



MAXWELL RENDER

Maxwell Render plugin for 3DS MAX

Plugin Manual



Maxwell Render for 3DStudioMAX :: Plug-in Help

The Maxwell Render for 3DStudio plugin has been created with the intention of providing an optimum integration of Maxwell Render.

The 3DStudio versions supported by the plugin are:

3DStudio MAX 7.0, 8.0 , 9, 2008, 2009, 2010 and Viz/Desing 2006, 2007, 2009 and 2010 for Windows 32 and 64 bits.

The Maxwell Render versions supported by the plugin are:

Maxwell Render 2.0

Latest revision of this document: Sep – 2009

Here you will find an assortment of topics relating to the actual use of the plugin, as well as descriptions of the parameters and interfaces which it exposes.

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Installation

The installation of 3DStudio plugin is a very easy and straightforward process.

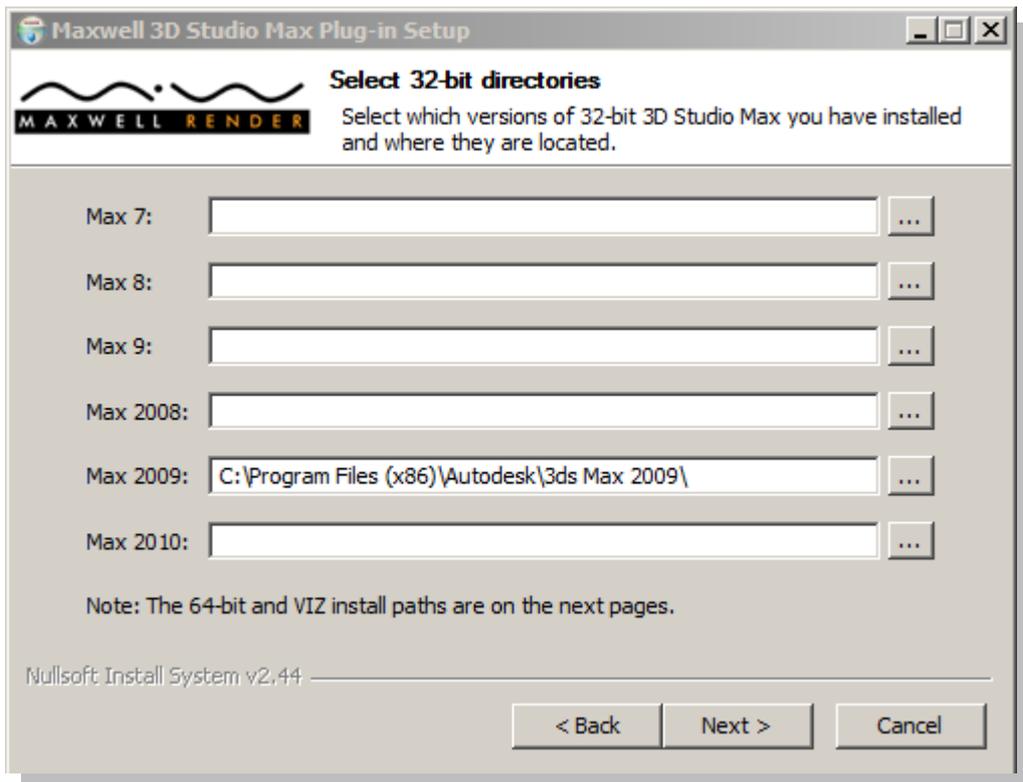
Installation on Windows

Once you download and decompress the zip file, you have to double click on the exe file. This will lead you to the plugin installation program and a new window will appear, as shown in the figure below.

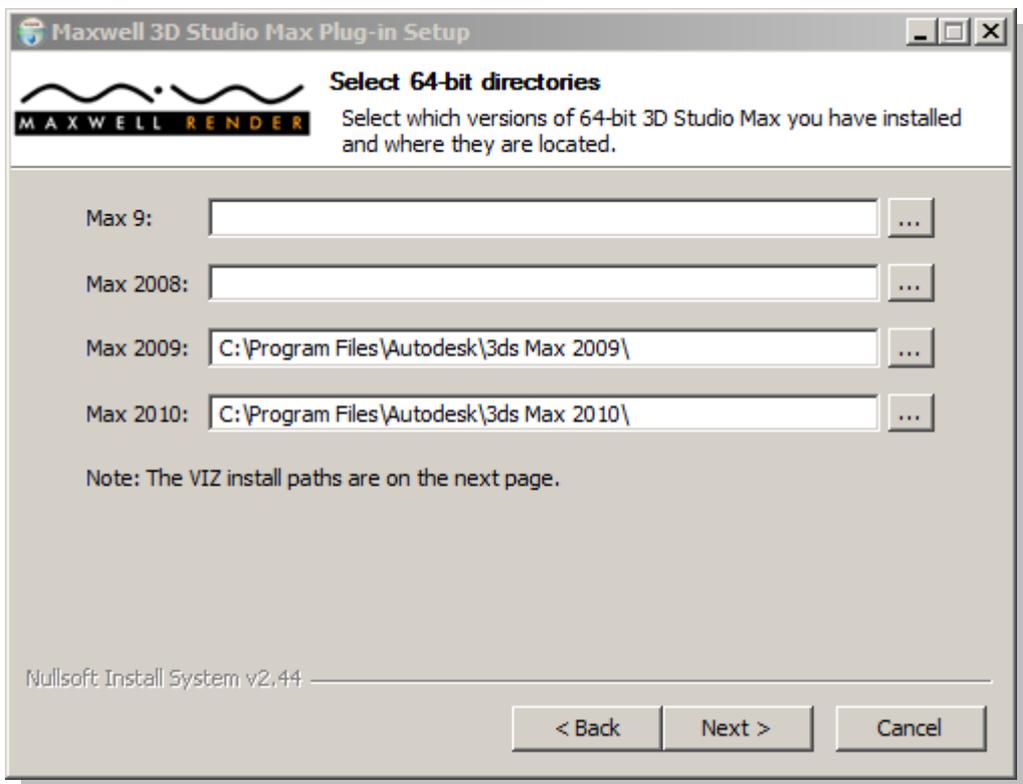


Click on *Next* and the installation program will automatically choose the path where 3DStudio MAX is installed, detecting the installed version as well.

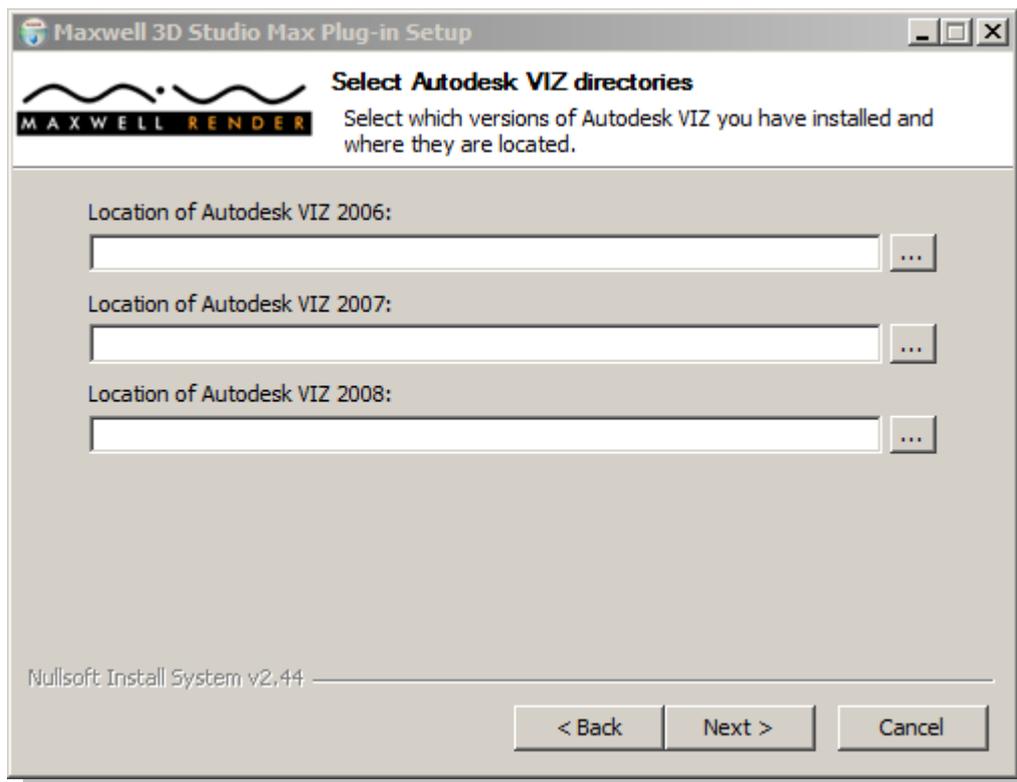
By clicking *Next* button the installation progress continue and lets you choose which features of Maxwell Render 3DStudio MAX plug-in you want to install.



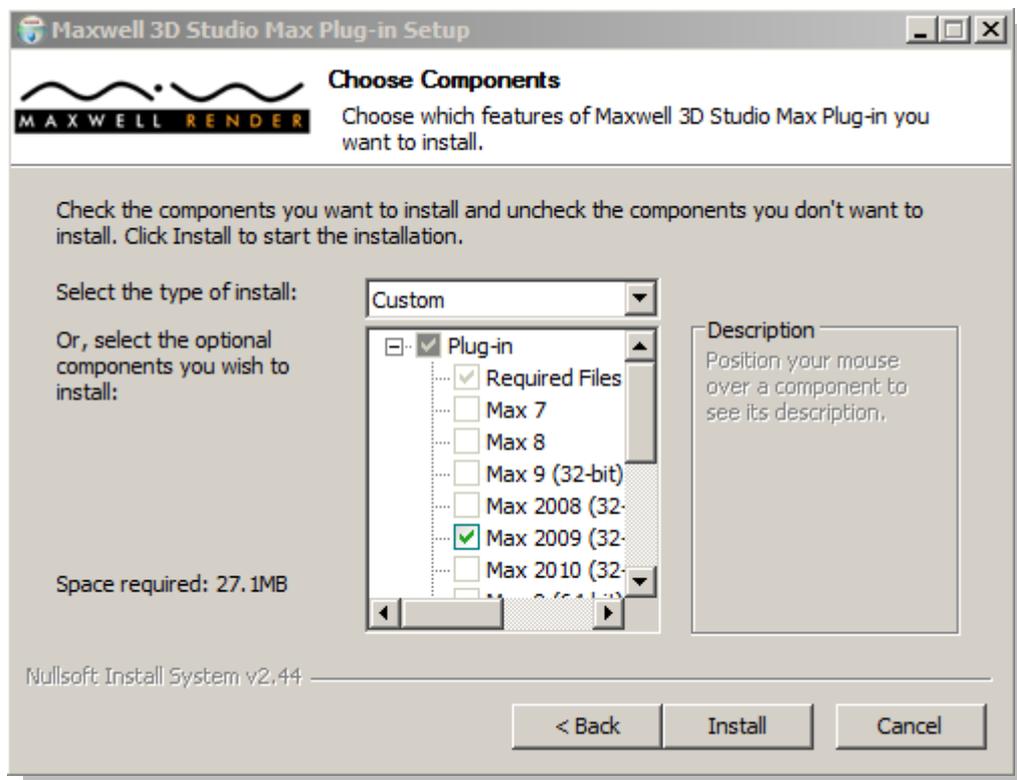
Install the 32 bits version for 3dStudio Max



Install the 64 bits version for 3dStudio Max



Complete the Maxwell Render 3DStudio MAX plug-in installation by clicking *Next* button.



User Interface Help

The user interface for the Maxwell Render for 3DSutio MAX plugin consists of several panels and buttons:

- Maxwell Render Camera Properties
- Maxwell Render Object Properties
- Maxwell Render options
- Maxwell Render Plug-in Options
- Maxwell Render Material
 - How to illuminate in Maxwell Render with 3DStudio Max
- Maxwell Render Export

These tools are located in the *Rendering* menu (F10), in *common* tab under *Assign Rendering* group, except Maxwell Render Material that is located under in the Material Editor.

The plugin has been designed to offer a comfortable workflow for 3DSTUDIO MAX users, including panels that follow the logical way to work with Maxwell Render (environment, camera, materials...).

Scene Settings

Every aspect of the scene is addressed in a different panel for each object or panel's options.

- Camera Settings : settings related to the current Camera
- Date & Time Settings : settings related to the current date and time
- Location Settings : settings related to the current Scene location
- Environment Settings : settings related to the current environment settings (Physical Sky, Sky Dome, etc.)
- Output Settings : settings related to the rendered output (MXS output file, image output file, etc.)
- Render Settings : settings related to the rendering process (sampling level, render time, etc.)
- Render Channels : settings determining which channels will be rendered (Alpha, Shadow, Z-Buffer, etc.)
- Plug-in Options : plugin user-preferences

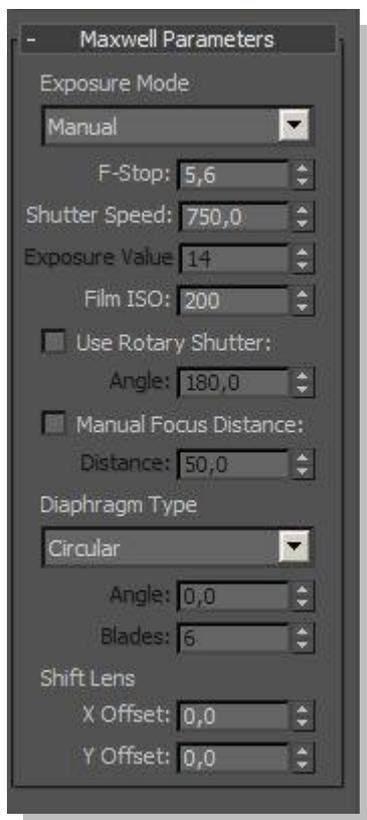
Maxwell Render Camera Properties

How Cameras Work

Maxwell Render uses a camera model that differs from 3DStudio Max camera model. Maxwell Render simulates a real camera with the associated lens set, diaphragm, etc. In this sense, Maxwell camera has got specific parameters that are reached through the plugin, however there is still some information from the 3DStudio Max camera model that is useful to fully define the way the camera will behave in Maxwell Render.

Camera properties

Maxwell Render Camera Properties panel will appear when a camera is selected in the control panel Maxwell Render Parameters tab and the Maxwell Render is selected to render.



Maxwell Render camera parameters

- **Exposure Mode:** Indicates what method will be used to Exposure mode, Manual, Shutter Priority or Aperture Priority. Depending of which method we choose others options below will be activated or deactivated.
- **F-Stop:** Controls the aperture of the lens.
- **Shutter Speed:** specified 1/n of a second.
- **Exposure Value:** Exposure value for the camera.

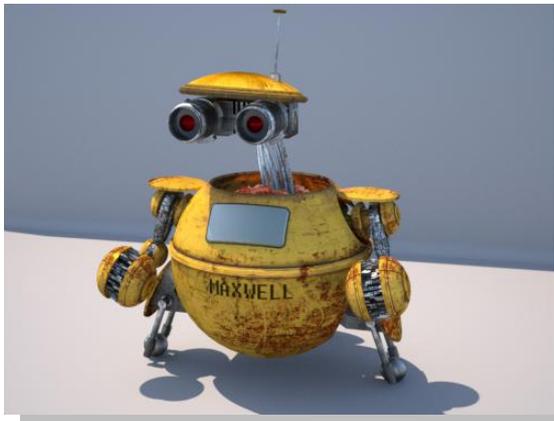
- **Film ISO:** the film's light- sensitivity, higher ISO is more sensitive
- **Use Rotary Shutter:** Angle rotation for shutter parameter off/on

Angle: Angle of the rotation of the rotary shutter

- **Manual Focus Distance:** Indicates the focus distance manually. By default all objects are in focus if manual focus distances are unchecked.

Distance: Amount of focus distance applied.

