



What's New in Turtle 5?

General

Maya 2009 and 2010

Turtle now supports Maya 2009 and 2010.

User Interface

Render Settings Window

The Render Settings Window has been redesigned with a new separation of settings into different classes. The classes are:

- Sampling - Options for Anti-Aliasing, Ray Tracing and Motion Blur
- Global Illumination – All options associated with Global Illumination and Caustics
- Environment – All options associated with Environment and Image Based Lighting
- Options – Various options for Rendering Performance and Overrides
- Baking – The bake layer control with all options associated with baking

This makes it easier to find the option you want to change.

New Turtle Attribute Workflow

The handling of Turtle specific attributes has been redesigned completely. You will now add Turtle specific options to your Maya nodes only when you need them. This prevents Turtle from polluting your scene with Turtle specific attributes everywhere. It also reduces the scene file size and memory usage a lot.

There is support for adding, removing or changing the Turtle options on multiple nodes at once.

Render Type Selection

The Render Type selection box has been moved to the top of the render settings window for easier access. You now only choose between Rendering and Baking. The type of baking to do is now specified in each bake layer, see Baking below.



Unified Anti-Aliasing Controls

The anti-aliasing user interface has been unified for Super Sampling and the new Adaptive Sampling. The sampling density is set with a Min/Max Sample Rate control, where the exact number of samples to take is displayed below the control.

Rendering

New Adaptive Sampling

A new anti-aliasing scheme, *Adaptive Sampling*, has been implemented which supports adaptive oversampling as well as undersampling. The sampling scheme can go from every 256th pixel up to 256 samples per pixel. So this scheme can be used to render superfast previews as well as very high quality images.

3D Motion Blur and Depth of Field

The sampling scheme for 3D Motion Blur and 3D Depth of Field has been improved. You now get better quality with the same number of rays.

Ray Traced Soft Shadows

A new sampling scheme for ray traced soft shadows has been added. It gives better quality with the same number of rays and works adaptively for increased performance.

Geometry Instances

Geometry instances are now fully supported.

Improved Real-time Viewport Visualization

The hardware shader *ilrHwBakeVisualizer* now supports multiple UV-sets. It also supports floating point textures. A single hardware shader can now be shared between multiple geometry instances.



Global Illumination

New Final Gather Algorithm

The algorithm for Final Gather has been redesigned. The new method uses a progressive scheme where new samples are added based on contrast difference to neighboring samples. The new method is much better at handling sharp edges in the illumination and it is better at eliminating artifacts due to geometric discontinuities where the old method often failed. Also the calculation of incident lighting in final gathering is more intelligent and adaptive, which reduces the amount of noise with the same number of gathering rays. The old FG method can still be used if needed by enabling the *Legacy* checkbox.

Final Gather Attenuation

A new feature for attenuating FG rays has been added. Two type of attenuation is supported; *Falloff Attenuation*, where the light is decreased with distance, and *Occlusion Attenuation*, where the light is decreased for shorter rays, which enhances the occlusion and shadowing effect of final gather. Occlusion Attenuation is very useful for giving more contrast and depth to the lighting, especially if multi-bounce Global Illumination is used, where the result can look flat and washed out in areas of strong illumination.

Blending ambient occlusion in Final Gather

Ambient occlusion can now be blended directly in final gathering, resulting in only one render pass needed at no extra cost. The ambient occlusion can be controlled in the final gathering settings. New controls for ambient occlusion have also been added and it's now much easier to adjust the contrast and boost the shadowing effects.

Radiance Cache unified with Final Gather

The Radiance Cache light integrator has been integrated into Final Gather. In the Final Gather settings you can now choose what cache type to use. If you select *RadianceSH* a Radiance Cache will be used.

New Final Gather Mode

Final Gather has a new mode for brute force sampling. This is enabled by choosing *None* when selecting *Cache Type*. In this mode a new hemisphere sampling is performed for every shading point, which gives a very exact result. The render time is often long so it's mostly suitable for rendering reference images.



New Monte Carlo Global Illumination

There is a new light integrator called Monte Carlo. It's very similar to the brute force FG method but handles secondary bounces more efficiently, so a high number of bounces can be used without exponentially increasing the render time. This integrator can also be used as Secondary GI.

