAppearance
	Flag added: affectsWorldspace
	Flag added: attributeType
	Flag added: cachedInternally
	Flag added: categories
	Flag added: channelBox
	Flag added: indeterminant
	Flag added: renderSource
	Flag added: usedAsFilename
	Flag added: usesMultiBuilder
	Flag added: worldspace
bakeResults	Argument type changed for minimizeRotation from "string" to "boolean"
bakeSimulation	Argument type changed for minimizeRotation from "string" to "boolean"
bufferCurve	Flag added: query
	Flag added: useReferencedCurve

Command	Changes
character	Flag added: addOffsetObject
	Flag added: removeOffsetObject
clip	Flag added: rotationOffset
	Flag added: translationOffset
cmdScrollFieldEx-ecuter	Flag added: autoCloseBraces
confirmDialog	Flag added: annotation
containerTem-plate	Flag added: allKeyable
	Flag added: attribute
	Flag added: fromSelection
	Flag added: useHierarchy
convertSolidTx	Flag added: pixelFormat
copyKey	Flag added: animLayer
curve	Flag added: bezier
dgInfo	Flag added: size
editorTemplate	Flag added: queryName
	Flag added: removeControl
exportEdits	Flag added: includeConstraints
	Flag added: includeSetDrivenKeys
file	Flag added: add
	Flag added: loadReferencePreview
	Flag added: mergeNamespaceWithParent
	Flag added: mergeNamespaceWithRoot
	Flag added: preview
floatFieldGrp	Flag added: step

Command	Changes
keyingGroup	Flag added: minimizeRotation
ls	Flag added: absoluteName
	Flag added: excludeType
	Flag added: modified
	Flag added: showNamespace
menuItem	Flag added: optionBoxIcon
modelEditor	Flag added: clipGhosts
	Flag added: imagePlane
	Flag added: motionTrails
movieInfo	Flag added: counter
	Flag added: dropFrame
	Flag added: frameDuration
	Flag added: movieTexture
	Flag added: negTimesOK
	Flag added: numFrames
	Flag added: quickTime
	Flag added: timeCode
	Flag added: timeCodeTrack
	Flag added: timeScale
	Flag added: twentyFourHourMax
namespace	Flag added: deleteNamespaceContent
	Flag added: mergeNamespaceWithParent
	Flag added: mergeNamespaceWithRoot
namespaceInfo	Flag added: baseName
	Flag added: fullName
ogs	Flag added: rebakeTextures
outlinerEditor	Flag added: showReferenceMembers
	Flag added: showReferenceNodes
pasteKey	Flag added: animLayer

Command	Changes
	Flag added: matchByName
playbackOptions	Flag added: blockingAnim
polyListCompon-entConversion	Flag added: vertexFaceAllEdges
radioButtonGrp	Flag added: annotation1 Flag added: annotation2 Flag added: annotation3 Flag added: annotation4 Flag added: labelAnnotation
referenceQuery	Flag added: isPreviewOnly Flag added: namespace
relationship	Flag added: relationshipData
scriptTable	Flag added: cellBackgroundColorCommand Flag added: cellForegroundColorCommand Flag added: cellIndex Flag added: cellValue Flag added: editable Flag added: excludingHeaders Flag added: multiEditEnabled Flag added: rowHeight Flag added: selectedCells Flag added: selectedColumns Flag added: selectedRows Flag added: selectionBehavior Flag added: selectionMode Flag added: useDoubleClickEdit
selectPriority	Flag added: byName
selectType	Flag added: byName
setAttr	Flag added: capacityHint

Command	Changes
shot	Flag added: createCustomAnim
	Flag added: customAnim
	Flag added: deleteCustomAnim
	Flag added: flag10
	Flag added: flag11
	Flag added: flag12
	Flag added: flag1
	Flag added: flag2
	Flag added: flag3
	Flag added: flag4
	Flag added: flag5
	Flag added: flag6
	Flag added: flag7
	Flag added: flag8
	Flag added: flag9
	Flag added: hasCameraSet
	Flag added: hasStereoCamera
	Flag added: transitionInLength
	Flag added: transitionInType
	Flag added: transitionOutLength
	Flag added: transitionOutType
skinCluster	Flag added: bindMethod
	Flag added: heatmapFalloff
stereoCameraView	Flag added: cameraSet
	Flag added: imagePlane
	Flag added: motionTrails
textFieldButton-Grp	Flag added: textChangedCommand
textFieldGrp	Flag added: textChangedCommand
treeView	Flag added: buttonErase
	Flag added: ignoreButtonClick

What's New in API

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imagePlane node changes

The imagePlane node, which was previously a dependency node, is now a shape node (in other words, a DAG node). This may require changes to your scripts and plug-ins.

If you have been using MFnDependencyNode to create imagePlane nodes, you must change your code to use MFnDagNode instead. Similarly, if you were using MDGModifier to create or delete imagePlane nodes, then you must use MDagModifier instead.

Scripts and plug-ins which delete imagePlane nodes may now have to do additional work to clean up the parent transforms.

In addition, to avoid conflicts with some of the standard DAG node attributes, the following imagePlane attributes have been renamed:

previous name	new name
center (c)	imageCenter (ic)
centerX (cx)	imageCenterX (icx)
centerY (cy)	imageCenterY (icy)
centerZ (cz)	imageCenterZ (icz)

Scripts and plug-ins that refer to the child attributes by their previous names no longer work.

Scripts and plug-ins that refer to the parent attribute by its previous name (center) appear to work but now return the center of the node's bounding box, and not the center of the image plane, which may be different.

Module support for plug-ins

You can now easily create a distributable deployment of your plug-in. The site administrator can setup a plug-in as a folder on a network, along with a module description file. Each user's machine should point to the module description file through the MAYA_MODULE_PATH environment variable. This way, making changes to the plug-in is simple even across multiple Maya versions and platforms.

Multiple versions of a plug-in are now supported, where the version used is determined by a combination of the current operating system, the version of Maya, and the language setting (locale). The details of the new module file syntax are outlined in the following section.