- **Diaphragm Type:** Controls the shape of the 'bokeh' effect seen in out-of-focus highlights (circular or polygonal).
- **Diaphragm Angle:** The angle of blades in 'Polygonal' cameras
- **Diaphragm Type:** The number of blades of 'Polygonal' cameras
- **Shift Lens:** Indicates a shift for the lens



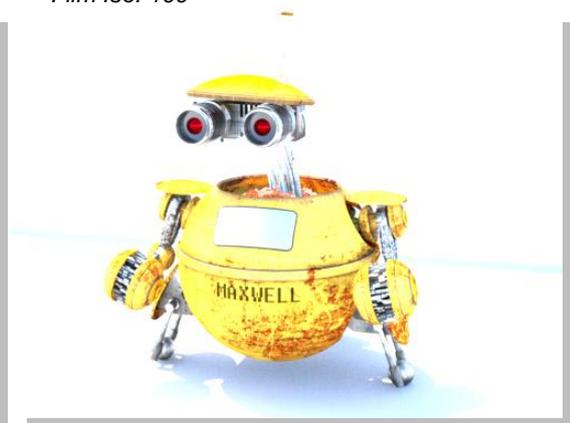
Exposure Mode: Manual
F-Stop :5.6
Shutter Speed: 250
Film Iso: 100



Exposure Mode: Manual
F-Stop: 5.6
Shutter Speed:500
Film Iso: 100



Exposure Mode: Shutter Priority
Shutter Speed: 250
Exposure Value: 14
Film Iso: 100



Exposure Mode: Shutter Priority
Shutter Speed: 250
Exposure Value: 10
Film Iso: 100



*Exposure Mode: Aperture Priority
F-Stop: 5.6
Exposure Value: 14
Film Iso: 100*



*Exposure Mode: Aperture Priority
F-Stop: 1
Exposure Value: 10
Film Iso: 100*



*Exposure Mode: Manual
Film Iso:100*

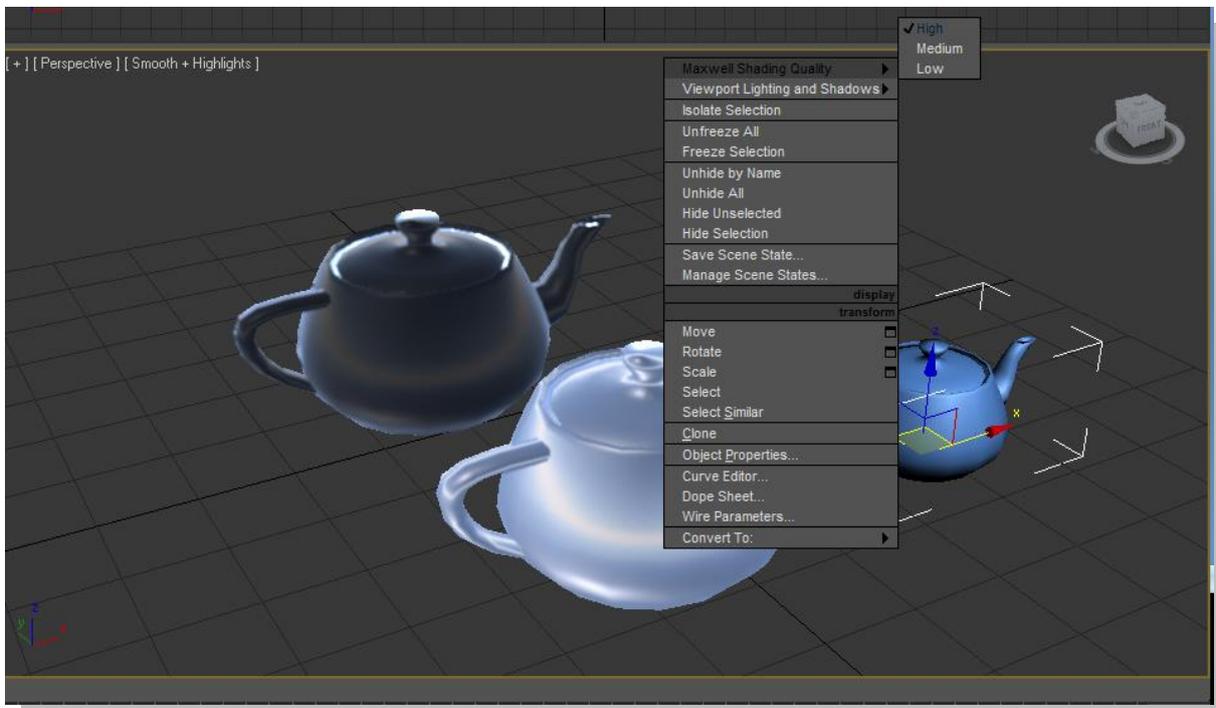


Exposure Mode: Manual
Film Iso:200

Note: Make sure you have checked the Manual Focus Distance Option if you want to see the effects of the F-Stop.

Shading in Viewport

We have the option to see the materials displayed in the viewport depending on the quality we choose.



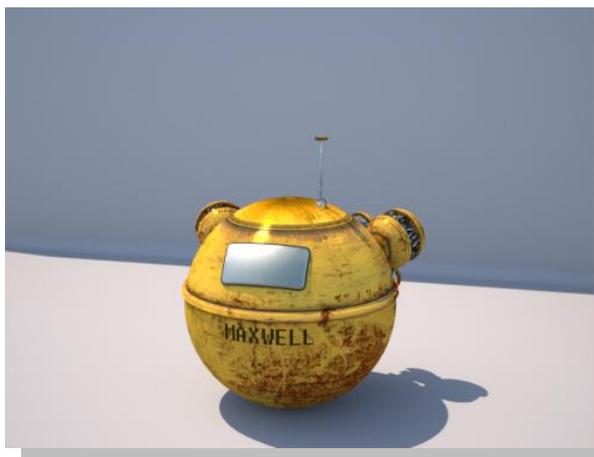
Maxwell Render Shading Quality menu have been added clicking on right button in the viewport.

We can show the proximity to the maxwell materials directly in the screen activating these options.

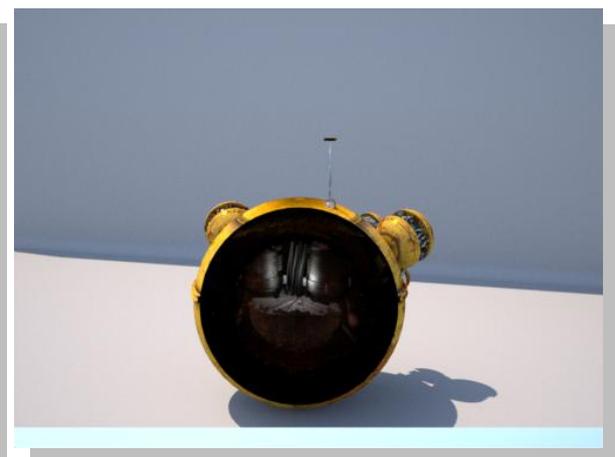
- **Low:** Shows the materials in the viewport with low detail.
- **Medium:** Shows the materials in the viewport with medium detail.
- **High:** Shows the materials in the viewport with high detail. It will be similar to the final render.

Z-Clip Planes

It is possible to define 2 clipping-planes, which are positioned perpendicular to the Camera's directional axis, the Far Clipping Plane and Near Clipping Plane in the Maxwell Render Camera Properties panel.



Clipping Planes OFF



Clipping Planes ON with inner lighth.

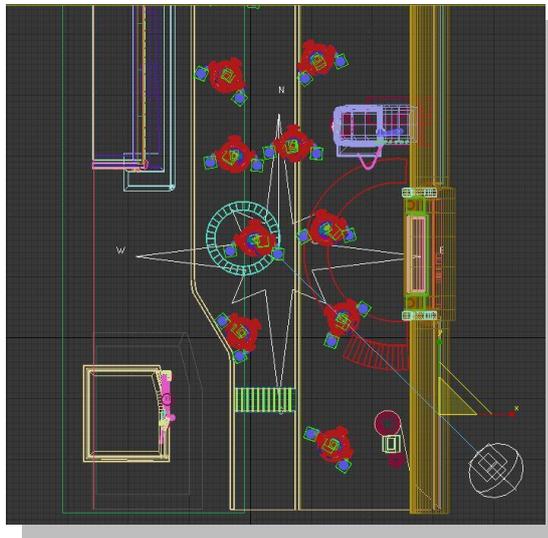
Note: When we making z-clip planes it does not mean light passes through objects. In order to illuminate the inner we need add a light as the right image.

Daylight System

Maxwell Render plugin accepts Daylight system from 3dstudio max to set the environment.

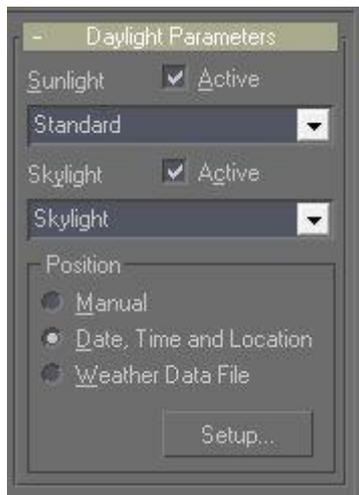


Daylight system tool.

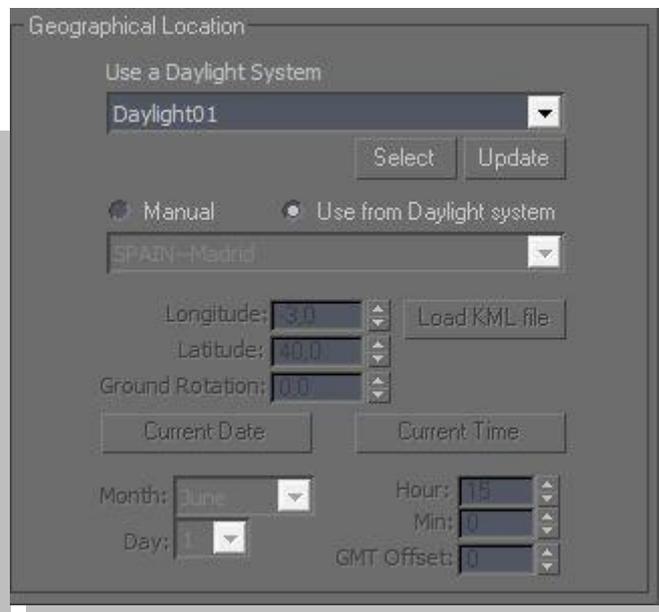


Daylight system in the viewport.

In order to set our daylight system as Physical Sky we must to set inside of environment options (see environment options below)



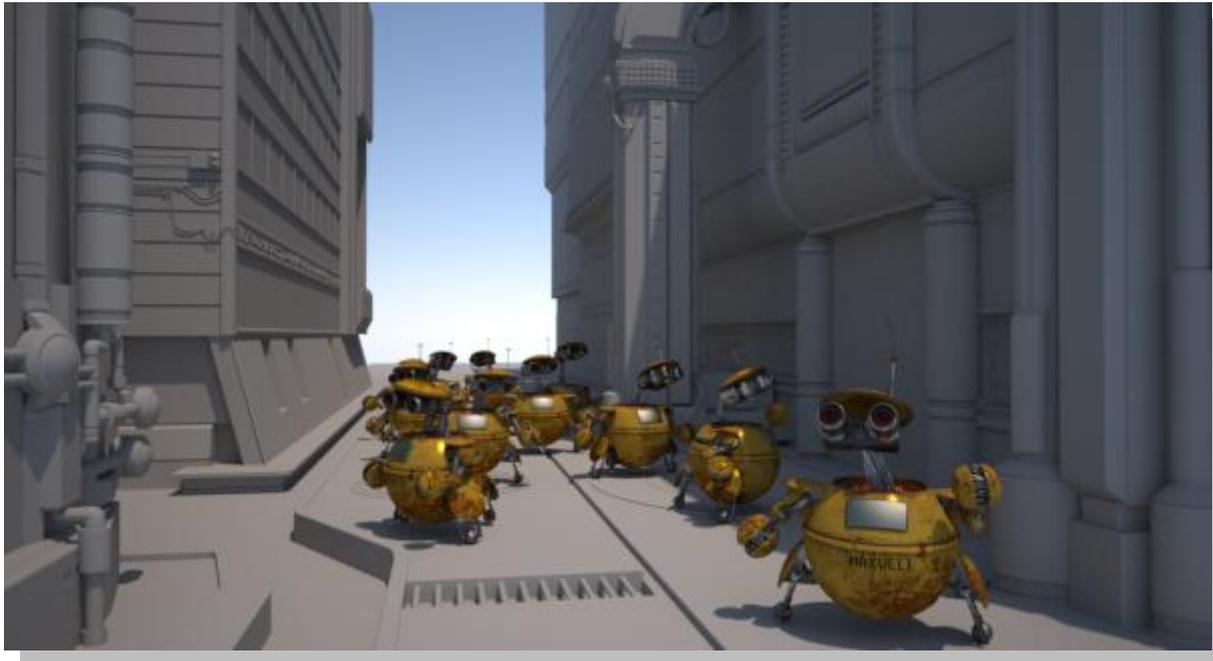
Daylight system parameter



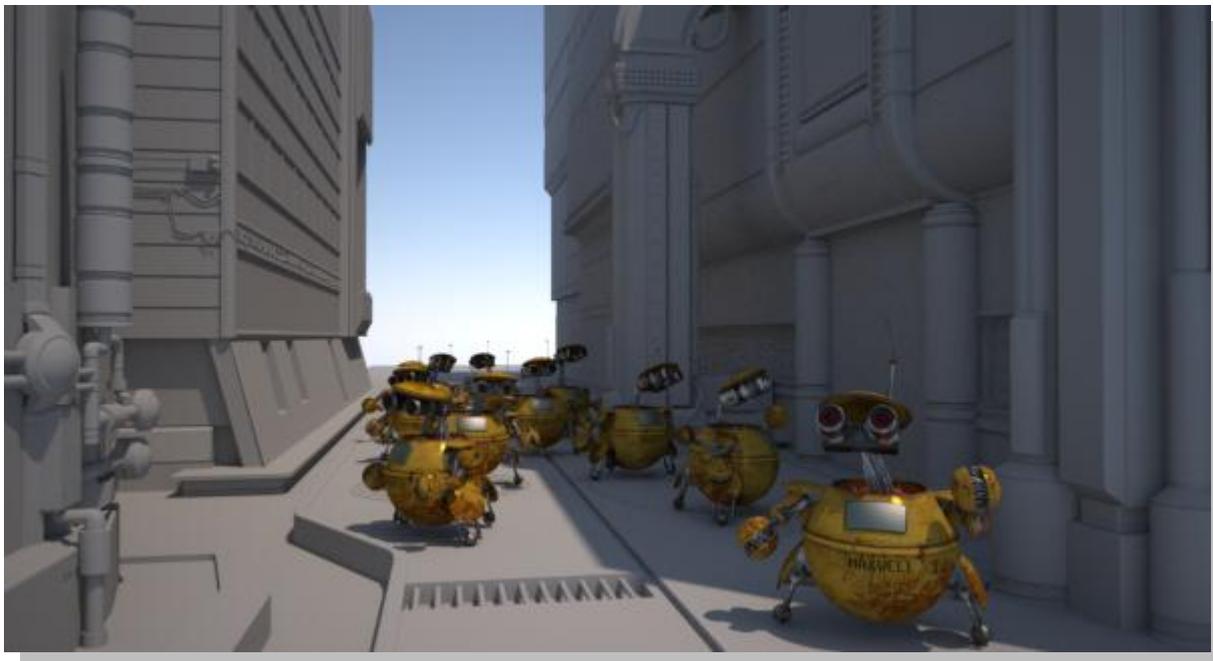
Use Daylight System activated in the render parameters

Note: You can configure the Daylight System with the values for Date, Time and Location inside Daylight options. To find out how the Daylight System works, see the 3DStudio Max manual.

Make sure you have selected the Use a Daylight System option in the render parameters for Maxwell Render to render



*Daylight System Render
Location: Madrid- Spain
Date: 6 / 1 /2009
Time : 12h 0m 0s*



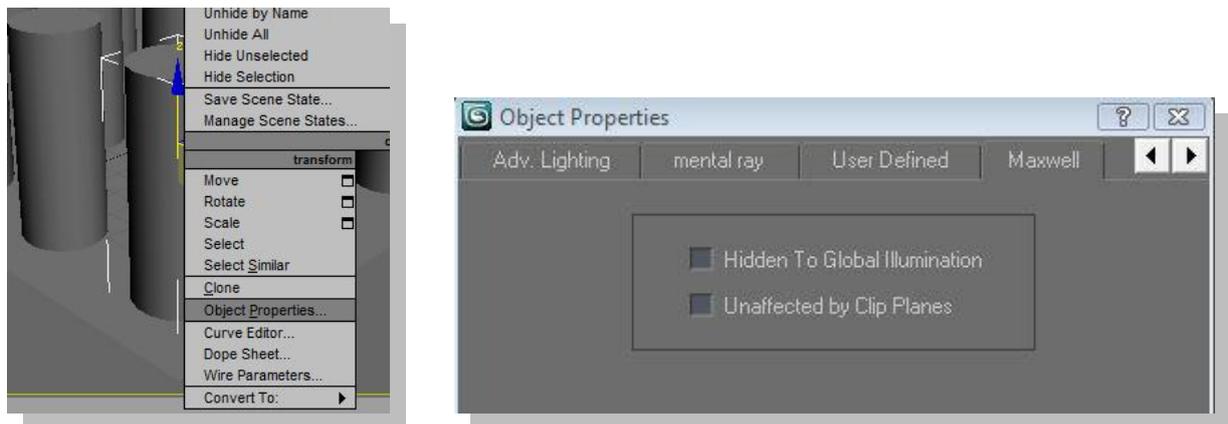
*Physical Sky
Location: Longitude (-3) Latitude (40) (Madrid, Spain)
Date: 6 / 1 /2009
Time : 12h 0m 0s*

Maxwell Render Objects Properties

Maxwell Render plugin accepts all type of geometry coming from 3Dstudio Max and will take into account transformations and deformations as well.

Object Properties

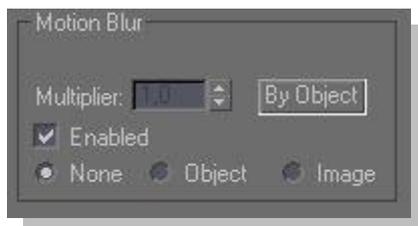
Maxwell Render Object Properties panel will appear when an object is selected and you access to the object's properties selecting Maxwell Render tab.



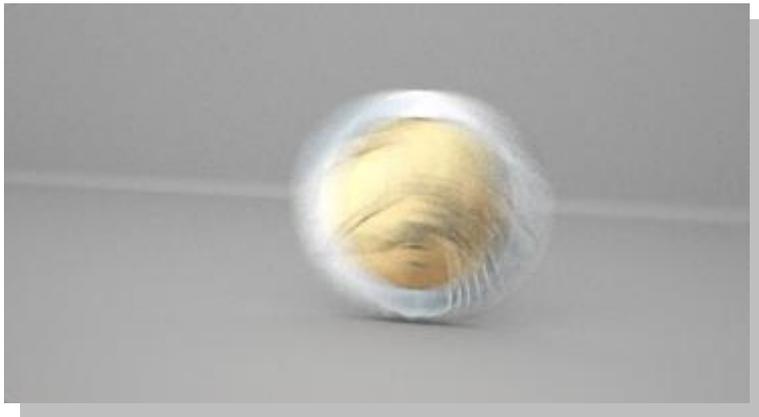
- **Hide to GI:** Means the object will render but will not affect lighting.
- **Unaffected By Z Clip:** If this option is selected, the object won't be cut by zClip planes.

Object Motion Blur

We can activate motion blur for the objects to render with Maxwell Render from object properties and Motion blur zone.