Cache Direct Light

Final Gather, Path Tracer and Photon Mapping have a new checkbox for *Cache Direct Light*. When enabled they will cache both indirect light and direct light from the light sources. This increases performance since fewer direct shading calculations are needed. This is an approximation so it can affect the quality of the result. For instance indirect lighting from specular highlights might be lost. Previously a similar method was used when selecting *Approximate* GI shading method. But now this can be controlled per integrator instead. Note that caching direct light is only valid when using Path Tracer and Photon Map as secondary integrators or when multi-bounce Final Gather is used.

New Method for Light Leak Problems

To eliminate light leak problems new functionality for checking visibility between cached sample points has been added. This makes sure that samples from different sides of geometry are not used together, causing light leakage. This is added to both Final Gather and Path Tracer. By enabling *Check Sample Visibility* all light leakage is removed. It comes with a small performance hit so make sure you use this only when you need to.

Improved Color Balance

The color balance system for Global Illumination has been unified and now supports color balance to every output, including Spherical Harmonics and RNM. Color balance now affects Global Illumination caches, previously it was just a post process. The Intensity and Saturation controls have been modified so that primary now affects the first bounce and secondary all other bounces, independent of what Global Illumination methods are selected. So for example if you use multi-bounce Final Gather you can now adjust the contribution from the first and the secondary bounces separately.

The override controls for *Intensity* and *Saturation* has been moved from the shapes in Maya and is now located on each shader instead. The shader local values are multiplied by the global values.

New color balance controls have been added. You can now modify the diffuse, specular and emissive contributions independently for Global Illumination. These controls are available both globally and locally on each material shader.



New Prepasses

The precalculation pass for Final Gather and Occlusion is now progressive and runs in a number of passes, each pass with a higher detail level. Under Anti-Aliasing -> Prepass you can set the min and max sample rate which controls the number of passes that will be rendered. Another difference is that the visualization of the prepass now shows the indirect lighting, instead of the full shaded result. This increases performance and gives a better visualization of the indirect lighting.

The Path Tracer prepass has also been modified to show the indirect lighting. It now shows a direct visualization of the path tracer cache, instead of the noisy path tracer solution.

GI Transparency Depth

A new control, *GI Transparency Depth*, has been added for limiting the number of transmissions a Global Illumination ray can do. This will affect rays spawned by Final Gather, Monte Carlo and Occlusion sampling.

Performance Improvements

Major performance improvement has been done with multi-bounce Final Gather. Previously there was a massive performance hit when using FG Depth higher than 1. But that has now been optimized.

Overall performance of global illumination has been improved and it now scales better on multi-core systems.

Baking

Workflow

The workflow for Surface Transfer and Texture/Vertex Baking has been united into a single Baking workflow. When adding objects to a bake layer you now specify if the object has any source surfaces (for Surface Transfer). An object without source surfaces will be baked with ordinary baking. So you can now mix Surface Transfer with ordinary Texture Baking as you like, in the same bake layer. The same thing goes for Vertex Baking, which also means that you can now do Surface Transfer on vertex level. This is useful e.g. for baking vertex colors for different LOD levels of a mesh. For each bake layer you specify if it should use vertex or texture baking.

Vertex Baking to File

Vertex Bakings can now save the result to point cloud files. This makes it possible to distribute vertex bakings. The resulting point clouds with vertex colors can then be imported back into Maya using a new MEL command `ilrImportVertexColorsCmd`.



New Vertex Bake Sampling

We have a new sampling system for Vertex Baking, where each vertex color is the result of multiple samples taken over its triangles. This gives much better quality and a softer result.

Conservative Rasterization

New *Conservative Rasterization* has been added to texture baking, for better handling of very small or thin triangles.

Transparency with LUA

Rays spawned by LUA baking scripts now handles transparency correctly. So you can now bake SH or other advanced baking passes in LUA and get correct illumination from transparent objects. This also works for LUA occlusion baking. In the case of occlusion the option *gather.obeytransparency* can be set to turn this feature on/off.

Performance Improvements

Vertex color filtering has been multi-threaded and can now utilize multiple CPUs.

Writing of baked vertex colors back into Maya meshes has been optimized and is much faster.