Motion Blur deactivated - frame 1



Motion Blur activated – frame 1

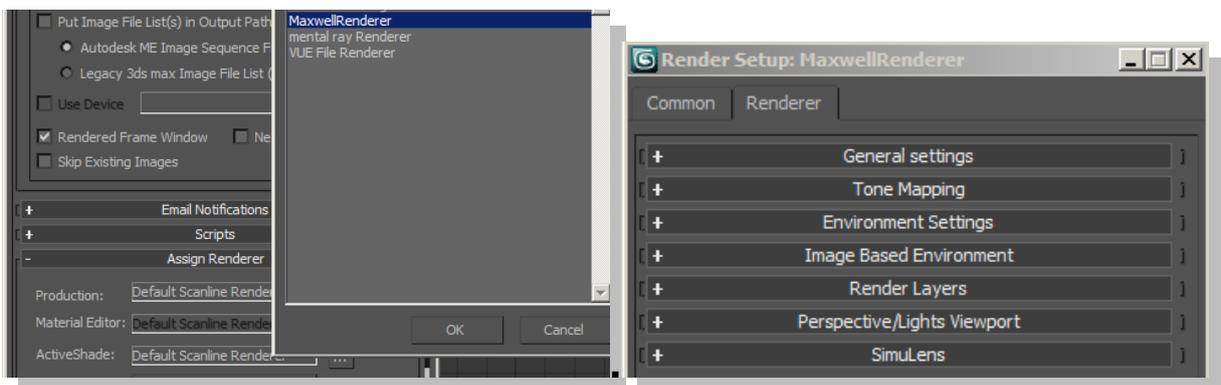
Note: Image Motion Blur option is not valid to render with Maxwell Render.

Note: Instanced objects are converted to real geometry when motion blur is activated.

Maxwell Render Render Options

Generic Settings

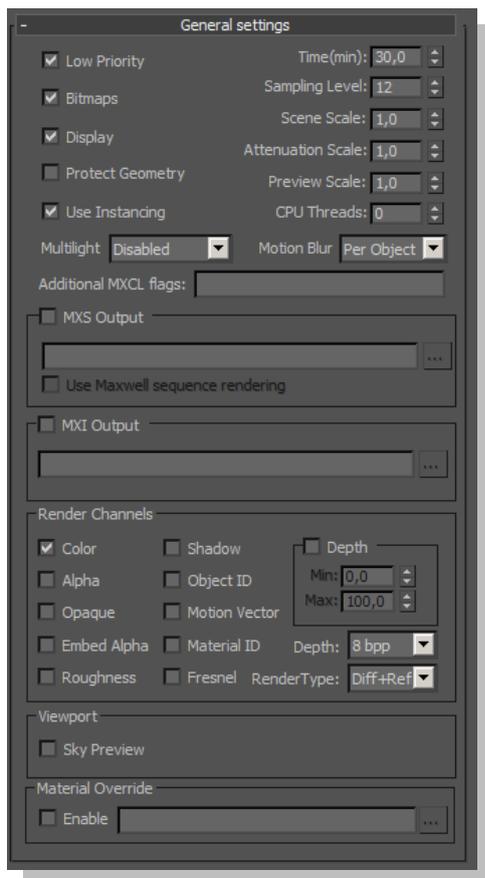
Generic Settings page provides control over the various parameters available to control the actual rendering process. We can select the Maxwell Render from Render menu or (F10) in Common panel under Assign Renderer panel:



Selecting the Maxwell Render in the Render Scene properties.

When we are selecting the Maxwell Render, we can choose its options from Render panel.

General settings



Maxwell Render General Settings.

- **Low priority:** Enable this if you want to work at your computer during rendering.
- **Bitmaps:** Activate /deactivate all bitmaps in render.
- **Multilight:** Activate /deactivate the multilight option in render so you can change their parameters while the render is working. It can be Disable, Intensity or Color + Intensity.
- **Display:** When checked, shows the Maxwell Render process.
- **Global Motion Blur:** Enables/disables motion blur. Motion blur amount is controlled by 3DStudio MAX's camera Shutter Angle. It can be Per Object, taking the motion blur properties for each object, On or Off.
- **Protect Geometry:** Export the scene's geometry protected or not. If it is checked the geometry can not to be exported from Maxwell Render Studio.
- **Use Instancing:** If it is checked use the instances in the scene. If not they are converted to simple objects.
- **Time(min):** Use this parameter to introduce the time that you want to see the render finished, and Maxwell Render automatically will optimize its internal calculus to obtain the best result in this render time. As you can see Maxwell Render refresh the frame

buffer window to let you see the render result as it is in progress. Notice that the first iterations are faster for a quick preview of the scene and then little by little the iterations get longer and longer up to some few minutes to have a better processor performance.

- **Sampling Level:** sets the minimum sampling level to be reached before stopping the render. When the render attains the Sampling Level specified here, processing will stop. Setting Sampling Level to very high values (>25) when rendering single frames ensures that the render will not be terminated before an acceptable quality level has been reached.
- **Scene Scale:** This specifies how much one 3DStudio Max unit represent into Maxwell Render. Is important to work in real physic units because Maxwell Render calculates the light attenuation and other parameters in using real scale in meters.i.e.: 0.01 will export 100 Max/Maya units as 1 meter in Maxwell Render.
- **Attenuation Scale:** The attenuation values for all the materials in the scene will be multiplied by this number when they are exported.

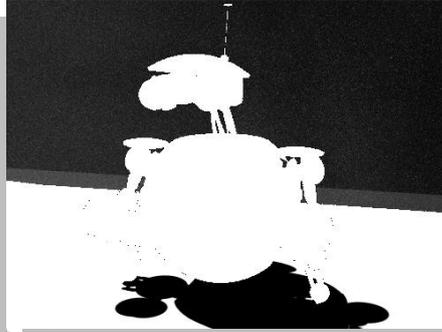
This is useful if you have a scene that's not modelled to scale, but the transparent materials are already set up so that they look right. If you use the global scale to fix DOF issues (for example) you will break the transparent materials; the attenuation scale can then be used to fix those materials by setting it to the same value as the global scale.

- **Preview Scale:** Indicates the scale for Preview render.
- **CPU Threads:** Maxwell Render parallelizes and distributes the render calculus between all the system available processors. With this option you can limit the render to a number of threads. In case of Hyper threading processors each CPU will represent two threads. Setting this value to 0 will cause mxcl.exe to auto-detect the available number of processors, and use them all for the rendering process
- **Additional MXCL flags:** It is the command line field. Flags can be introduced automatically from here.
- **MXS Output:** Use this option to select where Maxwell Render will export its MXS file for the current scene.
- **Use Maxwell Render sequence rendering:** Use this option to select where Maxwell Render will export its MXS file sequence for the current scene.
- **MXI Output:** Use this option to select where Maxwell Render will export its MXI file for the current scene.
- **Render Channels:** Channels are a special feature for rendering pass.
 - **Color:** Enables the option of saving an RGB image for the scene.
 - **Shadow:** Enables the option of saving an shadow pass for the scene.
 - **Alpha:** Enables the option of saving an alpha pass for the scene.
 - **Object ID:** Enables the option of saving an image with objects silhouettes.
 - **Motion Vector:** Enables the option of saving an image with motion vector channel.

- **Embed Alpha:** Enables the option of saving the alpha pass for the scene embed.
- **Material ID:** Enables the option of saving an image with material silhouettes.
- **Roughness:** Enables the option of saving an image with roughness pass for the scene.
- **Fresnel:** Enables the option of saving an fresnel pass for the scene.
- **Depth (Z buffer):** Enable the option of saving an image representing depth within the two values specified in Z buffer range Min and Max.



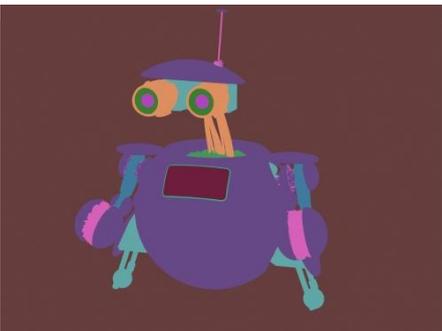
Color pass



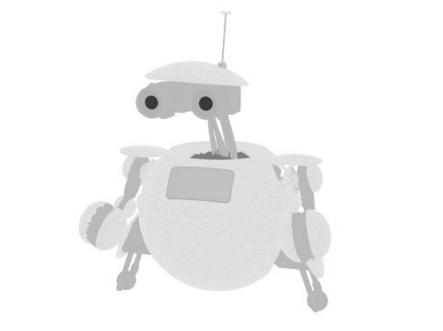
Shadow pass



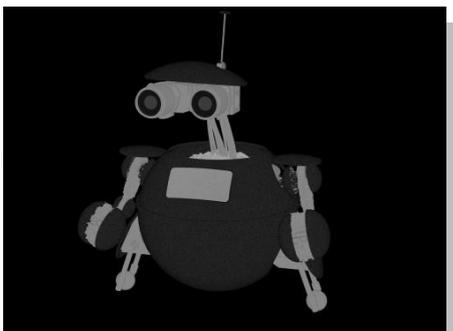
Object ID pass



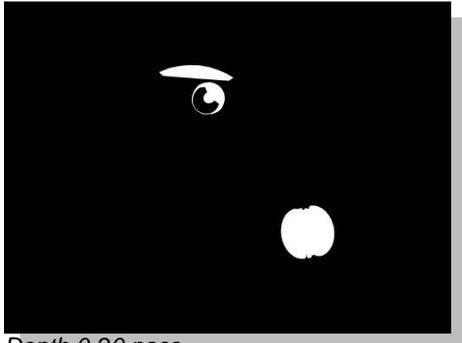
Material ID pass



Roughness pass

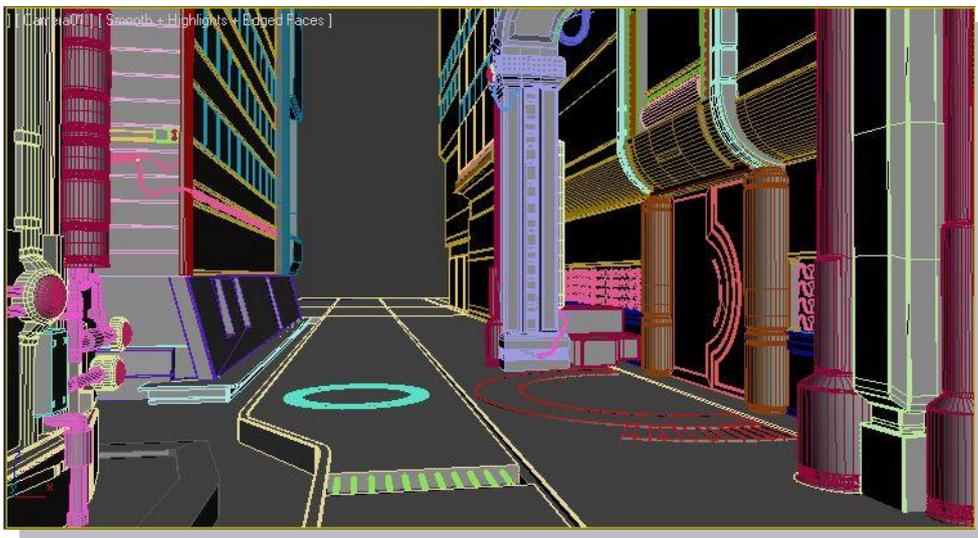


Fresnel pass

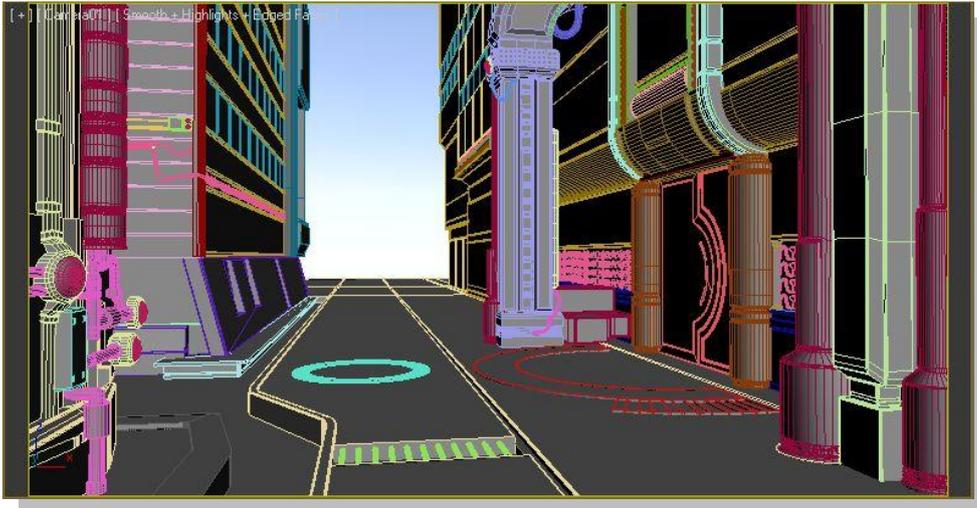


Depth 0-20 pass

- **Parameter for Render Channels**
 - **Depth:** Indicates the depth of bits for the saved images.
 - **RenderType:** Indicates what channel we want to save. Diffuse + Reflection, Reflection or Diffuse.
- **Viewport:**
 - **Sky Viewport:** Shows the sky color in the background on the viewport.
- **Material Override:**
 - **Enable:** Enable a material to render without taking in account the materials applied in the scene.



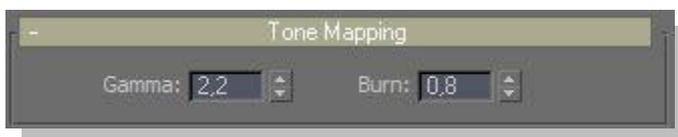
Sky Viewport Off.



Sky Viewport On.

Tone Mapping

- **Gamma:** A tone mapping parameter that controls the monitor gamma of the output image.
- **Burn:** For the value of 0.8 it doesn't apply any change in the image contrast. For values higher than 0.8 it will increase the contrast and for values lower than 0.5 it will decrease the contrast in the output image.



Maxwell Render Tone mapping.

Environment Settings

Sky Settings

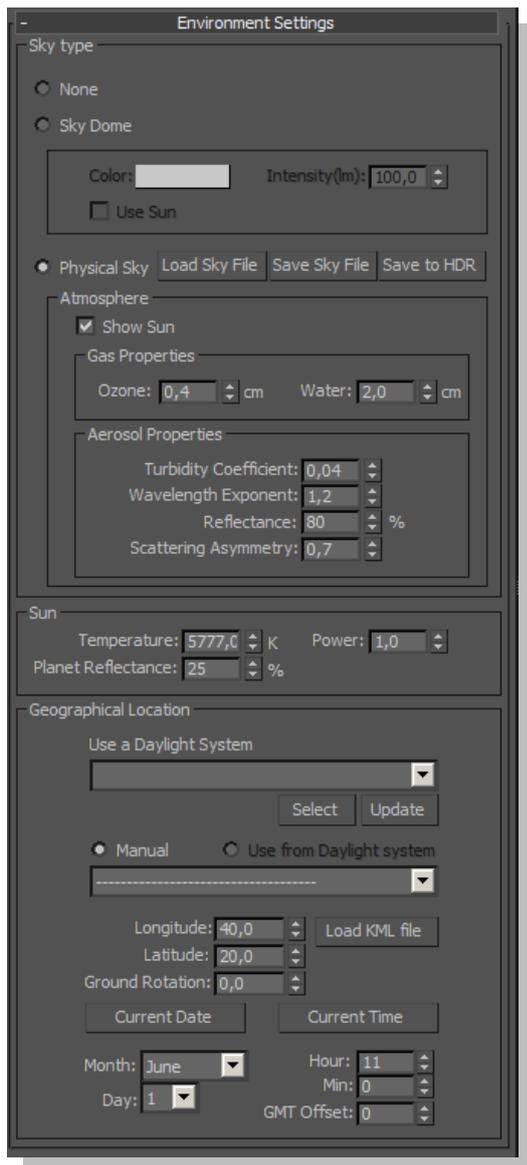
Generic Settings page provides control over the various parameters available to control the actual rendering process:

Sky Dome

The Sky dome is a uniform sky color, in this sky model the light is coming equally in intensity from all the directions.

Physical Sky

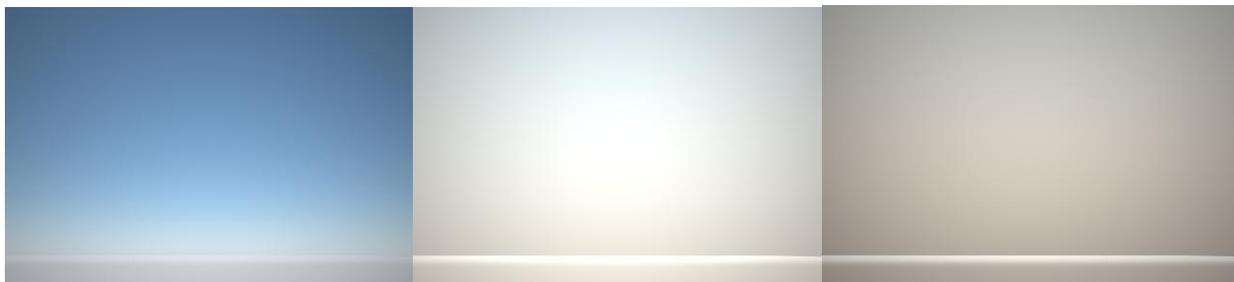
Maxwell Render provides a realistic simulation of the sky. When using this mode, it is possible to enable or disable the Sun, as well as adjust the sky's Turbidity, Water, and Ozone values.



Maxwell Render Environment Settings.

- **None:** Renders without lights in the scene
- **Sky Dome:** The Sky dome is an uniform sky color, in this sky model the light is coming equally in intensity from all the directions.
 - **Color:** This is the sky constant color.
 - **Intensity:** This parameter is the intensity of the sky emission.
- **Physical Sky:** This sky model simulates the real Earth sky. To activate is, check in the “enable” button. Both skies can’t be used at the same time.
 - **Load Sky File:** Load a previous saved sky file for physical sky mode from Disk allowing you to choose a location to load a .sky presets file.

- **Save Sky File:** Save a sky file with the actual parameters for physical sky mode.
- **Save to HDR:** Save the render to HDR file.
- **Atmosphere:**
 - **Show Sun:** This parameter activates and deactivates the Sun. To have a proper illumination take in mind that you must use big horizontal surface simulating the ground.
 - **Gas Properties:**
 - **Ozone:** The amount of ozone gas in the atmosphere. The default value of 0.4 centimeters means that if you gathered all the ozone in a vertical column stretching through the entire atmosphere, you would get a stack of ozone of 0.4cm high. Raising this value will result in the sky and scene illumination having a more blue tone, lowering it will produce a more yellow tone.
 - **Water:** The amount of water vapor in the atmosphere. It is measured in centimeters, in the same way as ozone. This setting may not have much influence on the look of the sky at midday, but will have a clearer effect at sunrise and sunset. In those situations, raising the water value will make the sky look heavier and less saturated, with a red/orange tone at the horizon, while the rest of the sky will turn a darker blue.
 - **Aerosol Properties:**
 - **Turbidity Coefficient:** Defines the concentration and amount of particles in the atmosphere. A value of 0 means a perfectly clear sky (in which case the next three parameters won't have any effect). 0.01 is a good value for low turbidity, e.g. a sky with very few aerosols in it so that it will appear almost clear. 0.04 is a good medium value and 0.1 is a high value.



Default settings (0.04)

Turbidity 0.65, Scatt. Asymmetry 0.7

Turbidity 0.65, Scatt. Asymmetry -0.7



Default settings (0.04)

Turbidity 0.18, ISO 150

Turbidity 0.18, ISO 1000

- **Wavelength Exponent:** Defines the average size of the particles in the atmosphere. The particle size influences which wavelengths of light are absorbed and which are scattered. You can greatly vary the coloration of the sky by changing this parameter, and the effect of the Wavelength Exponent will be more visible the higher you set the Turbidity Coefficient. Having a lower value than the default 1.2 will have a desaturating effect on the sky. Higher values than the default will at first increase the saturation of the sky, until gradually turning towards green and then orange:



Wavelength Ex. 1.2 (default)

Wavelength Ex. 10

Wavelength Ex. 30

- **Reflectance:** Refers to the albedo of the aerosols, or the rate of energy scattered and absorbed by the aerosols. Higher values will scatter more light from the aerosols which will brighten the sky and scene illumination. Values range from 0 to 1. A value of 1 means that all light that interacts with the aerosols scatters, and none is attenuated.
- **Scattering Asymmetry:** This factor controls the anisotropy of the particles, that is, in which direction most of the light will be scattered. Light can be scattered along the same direction as the incoming sunlight (positive values), or back towards the direction of the sun (negative values). A value of 0 means that the light is scattered equally in all directions (isotropic value). Positive values will produce a halo effect around the sun, brightening the area around it:



Scattering Asymmetry 0.7 (default)

Scattering Asymmetry 0

Negative Scattering Asymmetry values will have an overall darkening effect on the sky. Avoid setting a higher negative or positive Asymmetry setting than -0.85/0.85 as this will result in noisier renders.

- **Sun:**

- **Temperature:** Temperature of the sun's spectral radiation. The default value of 5777 is the most common value measured outside the Earth's atmosphere. Lowering this value will give the sky and scene illumination a yellow tint, higher values will give the illumination a blue tint. Although it is possible to change this value for different looks, it is better to leave it at default and instead change the other atmosphere parameters for accurate and predictable results.
- **Planet Reflectance:** A multiplier that controls the amount of light emitted from the sun. Higher values than the default 1 will make the sun emit more light, lower values will emit less. A value of 2 means the sun in your scene emits twice as much light as the Earth's sun.
- **Power:** Controls the percentage of light reflected from the planet surface back into the atmosphere. Changing this value will brighten/darken the overall sky and scene illumination with lower values giving a darker result. Common values are 26-32 %. This parameter is similar to the common term "Planet Albedo", which refers to light reflected from the planet surface plus the light reflected from cloud coverage. Albedo is the ratio of light reflected by an object to the total amount of light it receives. The albedo of an object can range from 0 (0% light reflected back) to 1 (100% light reflected back). The average albedo for the Earth is 0.3, which means on average the Earth reflects 30% of the light it receives back into the atmosphere. The albedo can vary greatly. Fresh snow has an albedo of about 0.8; forested areas have an albedo of 0.05-0.10, etc. Regional albedo values can be found on the internet.

Tips for working with the Physical Sky

Keep in mind that the atmosphere parameters influence each other. For example, if you raise the Turbidity Coefficient (more particles in the atmosphere), the Wavelength Exponent,

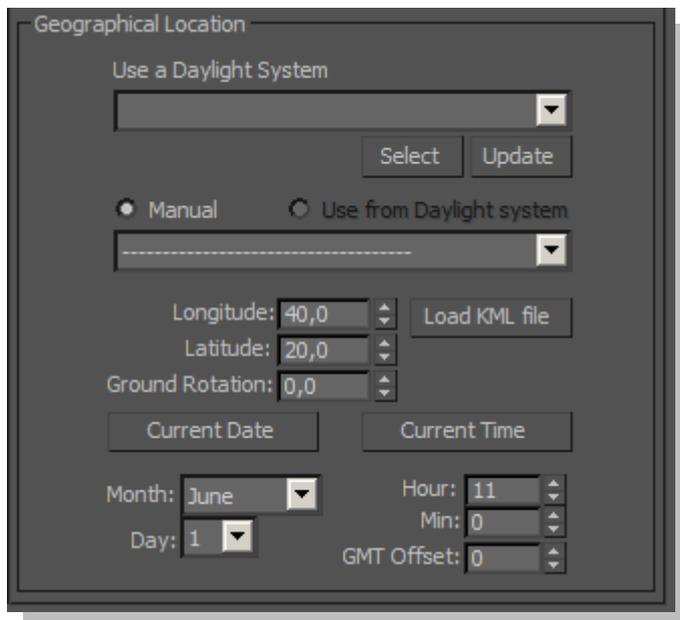
Reflectance and Scattering Asymmetry parameters will then have a greater influence on the look of the sky: they are affecting a larger amount of particles.

To keep the horizon from turning too bright, lower the Planet Reflectance and decrease the Scattering Asymmetry.

Maxwell Render Studio and some of the plug-ins can interactively show an accurate OpenGL view of the current sky coloration and brightness. In Studio, press the “K” key to activate/deactivate the Sky Preview. This OpenGL view also takes into account the cameras’ F-stop, ISO and Shutter Speed settings.

The scene illumination and coloring change depending on what sky settings you use. If you raise the ozone level, which makes the sky scatter more blue light, your entire scene will have a bluer illumination.

Because the Maxwell Render camera has a fixed white balance of 6500K, you can save your render as HDR and white balance your image in an image editing application that can handle HDR files.



Maxwell Render Geographical LocationSettings.

- **Geographical Location:** Uses the actual daylight system in your scene. “Select” allows you to select the daylight object in the screen, and the “Update” button updates the Daylight System list.
 - **Use from Daylight system:** We can set the daylight system for our Physical sky.
 - **Manual Override:** Uses the manual options in the Daylight system.
 - **Location:** Set a predefined location with a longitude and latitude.
 - **Load KML file:** option allows you to load a file with the coordinates’ parameters.
 - **Longitude:** Earth longitude position to calculate the sky/sun light.
 - **Latitude:** Earth latitude position to calculate the sky/sun light.
 - **Ground Rotation:** Ground rotation.

- **Current Date:** Get the actual date.
- **Current Time:** Get the actual time.
- **Month, Day:** Set julian day (0-364) to calculate the sky/sun light.
- **GMT Offset:** Set the Greenwich Mean Time offset of your current location.
- **Hour, Min:** Set the hour and minutes for the day.



Sky dome with sun option checked



Sky dome with sun option unchecked



Physical Sky with sun option checked



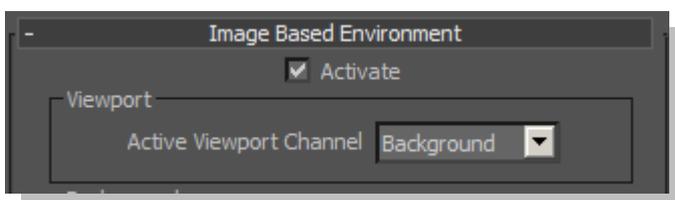
Physical Sky with sun option unchecked

Image based Environment

The Scene Manager's Environment Settings page provides access to settings related to type of lighting used in the Scene.

In this mode, Environmental lighting is provided by either a Maxwell Render MXI (.mxi) image, or an HDR image. Four separate layers (Background, Illumination, Reflection, and Refraction) are provided, and different maps may be used in all of them, if so desired. Individual layers may be enabled or disabled as well. The user may choose to use Physical Sky, Sky Dome, or no Environmental lighting in disabled layers.

Please note that changes made to one channel will not be made to the others as well. Also note that the Sun is also able to be enabled and rendered when using an Image Based Environment.



- **Active Viewport Channel:** Indicates the channel which you want to see in the viewport when the "Sky preview" option is enable. It can be Background, Reflection, Refraction or Illumination.

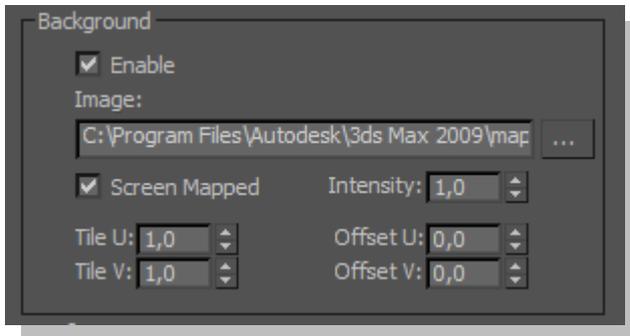


Image Based background Settings.

- **Activate:** Active/deactive Image based environment.
- **Background:**
 - **Enable:** Enables the Background channel
 - **Image:** Allow the addition of an MXI/HDR map as a background environment, not for emission purposes but for a background on the scene.
 - **Screen Mapped:** It can be used to map the MXI/HDR image to screen coordinates.
 - **Intensity:** Adjust the intensity of the map.
 - **Tile U:** Choose to tile the image in X axis
 - **Tile V:** Choose to tile the image in Y axis
 - **Offset U:** Move the image in X axis
 - **Offset V:** Move the image in Y axis

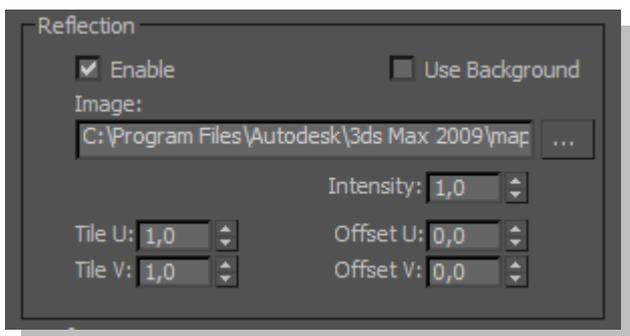


Image Based Reflection Settings

- **Reflection:**
 - **Enable:** Enables the Reflection channel
 - **Use Background:** Get the image from Background channel.
 - **Image:** Add an MXI/HDR map for reflections on scene objects.
 - **Intensity:** Adjust the intensity of the map for scene reflections.
 - **Tile U:** Choose to tile the image in X axis
 - **Tile V:** Choose to tile the image in Y axis
 - **Offset U:** Move the image in X axis

- **Offset V:** Move the image in Y axis

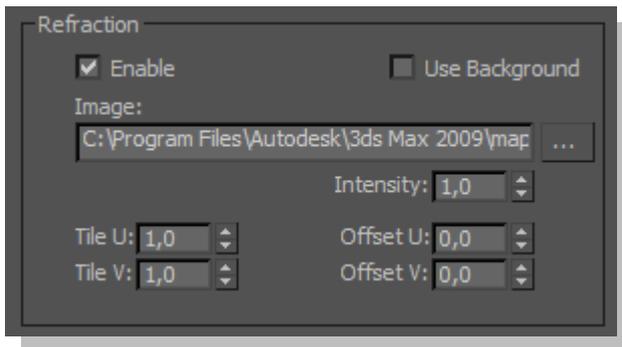


Image Based Refraction Settings

- **Refraction:**

- **Enable:** Enables the Refraction channel
- **Use Background:** Get the image from Background channel.
- **Image:** Add an MXI/HDR map for refraction on scene objects.
- **Intensity:** Adjust the intensity of the map for scene refractions.
- **Tile U:** Choose to tile the image in X axis
- **Tile V:** Choose to tile the image in Y axis
- **Offset U:** Move the image in X axis
- **Offset V:** Move the image in Y axis

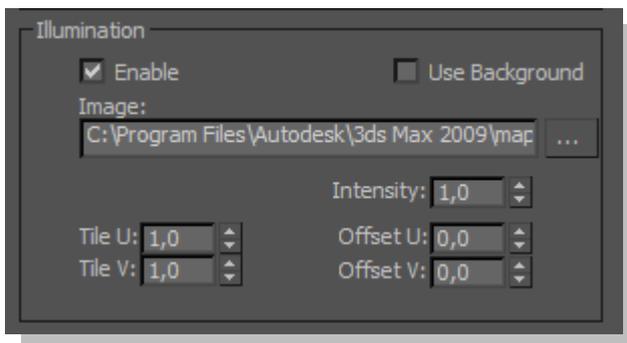


Image Based Illumination Settings

- **Illumination:**

- **Enable:** Enables the Illumination channel
- **Use Background:** Get the image from Background channel.
- **Image:** Add an MXI/HDR map as a background emission.
- **Intensity:** Adjust the intensity of the map for scene illumination.
- **Tile U:** Choose to tile the image in X axis
- **Tile V:** Choose to tile the image in Y axis
- **Offset U:** Move the image in X axis
- **Offset V:** Move the image in Y axis

Note: When a channel is disabled, this one will use the sky selected in the Environment Settings tab. It can be Physical Sky, Sky Dome or None depending on which we have active.



HDR file used for testing the render.



*Image Based render. All channels are enabled
Sky Used for disabled channels: Physical Sky*



*Image Based render. Illumination is disabled
Sky Used for disabled channels: Physical Sky*



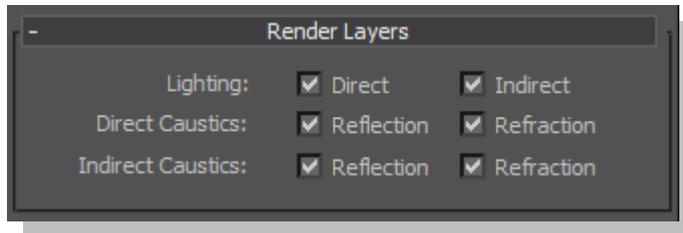
*Image Based render. Reflective and Refractive disabled
Sky Used for disabled channels: Physical Sky*



*Image Based render. Illumination enabled used with
another HDR map.*

Render Layers

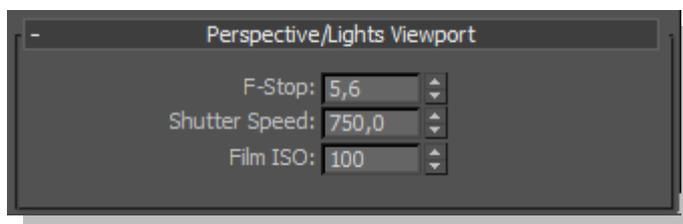
Specifies which of the different light interactions should be included or excluded from the calculation.



Maxwell Render Render Layers Settings

- **Lighting:** These options allow the user to choose whether to render direct lighting, indirect lighting or both.
 - **Direct:** Enables the direct lighting render layer
 - **Indirect:** Enables the indirect lighting render layer
- **Direct Caustics:** Controls the rendering of caustics.
 - **Reflection:** Enables the direct reflected caustics. These are caustic light patterns caused by direct light bounced off reflective objects
 - **Refraction:** Enables the direct refracted caustics. These are caustic light patterns caused by direct light bounced off refractive objects
- **Indirect Caustics:**
 - **Reflection:** Enables the indirect reflected caustics. These are caustic light patterns caused by direct light bounced off reflective objects
 - **Refraction:** Enables the indirect refracted caustics. These are caustic light patterns caused by direct light bounced off refractive objects

Perspective/Lights Viewport



Maxwell Render Perspective/Lights Settings

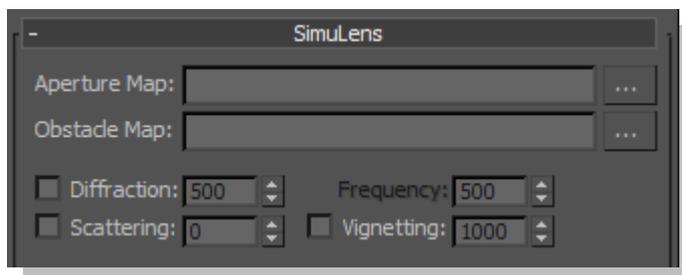
- **F-Stop:** Controls the aperture of the lens.
- **Shutter Speed:** The shutter speed, specified in 1/n of a second.
- **Film ISO:** This parameter applies a potential function to the irradiance value that is coming to the image pixel. With a value equal to one this parameter creates a linear

response to the energy, and produces a very fast saturation in the pixel color. When you decrease this parameter you obtain a very fast increase in the dynamic range and avoiding a fast saturation of the pixels. This effect also produces a reduction of the contrast in the output image.

SimuLens

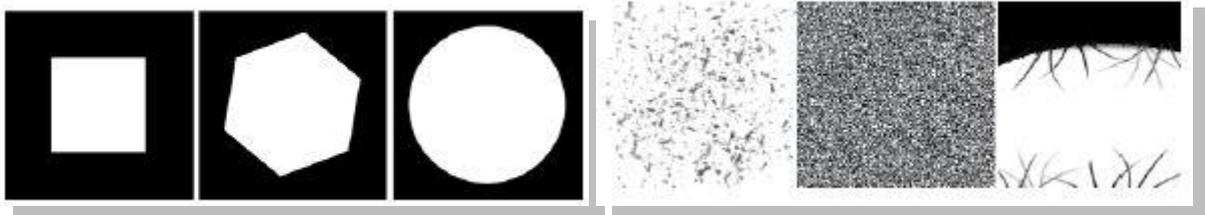
Maxwell Render's SimuLens system allows the user to define a pattern to simulate the shape of the diaphragm that will model the pattern of light reaching the camera film, creating realistic lens diffraction effects (glare).

Allows you to control the lens diffraction, lens scattering, and vignetting effects of the Maxwell Render Simulens system.



Simulens parameters.

- **Aperture Map:** The shape of the diaphragm will model the pattern of light that reaches the film. You can set the diaphragm shape using a black/white map called aperture map.
- **Obstacle map:** Water drops, eyelashes, dirt, etc on the camera lens will also cause diffraction effects. Again, a white/black map is needed.



Aperture Maps

Obstacle Maps

Note: If you don't want to use an obstacle map you can leave this path blank, you only need an aperture map for diffraction to work.

- **Diffraction :** Controls diffraction/glare intensity.
- **Frequency:** Controls the frequency of coloring in diffraction effect. Higher values will make the patten denser.
- **Scattering:** Commonly known as bloom and happens when the light is scattered inside the lens before reaching the film.

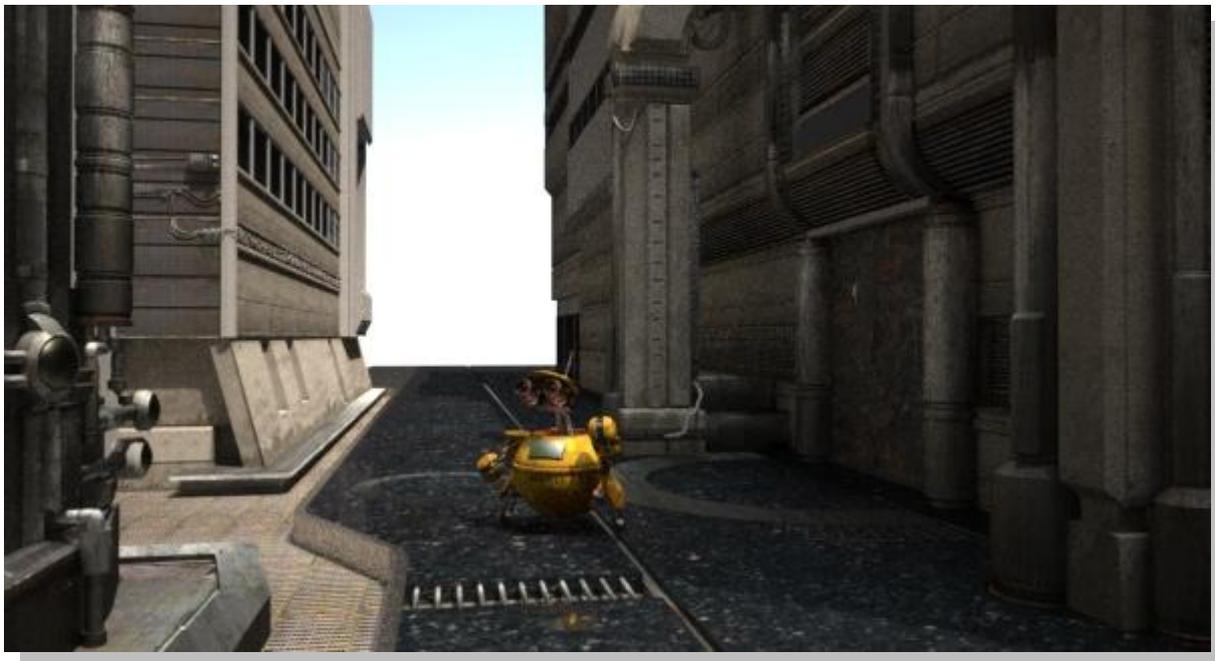
- **Vignetting:** Vignetting is an artefact darkening the image through the edges due to camera optics, now you can partially or completely remove increasing the value.



Scene without SimuLens effect



Scene with SimuLens effect



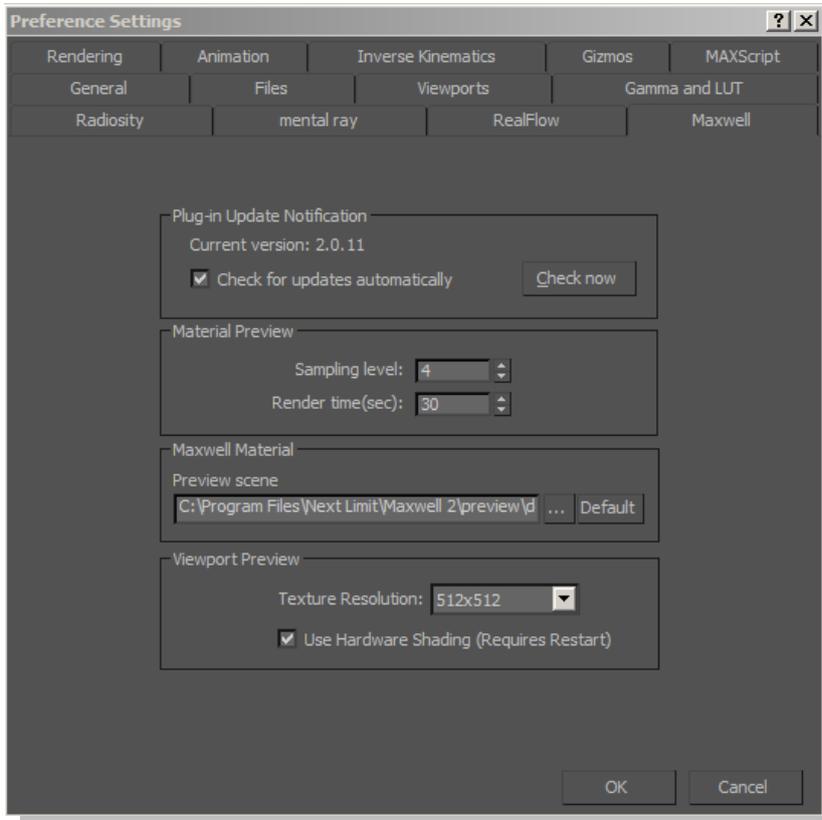
Scene with SimuLens effect



Scene with SimuLens effect

Plug-in Options

Into Preferences Settings Options holds several parameters which affect how the plugin works inside 3DStudio Max.



Material Preview

- **Sampling level:** This parameter controls the quality of the preview in the material editor
- **Render time(sec):** The higher the sampling level reached, the more accurate the image is obtained

Plug-in Update Notification

- Check the last version of the plugin.

Maxwell Render Material

- **Default Material Type:** Set the Maxwell Render parameter material as embedded or referenced by default in the material Editor.
- **Start-up directory for Material Browser:** Default directory for the browser material.

Viewport Preview

- Activates the Hardware Shading to visualize the blending mode between materials in the viewport.

Maxwell Render Materials

The Maxwell Render Approximation

Maxwell Render plugin will make an automatic conversion of your 3DStudio Max materials taking into account some of their properties (no shader added).

- the 3Dstudio Max material (surface) is translated into a Maxwell Render approximation.
- The approximated material has two layers, a diffuse layer and a shiny layer.

The following attributes are used:

- * *color* - set as the color of the diffuse layer
- * *diffuse* - set as the weight of the diffuse layer
- * *reflectivity* - set as both the weight and color of the shiny layer
- * *glossiness* - inverted and set as the roughness of the shiny layer
- * *transparency* - connected as transmittance on both layers
- * *bump* - connected as bump map on both layers

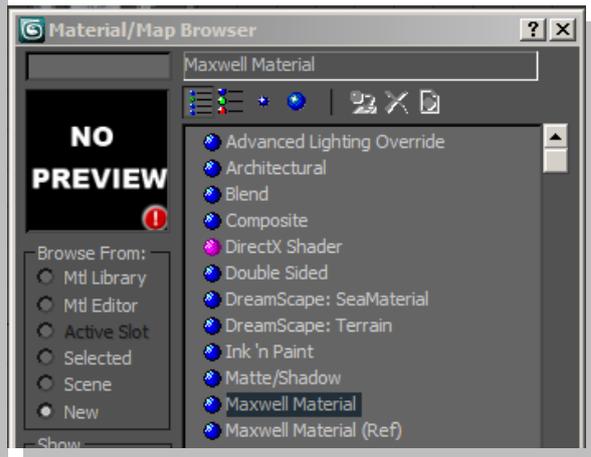
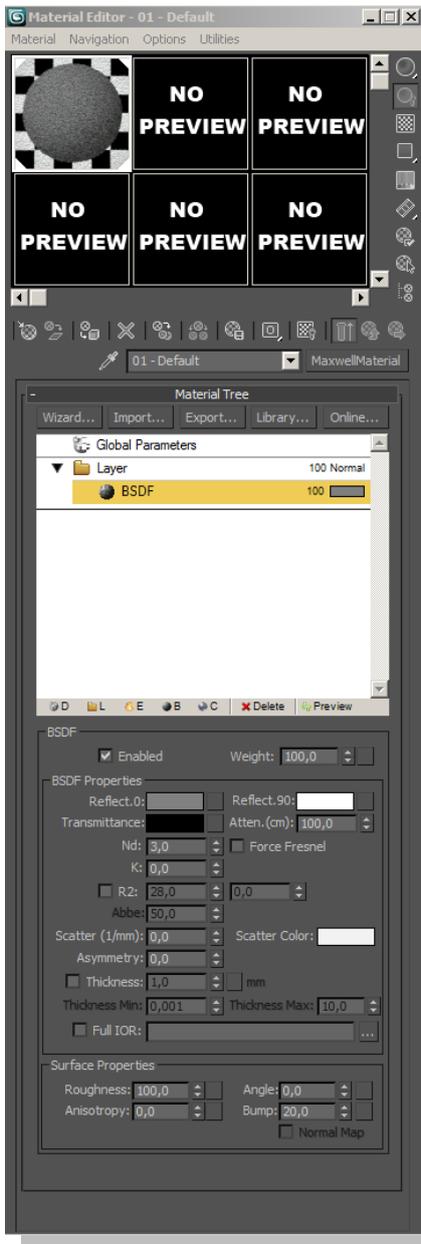


Maxwell Render library materials in <http://mxmgallery.maxwellrender.com>

The Maxwell Render Shader

However, you can use specific Maxwell Render Materials to control every aspect of the material.

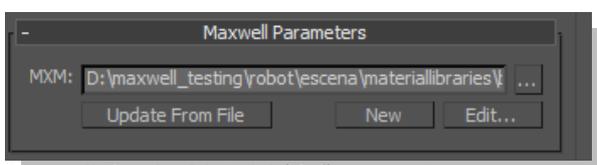
Maxwell Render Materials are located in the get Material button in the 3DStudio Max Material Editor. The Maxwell Render Material Shader provides tools enabling the creation, import and editing of Maxwell Render Materials:



Maxwell Render Material Editor.

Note: Maxwell Render in the Material Editor browser actually doesn't support render slot for 3DStudio Max native Shader and Maxwell Render at the same time. However we can view a representative render inside slot when the native render "Default Scanline" is selected to render.

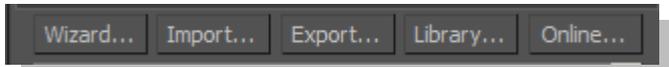
There is a Maxwell Render Material (Ref) when we choose the Maxwell Render material to load in our scene. It indicates to load a referenced Maxwell Render Material. Its properties are:



Maxwell Render Material (Ref) parameters.

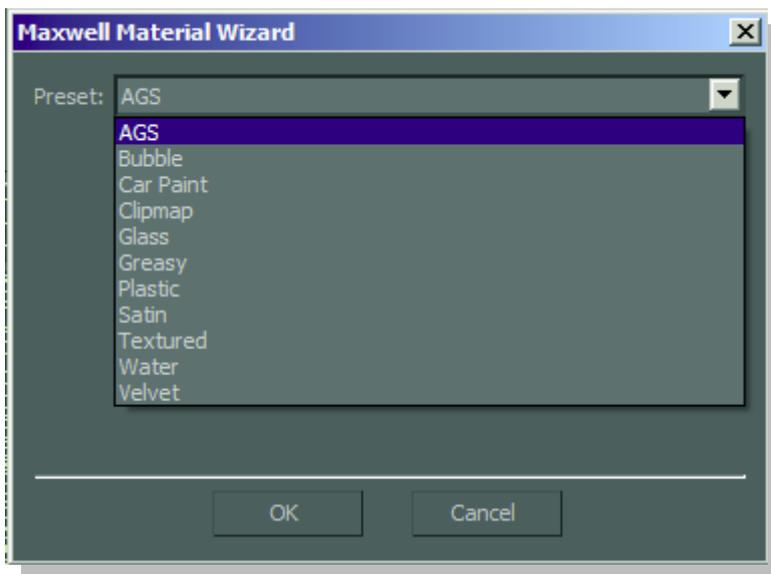
Material Options

The upper part of the Maxwell Render Material Editor shows the tree structure which is based on the Maxwell Render Material. We can create the Layers clicking on the buttons tree depending on layer to add. The functionalities in the upper buttons are:



Upper buttons for Maxwell Render Material

- **Wizard...:** The Material Wizard is provided to assist in the task of creating Maxwell Render Materials.

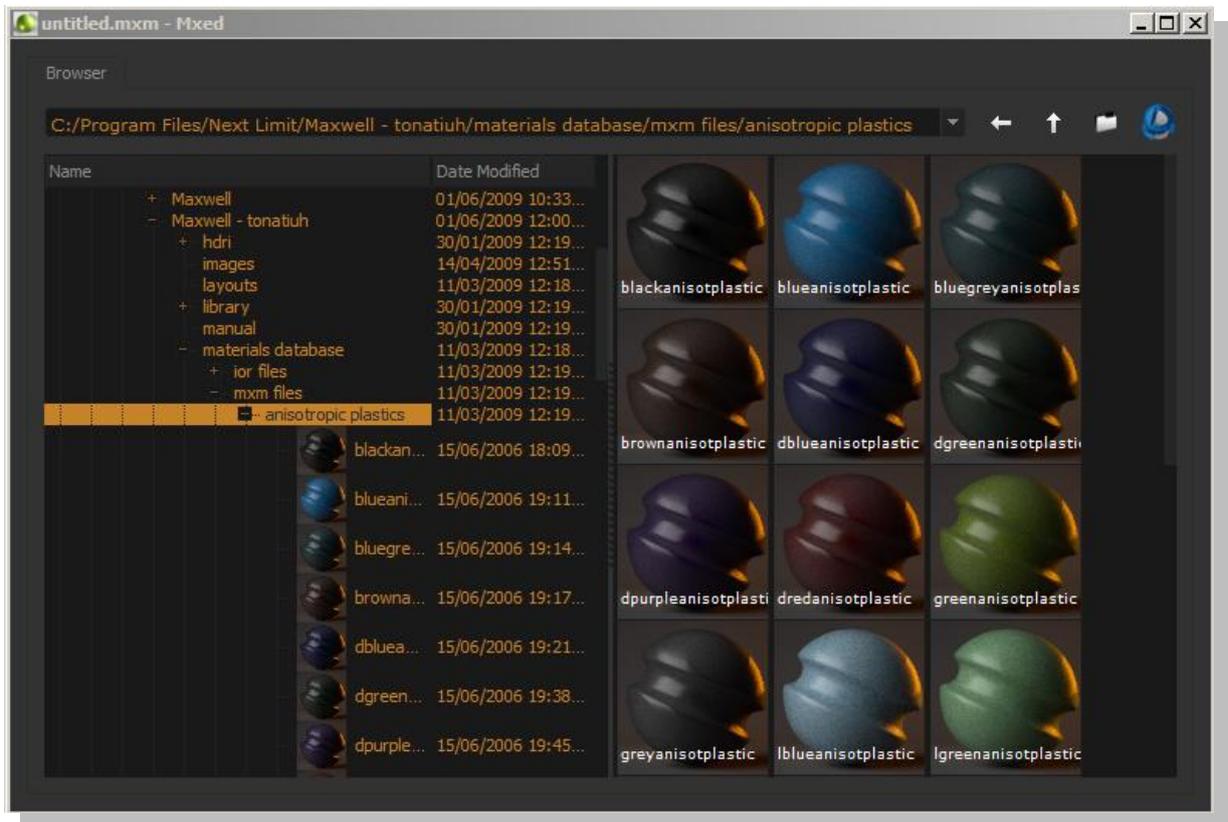


Maxwell Render Material Wizard.

The Material Wizard creates the following Materials using a minimum number of inputs:

- Architectural glass (a.k.a. AGS)
 - Bubble
 - CarPaint
 - ClipMap
 - Glass
 - Greasy
 - Plastic
 - Satin
 - Textured
 - Velvet
 - Water
-
- **Import MXM...:** Import a .mxm (Maxwell Render material file) into the material list
 - **Export MXM...:** Export the actual material to .mxm (Maxwell Render material file)

- **Library...:** It provides access to Maxwell Render MXM files located in the file system showing a preview of them. To load a material in the actual material editor slot double click on it.

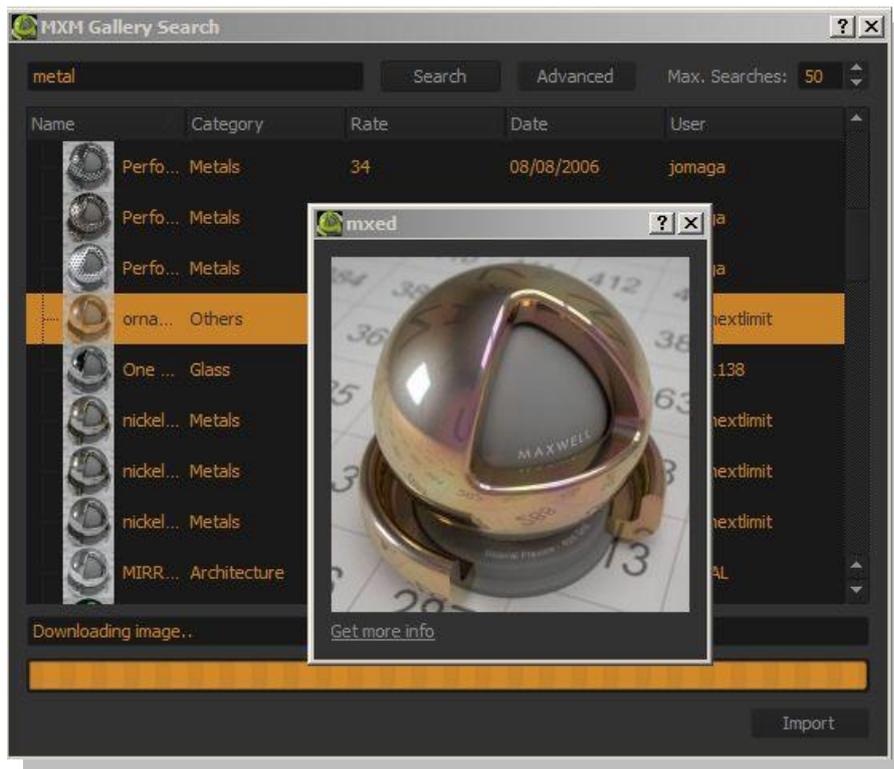


Material Browser

The MXM list simply shows the MXM contents of whichever folder it is currently set to view in Path parameter.

The UP folder and simple folder will let you choose the folder you want to browse in, being Home the material database of the installation folder. Scroll Down and up will let you navigate through the entire chosen folder.

- **Online:** It will allow us to choose the materials from Maxwell Render material database in the web. It is a good option to apply quickly materials in the scene.



Online Browser

This is a new and very useful tool. Clicking this icon you will be able to search a material in the entire online MXM Gallery database, from within Maxwell Render Studio. Thousands of materials ready to be used in your scene with just a few clicks.

Use the Search field to type a material name and the result of your search will be displayed in the window below.

Use the Advanced Search to specify some keywords, search by color, specify category or displaying options.

Note: When we enter the first time to online button, a dialog box appears indicating we must login to enter.

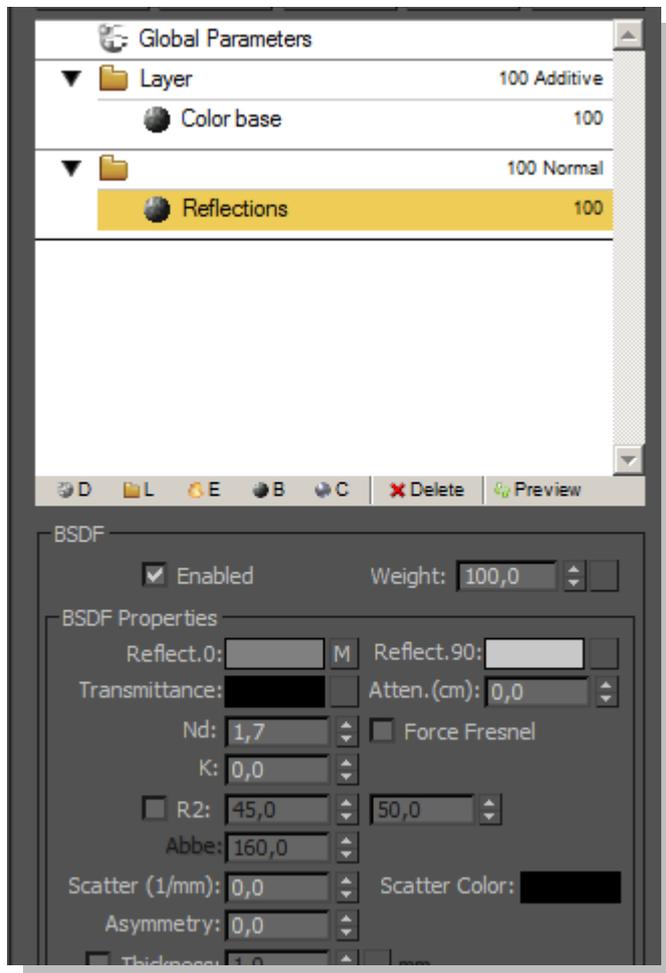
Maxwell Render Material Editor Controls

The Maxwell Render Material Editor interface features several controls like the ones in the 3DStudio Max Material Editor to enable a natural and convenient workflow to 3DStudio MAX users.

Materials are built from BSDF, Coating, SubSurface, Emitter layers. Adding and removing these layers is accomplished by clicking on the appropriate buttons below the Materials Components bin.

Material Layers Tree

The Material Layer Tree provide access to the values which define the behaviour of an individual Maxwell Render BSDF component (layer) allowing us to mix with another layers as (D) Displacement, (L) Stacking layers, (E) Emitters, (B) BSDF layer, (S) Subsurface Scattering and (C) Coating. Each one has its own parameters.



General Info

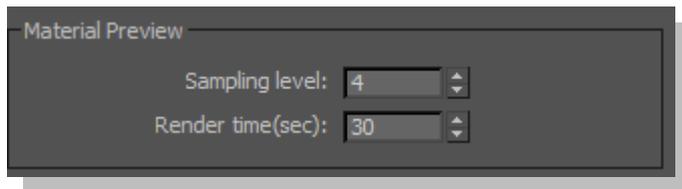
The names for each channel can be changed clicking twice on the title of name channel or layer.

Preview button

Update the view in the actual slot material. Provides a quick preview of the material. Preview quality options are accessible via Plugin Options.

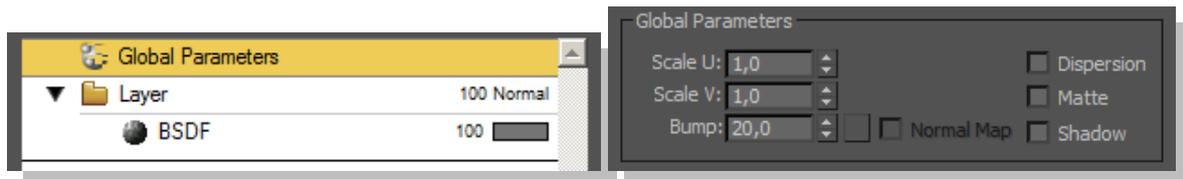


Preview quality can be modified from menu Customize > Preferences > Maxwell tab.



Global Parameters

Indicates the global parameters for the Maxwell Render Material.



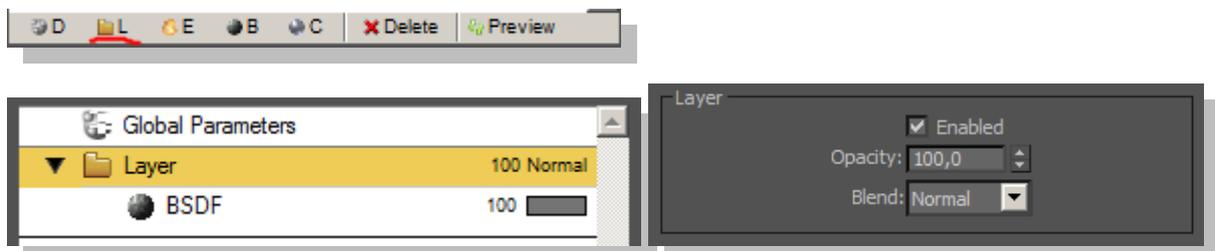
- **Scale U:** Scale the actual texture parameters indicating a value for U.
- **Scale V:** Scale the actual texture parameters indicating a value for V.

Note: Indicates a Global Texture Scale scaling the actual texture parameters for each UV channel.

- **Bump:** Indicates the global value for bump channel. With "*Normal Map*" checked we indicate the material is a "*Normal Bump*" map.
- **Dispersion:** Apply dispersion in the material. It is the effect seen when a beam of light passes through a prism and is split up into the different wavelengths of lights.
- **Matte:** Turns the assigned material into an invisible object, directly showing the environment.
- **Shadow:** Turning on this option for material will make all objects with this material applied behave as shadow catchers. With this option off will render white.

(L)Layer

Layer has the specific properties for Layer control for Maxwell Render material. We can create several layers to make stacking layers. In order to create a new layer we click on



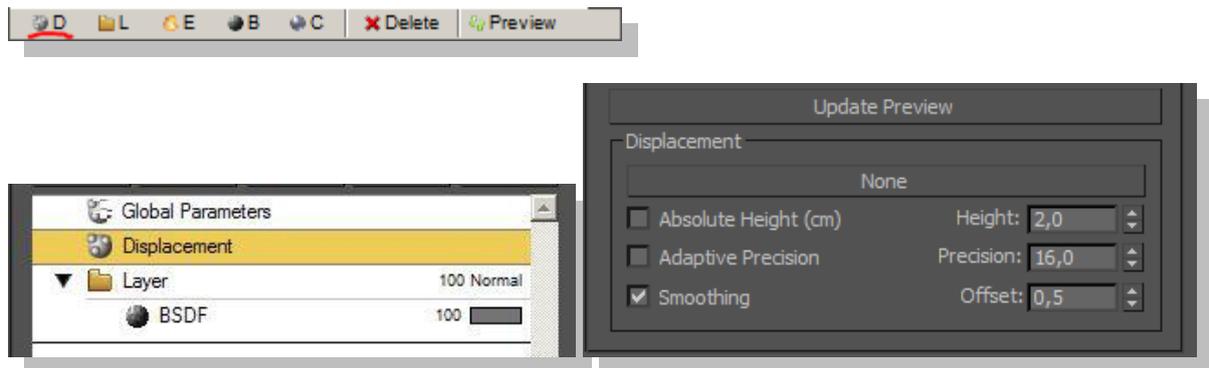
- **Enable:** On/Off the current Layer.
- **Opacity:** Indicates the opacity value for the current layer.

- **Layer Blending:**

- **Normal:** Normal mode should be used when making materials that are “fused” together, such as a mix of metals.
- **Additive:** Additive mode should be used when making materials that are mixed one on top of the other, such as rough molded plastic with a clear smooth coating applied.

(D) Displacement

Adds a general layer for displacement effect. In order to create a Displacement channel we'll click on



The Displacement panel provides access to the values that control the behaviour of displacement:

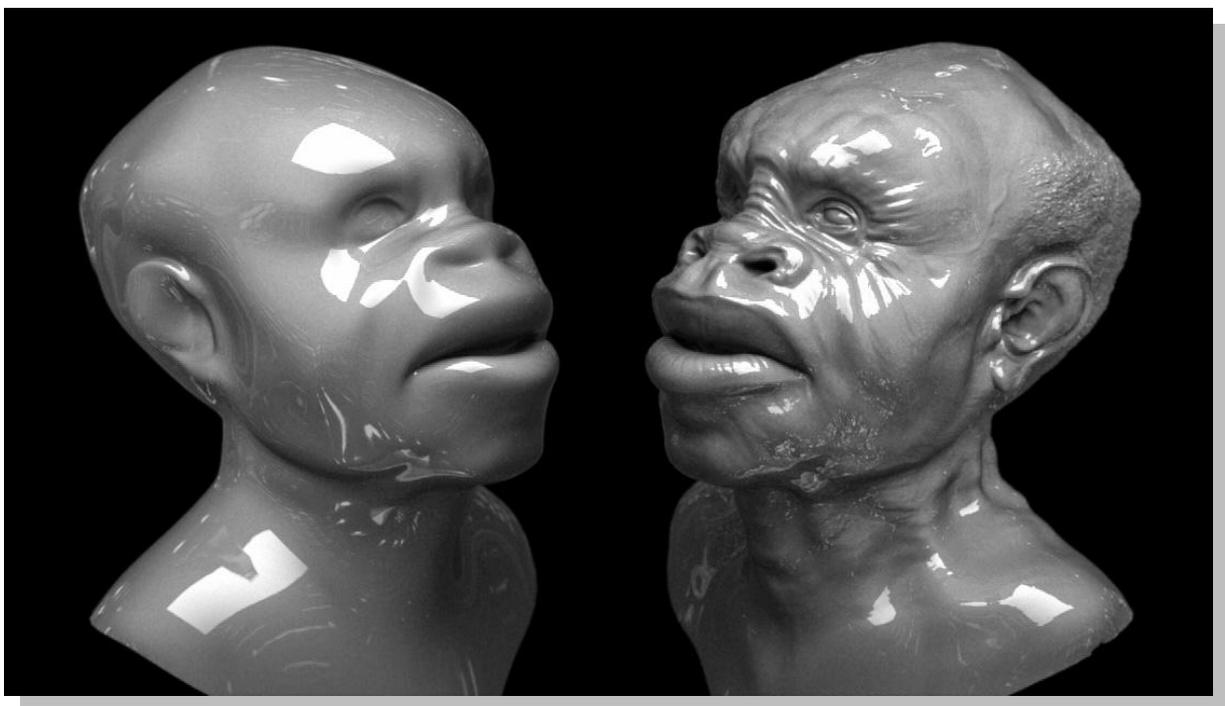
One displacement layer is available per material. It can be added to the material by clicking on the check button. Displacement may be removed by clicking the on the 'Remove' button.

- **Texture button:** The texture used is similar to a usual greyscale bump map – you have different shades of grey to describe elevation levels. For example lighter greys will raise the geometry, darker greys will create cavities. Maxwell Render can use 8, 16 or 32-bit greyscale displacement maps. It is recommended to use at least 16-bit displacement image as 8-bit images may not contain enough grey levels (only 256) to make a smooth displacement. You may see a stair stepping effect if using 8-bit maps. 8-bit maps may be enough for displacements that don't require smooth transitions between grey levels, and additionally Maxwell's texture interpolation helps to render even 8-bit images smoothly.
- **Absolute height:** Displacement height can be set to use either relative or absolute height.
- **Adaptive Precision:** The Adaptive Precision option locks the precision value to the given texture detail (at half pixel accuracy) which has the advantage of always creating the most detailed displacement that a given texture can provide and the drawback of having unnecessarily long render times on some occasions.

- **Offset:** Offset allows you to specify which grey level in the texture should represent zero displacement.
- **Smooth:** Similar to the objects smoothing angle setting, this parameter controls whether the displaced surface should render smoothly (continuous shading) or render faceted. It is generally suggested you leave this setting to On, unless you aim to render very sharp detailed displacements.
- **Precision:** Precision defines surface accuracy, ability and to respond to detail independent of texture resolution.
- **Height:** Height sets the maximum allowed displacement distance. It tells the engine how much real geometric height you want to displace on your base mesh. This value needs to be greater/less than zero for displacement to appear.



Maxwell Render displacement materials



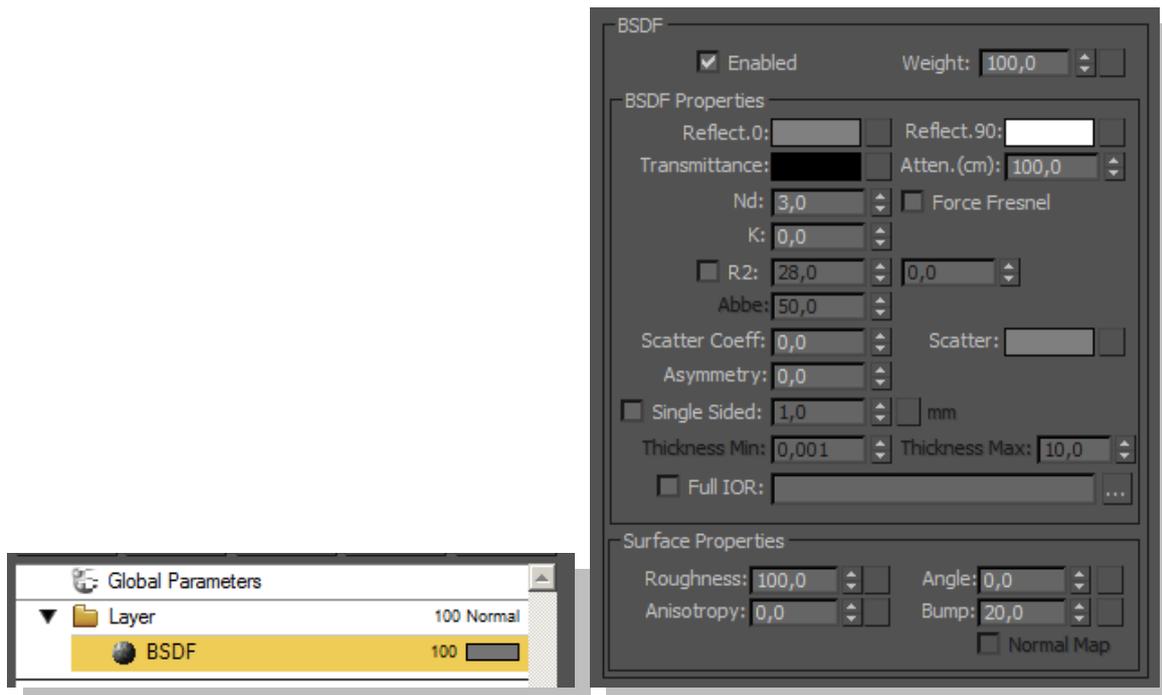
Maxwell Render Displacement applied to the mesh

(B)BSDF

Maxwell Render materials are defined in a physically correct manner from their BSDF curves (Bidirectional Scattering Distribution Function) making it possible to build up different layers of physical materials in the same object, like other BSDF. In order to create a new BSDF layer will click on



The parameters are:



- **Enable:** Enables the actual BSDF layer.
 - **BSDF:** Activate/deactivate BSDF parameters
 - **SSS:** Activate/deactivate SSS parameters
- **Weight:** In a Maxwell Render Material, BSDF layers are combined by their Weight values, or alternatively, by using a Weight Texture. A Weight Texture is generally a black & white (24bit RGB) bitmap defining areas of the BSDF that are meant to be visible (white areas), or invisible (black areas). A blend of grey may be used to define gradient blends between different BSDF layers. If no Weight Texture is specified, the simple Weight value is used.
- **Reflectance:** It is the light reflected by the material. It is the materials color. It can be set by color or by map. This color is when the object is seen at 0 degrees (frontal view).
- **Reflectance 90:** It is the light reflected by the material when the object is seen at 90 degrees (glancing angle).

Note: Reflectances in Maxwell Render BSDF layers may be defined in terms of RGB color values for the 0 and 90 parameters, or may be defined by specifying color Textures for the channels. Reflectance 0 could be generally referred to as the diffuse color of the layer, being the color that will be reflected from the more direct viewing angles. Reflectance 90 could be referred to as the specular color, being the color that will be reflected at glancing angles. In general, plasticine materials will exhibit a pure white [255, 255, 255] Reflectance 90° color, while metallics will exhibit varying degrees of self-colored specular reflection.

- **Transmittance:** For transparent materials, it controls the color of the light which passes through an object by the color or specifying a map.

Note: Transmittance in Maxwell Render BSDF layers is used to define how light is, or is not, allowed to pass into and through the object. Black [0, 0, 0,] Transmittance defines a completely opaque material, while white [255, 255, 255] defines one which all light is allowed to pass through. If light is allowed to pass into the object, then the Attenuation Distance parameter will control the depth to which light is able to reach beyond the object's surface. The Attenuation Unit parameter defines the scale with which the Attenuation Distance parameter is applied.

- **Attenuation(cm):** Indicates as light travels through a material.
- **Nd:** Index of refraction (IOR).
 - **Force Fresnel:** Force Fresnel ensures that the reflectance ramp (curve) between Ref0 and Ref90 will be maintained by the given Nd. It discards the luminance of a given reflectance color and enforces physically correct Fresnel while only deriving the hues of them. When Fixed is unchecked the reflectance value of a surface is derived both from the ND and the luminance of the refl0° color. When Fixed is checked, the reflectance between refl0 and 90° (the Fresnel curve) is maintained according to the Nd, and only the hue of a given reflectance color is taken in consideration.
- **K:** From a physical point of view, the index of refraction is not just a plain number. In fact it is a number derived from a complex calculation to define the refractive index at one particular wavelength. This is the calculation:

$$\text{Refraction at a particular wavelength} = Nd + K \cdot i$$

The Nd represents the refractive index, which is the well-know concept of Index of Refraction we often use.

The K is the extinction coefficient: the amount of absorption loss when an electromagnetic wave propagates through a material. This is usually confused with the Abbe, but it is not related to this. K is related to the extinction of the wave.

The use of the K value is optional. In most situations it is enough to just use the Nd value. Only in specific situations where the extinction effect is important, is it necessary to use the K parameter to get a more precise result.

The values of the extinction coefficients are obtained from measurements in laboratory, and are also included in the IOR files.

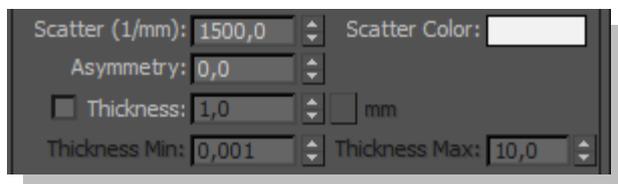
- **Abbe:** The Abbe parameter controls how much dispersion occurs in a transmissive BSDF when Dispersion is enabled. Render time is adversely affected when low Abbe values are used, due to the complex computational cost of these calculations.

In order to create Sub-Surface Scattering materials, we have several parameters included inside of BSDF layer.

Sub-Surface Scattering (SSS) simulates the effect of light entering a translucent object and scattering inside it. Some of this light is absorbed and some is also scattered back to the surface. It is a crucial component that allows you to accurately simulate many kinds of materials including plastics, marble, milk, skin etc.

The SubSurface editor panel provides access to the values which define the behavior of a Maxwell Render SubSurface material.

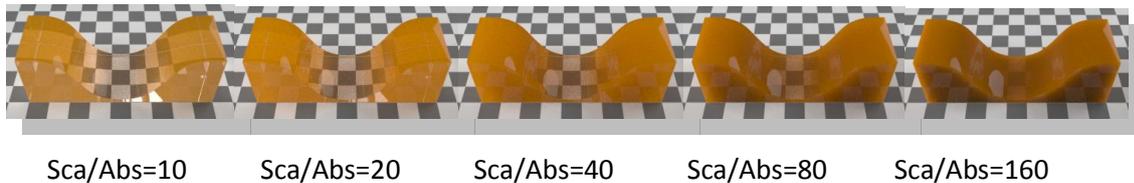
The parameters are:



- **Scatter (1/mm):** Defines the amount of light to be scattered back from sub-surface. When increased, the surface will become more translucent. Increasing this parameter will cause more of the light that enters an object to be scattered inside. Low values will make clear, glass-like materials.
- **Scatter Color:** Because the scattering coefficient acts as a multiplier for the scattering color, setting the color to 255,0,0 and scattering coefficient to 1 is the same as setting the scattering color to 1,0,0 and the scattering coefficient to 255: the same amount of light will be scattered inside the object.
- **Absorption (1/mm):** This parameter acts as a multiplier for the inverse color set in the transmittance parameter. The inverse color of the transmittance parameter will be absorbed faster. Increasing this parameter will cause light to be absorbed faster inside the material. Low values will make the material more translucent (more light will pass through the object) and high values will make it look more opaque. Because it is tied to the transmittance parameter, setting the transmittance to RGB 255 (full white), means no light gets absorbed by the material and this parameter will then have no influence. The absorption coefficient is dependent on the brightness of the transmittance color. A brighter transmittance color plus a high absorption is similar to setting a darker transmittance color plus a lower absorption.

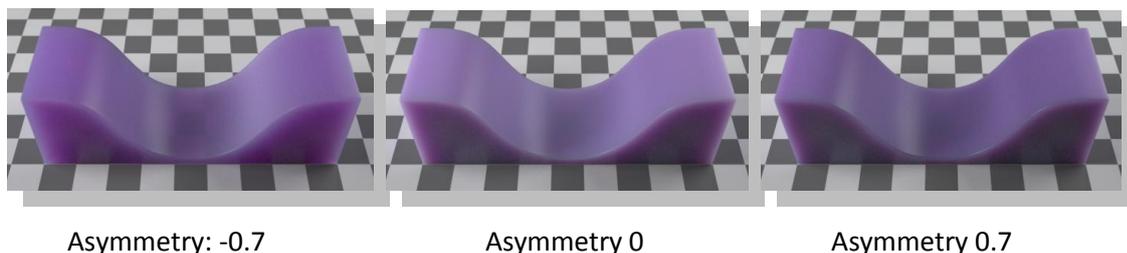
The transmittance will be defined with the transmittance color in the BSDF, this option specifies which dominant color of the light spectrum should be transmitted inside the object and which inverse ranges of the light spectrum will be absorbed faster. For example, if you set the transmittance color to dark red, then the inverse color range (bright cyan) will be absorbed the most.

Example of increased scattering and absorption coefficient. The same color - 255,128,0 (orange) was used for both Scattering and Transmittance:



- Asymmetry:** Defining the dominant direction of the scattering, this parameter can go from -1 to 1. When light hits a particle, the light can scatter equally in all directions (isotropic scattering, asymmetry set to 0) or it can scatter in a dominant direction (anisotropic scattering, asymmetry set to something other than 0). Negative asymmetry scatters the light more in the same direction as the incoming light meaning light can travel deeper inside the object with the effect of increased translucency. Set the asymmetry to a negative value for more translucent materials. Positive asymmetry sends more light back towards the direction of the incoming light, which results in brighter edges on the object. However, more of the light is scattered back and so the light travels a shorter distance inside the object, making positive asymmetry better suited for more opaque materials.

Examples of negative, zero and positive asymmetry values:



The N_d value for the SSS will be indicated by the N_d of the BSDF, it controls the index of refraction and Fresnel of the material and thus controls how reflective the surface will become. It also controls the diffusion of light inside the volume. This means higher values will blur the refractions more. With SSS, the normal N_d range is from 1.01 - 2. Raising it further may give strange results and will make the surface too reflective.

Note: We can access to the wizard to create materials with SSS by default

Tips:

- SSS must have a closed (watertight) volume to work properly. If there are any holes in your geometry, you will get dark or strange areas in the render.
- The SSS effect is scale-dependent. Model your objects to realistic scale and make sure it has the same thickness as the real object would have for best results. Strictly avoid using one-sided polygons; instead make thin volumes for thin objects.

- Try the material presets dropdown, and also the SSS converter first to get an idea of what the common parameters are and how they work.
- When setting the Asymmetry parameter, try not to use very high positive or negative values such as -0.7 or 0.7 because this will increase the amount of noise in your render and produce unrealistic results.
- Keep in mind that the Asymmetry parameter can help to create a more translucent or solid look, but that the main parameter for this is the Scattering parameter. The Asymmetry effect is highly dependent on the scene illumination because it depends on which direction the light is coming from.
- It is possible to mix several SSS components using weight maps, or SSS and BSDF. For example, you can easily create an SSS volume with a BSDF logo on it.
- To optimize your scenes, avoid placing emitters meant for scene illumination such as spot lights behind an SSS object.



Different Maxwell Render materials with SSS



Different Maxwell Render materials with SSS

Note: Surface properties are applicable to SSS channel too. To see a description of the parameters of Surface properties go to BSDF layer above.

- **Use R2:** Indicates a start value and end value to define a custom fresnel curve.
- **Use IOR:** Activate/deactivate IOR File.
 - **IOR File:** We can use an .ior file which provides Maxwell Render with the exact index or refraction for each wavelength .

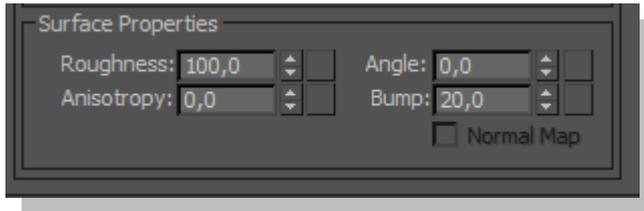
Note: A Maxwell Render BSDF simulates reflective fall-off effects using a realistic Fresnel reflection model. What this means in practice can be observed in semi-diffuse real-world materials, where a direct angle of view will yeild no defined specular reflection, and a glancing angle of view will reflect the environment. In the case of reflection, the Nd parameter controls the rate at which this transition may be observed, with low values causing low frontal reflection, and high values causing high frontal reflection.

In the case of a transmissive (dielectric) material, the results of this phenomenon affect how much light will actually be allowed to enter the object from various angles of incidence. Low Nd values (<2.0) minimize frontal reflection, yeilding transparent dielectric materials, while higher Nd values will cause the object to reject ever-increasing amounts of light, even to the point of effectively reflecting all light from all angles.

Custom IOR Mode uses a BSDF's Reflectance 0, Reflectance 90, and Transmittance parameters (or Textures), combined with the Nd and Abbe parameters to define the overall Reflectance/Transmittance of a given BSDF layer.

Complex IOR Mode uses an IOR (.ior) file to define all Reflectance/Transmittance parameters. While computationally intensive, Complex IOR materials offer the most accurate simulation possible.

- **Surface Properties:** Surface properties controls the aspect for Maxwell Render material.



Roughness: The Roughness parameter defines how smooth a BSDF layer is, using values from 0 (perfectly-smooth), to 100 (perfectly-Lambertian). A perfectly-Lambertian surface is one that reflects light evenly in all directions, that is, a perfectly-diffuse surface. A Texture may also be used to define Roughness, where white areas would correspond to high Roughness values, and black areas to low Roughness. In this case, the Roughness value is used to clamp the upper range (white) Roughness areas defined by the Texture.

Anisotropy: The Anisotropy parameter defines a surface that reflects light in a directional manner, as with a brushed metal. A Texture may be employed to control the distribution of this effect.

Angle: The Angle (Anisotropy Angle) parameter defines at which angle the directional effects of the Anisotropy parameter occur. A Texture may be employed to control how this angle is defined.

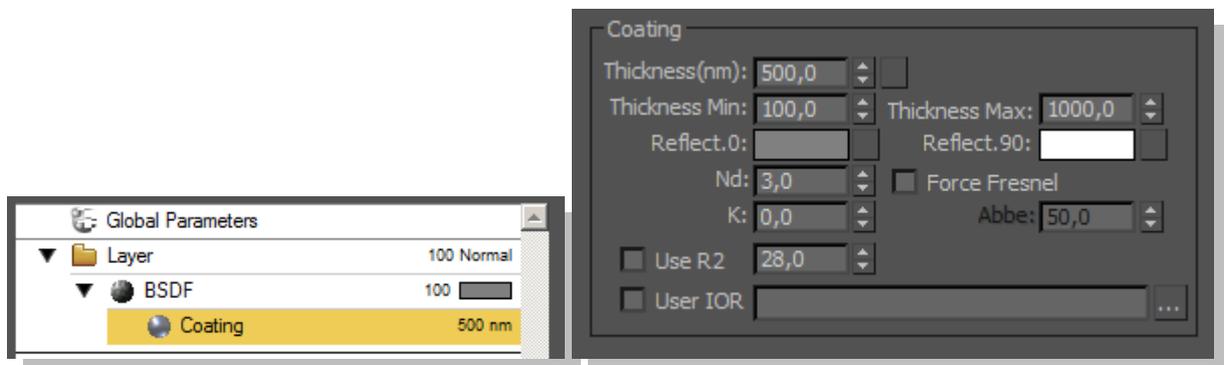
Bump: The Bump parameter works only in conjunction with the use of a Bump Texture. Using values from -100.0 to 100.0, it produces bumping effects across the surface of the object. When using a Texture, black areas correspond to low, or negative, areas, while white areas correspond to high, or positive Bump values. A Bump map may also use a normal map. Use Normal Map button should be enabled and you can control the normal mapping with the other three buttons available (self explanatory): Flip X, Flip Y and Wide Z.

(C)Coating

The Coating editor panel provides access to the values which define the behaviour of a coating. In order to create a Coating layer we'll click on



The parameter are:



Note: To add a coating layer, the BSDF layer must be selected.

- **Thickness(nm):** Indicates the thickness in nanometers for the coating layer. Uses a simple scalar Thickness value to specify the theoretical thickness of the Coating. To avoid heavier interference colors, use higher values for Thickness.
- **Thickness Range:** The Minimum and Maximum values correspond to the dark/light areas of the Texture used.
- **Reflect.0:** It is the light reflected by the material. It is the materials color. It can be set by color or by map. This color is when the object is seen at 0 degrees (frontal view). Reflectances in Maxwell Render Coating layers may be defined in terms of RGB color values for the 0 and 90 parameters. Reflectance 0 defines the color which will be reflected from the more direct viewing angles.
- **Reflect.90:** It is the light reflected by the material when the object is seen at 90 degrees (glancing angle). Reflectance 90 defines the color reflected from glancing viewing angles.
- **Nd:** Index of refraction (IOR).
- **K:** From a physical point of view, the index of refraction is not just a plain number. In fact it is a number derived from a complex calculation to define the refractive index at one particular wavelength. This is the calculation:

Refraction at a particular wavelength = $Nd + K \cdot i$

- **Force Fresnel:** Force Fresnel ensures that the reflectance ramp (curve) between Ref0 and Ref90 will be maintained by the given Nd. It discards the luminance of a given reflectance color and enforces physically correct Fresnel while only deriving the hues of them. When Fixed is unchecked the reflectance value of a surface is derived both from the ND and the luminance of the refl0° color. When Fixed is checked, the reflectance between refl0 and 90° (the Fresnel curve) is maintained according to the Nd, and only the hue of a given reflectance color is taken in consideration.
- **Abbe:** The Abbe parameter controls how much dispersion occurs in a transmissive BSDF when Dispersion is enabled. Render time is adversely affected when low Abbe values are used, due to the complex computational cost of these calculations.
- **Use R2:** Indicates a start value and end value to define a custom fresnel curve.
- **Use IOR:** Activate/deactivate IOR File.
 - **IOR File:** We can use an .ior file which provides Maxwell Render with the exact index or refraction for each wavelength .



Maxwell Render materials with coating layers



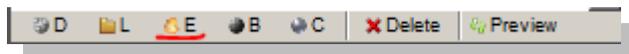
Maxwell Render materials with coating layers

HOW TO ILLUMINATE IN MAXWELL RENDER WITH 3DSTUDIO MAX

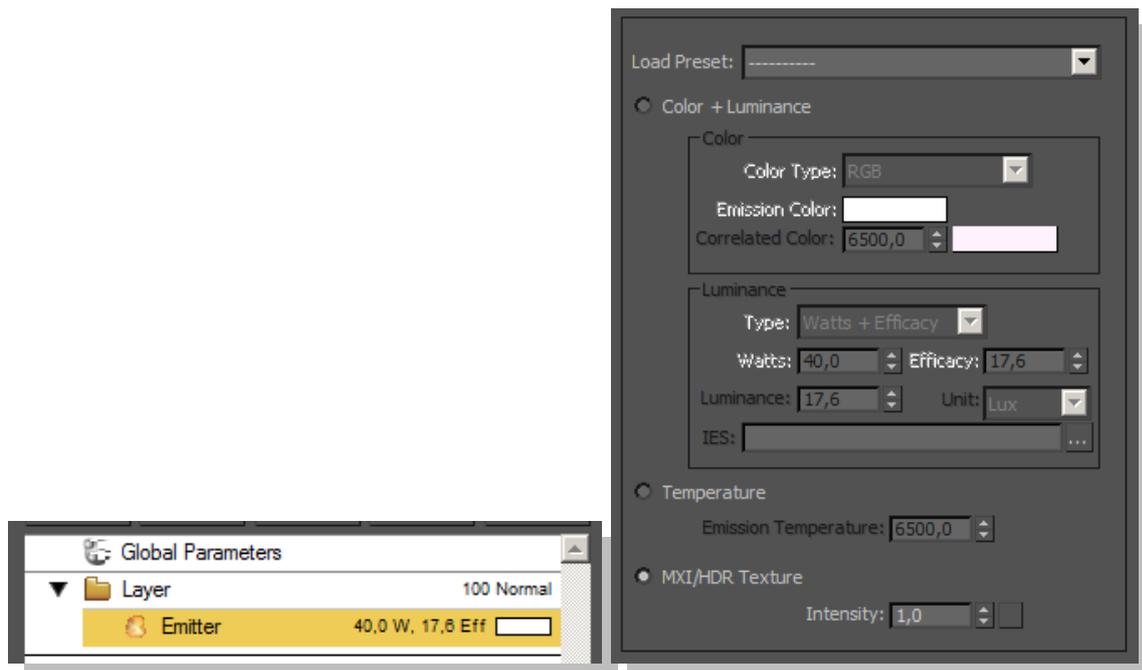
Maxwell Render doesn't use the actual lights from 3dstudio Max such as Omni, Spot or Direct. So you need to create emitter materials to emit light and to illuminate your scene. First you need to consider the scale of the scene to which you are going to apply an emitter material. For instance, if you have a scene with a bulb- and the bulb object is 8 cm in diameter, you can create an emitter material of 40 W and apply it to the bulb, and the light will be emitted correctly. If the bulb however is 8 meters in diameter and the material emitter is 40 W, the light will have more dispersion across its surface, and so will not emit correctly. It is advisable to work with meters, and set the objects to the correct proportions.

(E)Emitter

The Emitter editor panel provides access to the values which define the behaviour of a Maxwell Render Emitter. In order to create a Emitter layer will click on



The parameters are:

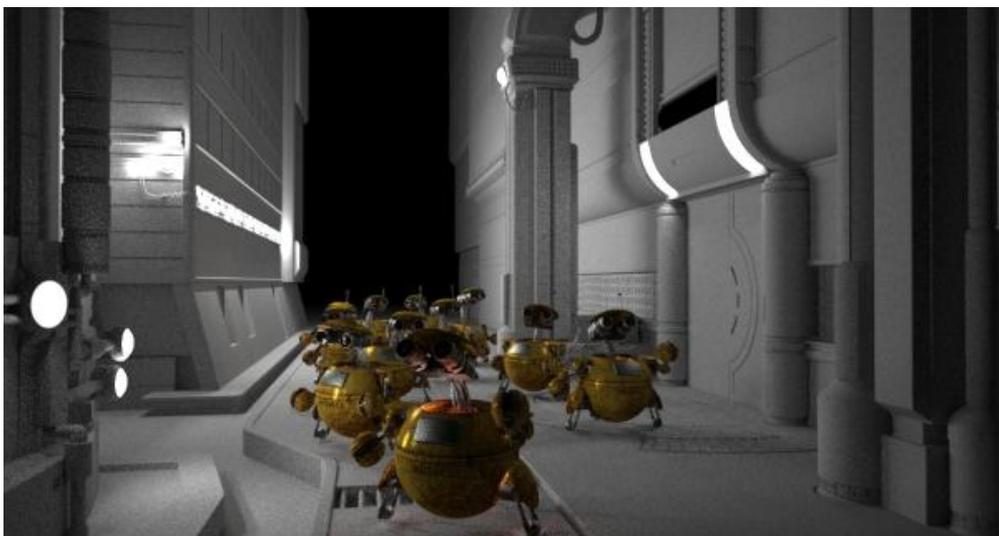
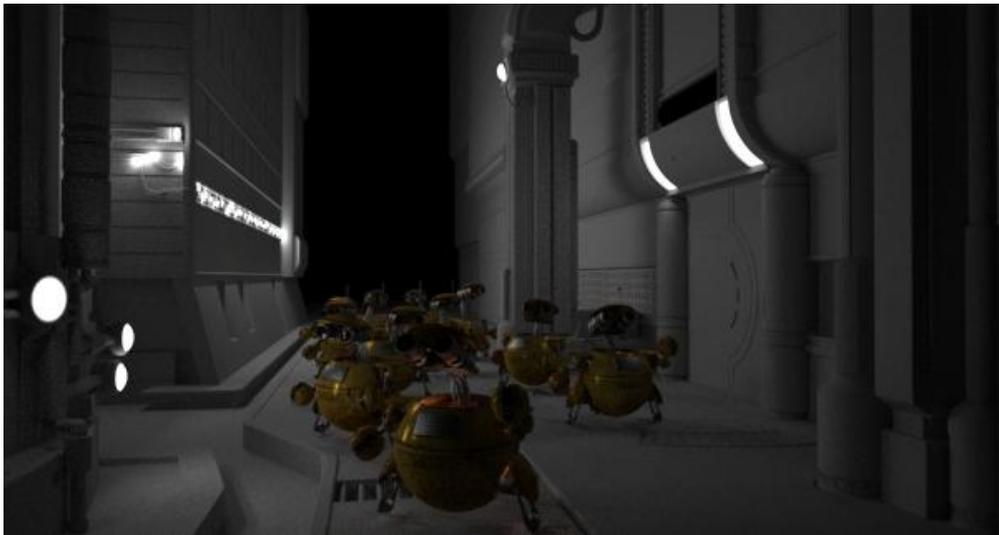


- **Load Preset:** Maxwell Render provides some emitter presets of standard type light sources.
- **Color + Luminance:**
 - **Color Type:** RGB (Red, Green and Blue). Clicking on the colored square allows the user to choose a color in the Maxwell Render emission color.
 - **Emission Color:** Chooses a color RGB for the emission
 - **Correlated Color:** Lets you choose the color that would correspond to an emission in Kelvin degrees.
- **Luminance:** Specifies the intensity of the light.
 - **Type:**
 - **Watts and Efficacy:** Allows you to specify how much electricity a lightsource consumes (Watts) and how efficiently it converts that electricity into visible light (Efficacy). The efficacy number specifies how many lumens are emitted per watt.
 - **Intensity:** Indicates the luminance for the emission
 - **Luminance:** Lumen is the SI (international System of Units) unit for luminous flux.
 - **UNit:** One “Nit” is 1 candela per square meter.
 - **IES:** Emitter will be a IES file or a LDT file.
- **Temperature:**

- **Emission Temperature:** Temperature of emission in Kelvin degrees. A higher temperature will make the emission more intense.
- **MXI/HDR Texture:** This emission option allows you to emit with an MXI/HDR intensity.



Maxwell Render emitter materials



Maxwell Render emitter lights

Instances

Maxwell Render supports instances from 3DStudio Max.

Instances are a memory saver for making multiple copies of an object. You could have for example 10000 instances of an object, and during rendertime, MXCL will use the same amount of memory as if you were rendering 1 real copy of that object. Examples of uses can be trees, bricks, stones, furniture, etc...

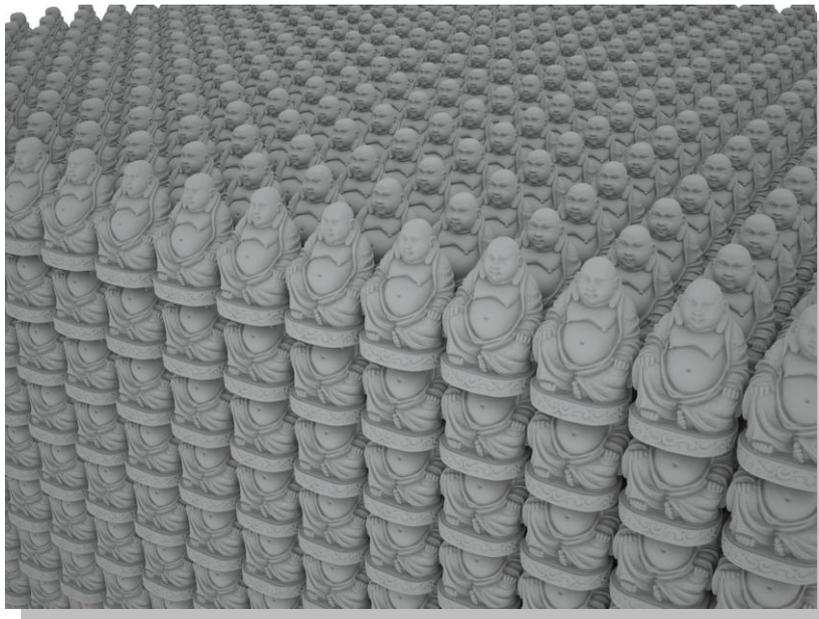
Maxwell Render Instances have got some specifications that worth knowing to correctly use them.

Instances cannot emit light, so if an emitter material is applied to the initial object, the copies will be automatically transformed into geometry when the MXS file is saved. Meaning this you won't get advantage of the memory savings because you'll have real copies of the initial object.

Instances will inherit the material applied to the Initial object unless otherwise specified. Each instance can have its own material, different from other instances'. However we have to take a closer look in the case of multimaterial objects. Instances will inherit multimaterial properties from the initial object but the user cannot specify multimaterial directly to an instance.

Note: Motion Blur and instances cannot currently run together in Maxwell Render. So if Motion Blur is enabled in Maxwell Render Options, the plugin will automatically treat layout clones as geometry copies, allowing the render to show the desired motion blur (but not having the memory benefit from instances).

Note: "use instancing" is off by default in existing scenes to ensure maximum compatibility; it's on in newly created scenes

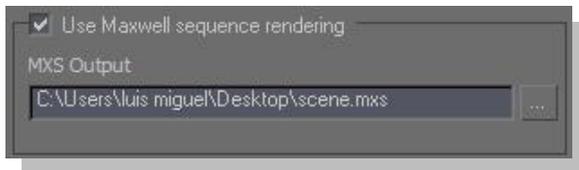


20x20x10 matrix (4000pcs), 370K poly each, Total: 1.5G poly, mxcl memory consumption is less than 200MB. Image by Tom

Export MXS Files

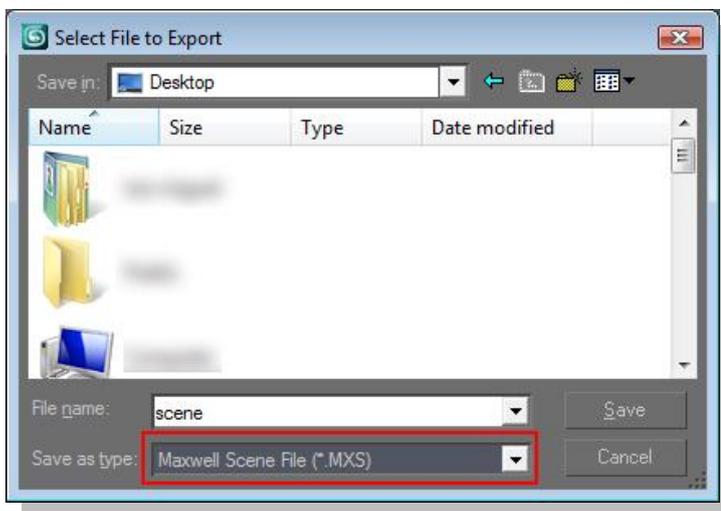
In order to export a scene directly as MXS format we have 2 options:

- From general settings we can put the name of the file MXS and rendering the scene. MXS file will be saved in the path where you introduced in the MXS output.

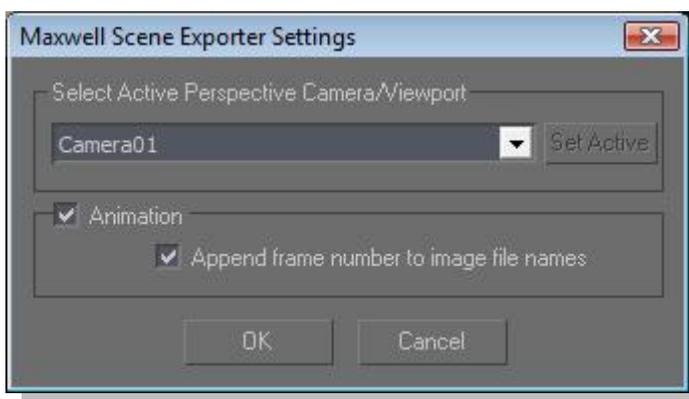


Note: If we are rendering an animation, a MXS file will be saved per frame.

- From File/export... menu



We indicate where it will be saved and the name for the MXS file in our hard disk. Another dialog box will appear where we can set the camera and if we want export the complete animation.



- **Select Active Perspective Camera/Viewport :** We can select the actual views to export the MXS file. Orthographic views are not allowed.
- **Set Active:** We can put the actual perspective view as active view.
- **Animation:** Append frame number to image file names

Maxscript

Maxscript is supported from Maxwell Render by 3DStudio Max plugin:

maxwellExportMXS <output:MXS filePath> <camera:cameraName>
[selectedObjects:TRUE/FALSE] [[animation:TRUE/FALSE]
[appendFrameNrToImg:TRUE/FALSE]]

maxwellMaterialExport <material:maxwell_material_node> <output:mxm_file_name>

maxwellMaterialImport <material:maxwell_material_node> <input:mxm_file_name>

maxwellLoadSky input:"C:\filename.sky"

maxwellSaveSky output:"C:\filename.sky"

Note: In order to see the Maxwell Render properties introduced in Maxscript type
"showProperties renderers.current" in the script listener.

FAQ Index:

- What does 'There is no MAXWELL_ROOT environment variable on this machine' mean?
- Why aren't my Emitters working?
- Why do projections show up as 'locked' when I open my MXS in Maxwell Render Studio?
- I've pressed 'Render' but no application is showing up.
- By enabling Motion Blur I don't get instances but copies.
- Why SSS shows black holes?

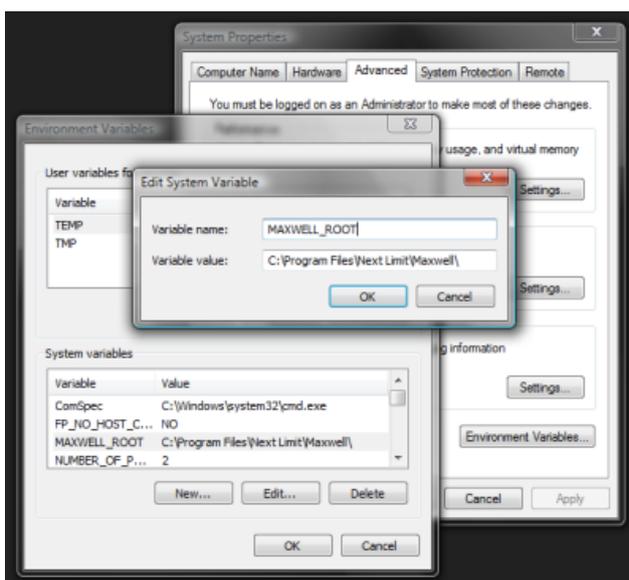
Question: What does 'There is no MAXWELL_ROOT environment variable on this machine' mean?

If you encounter this error when attempting to load the plugin, it means that either:

- Maxwell Render is not installed on the machine. Download and install Maxwell Render to fix the problem
- Maxwell Render is incorrectly installed on the machine. Uninstall/re-install Maxwell Render to fix the problem

An System Environment Variable is a value that is available to every application on your machine. As such, the MAXWELL_ROOT variable points to Maxwell's Render home directory, and provides the ability for any application that wishes to locate Maxwell Render to be able to do so. So, it is very important that it is correctly set when you install Maxwell Render. Usually this is no problem, but there are always cases where installation is not completely successful, and it is possible that you may need to manually create the variable. Note that you should proceed with caution when accessing Environment Variables. If you alter Environment Variables without having very specific reasons, you may encounter problems with the applications that rely on them.

To view your System's Environment Variables, go to: Start > right-click My Computer > Properties > Advanced > Environment variables:



If Maxwell Render is installed correctly, there should be a MAXWELL_ROOT variable present, similar to the one shown. Note that the actual path may differ, depending on where Maxwell Render is installed on your machine.

Question: *Why aren't my Emitters working?*

Maxwell Render Emitters behave according to real-world parameters. Therefore, it is necessary to:

- make sure your scene scale is realistic - 100W spread out over 100 sq. meters is not very bright
- make sure your emitter plane normals are facing the correct direction
- make sure your camera settings are correct
- make sure that the Emitter power is defined correctly (don't forget efficacy for watt-based emitters)

Question: *Why do projections show up as 'locked' when I open my MXS in Maxwell Render Studio?*

The MXS format does not hold data about 'projectors', UV mapping is saved on the objects themselves in the form of UV data attached to each mesh triangle. So in short, it is not projectors which are written into an MXS, it is the UV coordinates that they create.

Question: *I've pressed 'Render' button but the render doesn't seem to start.*

It's probably that you have to do an extra step once the scene file has been exported, and press 'Done' button afterwards.

This happens if the plug-in issued some warning during the export process.

Question: *By enabling Motion Blur I don't get instances but copies.*

Motion Blur and instances cannot currently run together in Maxwell Render. So if Motion Blur is enabled in Maxwell Render Options, the plugin will automatically treat layout clones as standard geometry, allowing the render to show the desired motion blur (but not having the memory benefit from instances).

Question: *Why SSS shows black holes?*

SSS must have a closed (watertight) volume to work properly! If there are any holes in your geometry you will get dark or strange areas in the render.