otoy

Greek Vases by Florinmocanu

octanerender™

user manual

version 1.20

OctaneRender™ Standalone Edition User Manual

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http://render.otoy.com

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By Enrico Cerica

Chapter 1

Installation

1. Installation Requirements

1.1 Hardware Requirements

OctaneRender™ requires a NVIDIA CUDA-enabled video card.

OctaneRender™ runs best on Fermi (e.g. GTX 480, GTX 580, GTX 590) and Kepler (e.g. GTX 680, GTX 690) GPUs, but also supports older CUDA enabled GPU models. GeForce cards are fast and cost effective, but have less VRAM than Quadro and Tesla cards. OctaneRender scales perfectly in a multi GPU configuration and can use different types of Nvidia cards at once e.g. a GeForce GTX 260 combined with a Quadro 6000. The official list of NVIDIA CUDA enabled products is located at https://developer.nvidia.com/cuda-gpus.

1.2 Software Requirements

OctaneRender™ is available for the following operating systems :

- Windows XP, Windows Vista, Windows 7, Windows 8 (32 and 64 bit)
- Linux (64 bit only)
- Macintosh OSX (32 and 64 bit)

1.3 Drivers

OctaneRender requires a Nvidia driver supporting CUDA 4.2. On Windows and Linux you only need a recent enough Nvidia driver (http://www.nvidia.com/download/index.aspx?). For MacOS we recommend using driver version 4.2.10 (http://www.nvidia.com/object/mac-driver-archive.html).

Looking to buy a new GPU for OctaneRender™?

There are several things to consider when purchasing a new GPU. You'll want to purchase a video card with the largest amount of RAM (we recommend a minimum of 1.5 GB video RAM), with the most amount of CUDA Cores for your budget. Make sure your Power Supply can handle the new card as well. If you're using a Mac, make sure that you purchase an Apple approved GPU.

Failure to install these driver versions may result in stability problems. The OctaneRender™ Team cannot provide support to users of different driver versions.

1.4 Internet Access

OctaneRender™ requires internet access to launch the first time. Internet access is not required to use OctaneRender™. When no internet access is present, the Live Database will not be accessable.

Upon launching OctaneRender™ for the first time, the user will need to log in to their OctaneLive™ account. This information can be found by logging on to the customer area on the OctaneRender™ homepage.

Your OctaneRender license can only be active on one machine at a time. If you wish to transfer your license to another machine, you will have to deactivate it on the current machine and reactivate it on the other one, (re-activation might cause a slight delay). In case of difficulty, contact support@octanerender.com

2. Windows Installation

To install OctaneRender™ on Windows, ensure that you have installed a suitable driver for your video card. After this, you only have to run the installer.

The latest video card driver can be downloaded from here:
http://www.nvidia.com/Download/index.aspx?lang=en-us

3. Mac OSX Installation

To install OctaneRender™ on Mac OSX 10.5 and OSX 10.6 (32 and 64 bit), you will need a recent enough CUDA driver. We recommend using driver version 4.2.10. which can be downloaded from http://www.nvidia.com/object/mac-driver-archive.html.

For users of Mac OSX 10.5 only, the installation of the XQuartz package available from:

http://xquartz.macosforge.org/trac/wiki/X112.6.3

Download the X11-2.5.3.dmg package and install it prior to running OctaneRender™ the first time. The XQuartz package is not needed for Mac OSX 10.6 users.

4. GNU Linux Installation

To install OctaneRender™ on GNU Linux (64 bit only) you will need a recent enough Nvidia driver which can be downloaded from:

http://www.nvidia.com/download/index.aspx?

OctaneRender™ for Linux was built and tested on CentOS 5.6 using GCC 4.1.2. Due to that libstdc++ must be of version 4.1.2 or higher.

5. Hardware Options

The options for adding GPU muscle to a current computer depends on available PCI-E slots on the computer.

Single PCI-E Slot

If the computer has a single PCI-E slot, the upgrade options are fewer. One could simply add a more powerful GPU as long as the power supply can provide enough power for the new GPU. Dual GPU, single slot card solutions like the GTX 590 or GTX 690 may also be used in this situation, again assuming that the power supply is sufficient to power the video card.

A second option is to use an external expansion box which contains multiple GPUs. This allows the use of multiple GPU's with a computer that only has a single PCI-E slot. For the smoothest user experience with OctaneRender™, it is recommended to dedicate one GPU for the display and OS to avoid slow and jerky interaction and navigation. The dedicated video card could be a cheap, low powered card since it will not be used for rendering and it should be unticked (off) in CUDA devices in the Device Manager/Preferences.

Special thanks to forum user pixelrush for the inspiration for these hardware diagrams.

Two PCI-E Slot Motherboard

If the computer has two PCI-E slots the user is presented with many additional upgrade options.

One option is to install a second graphics card along with the currently installed GPU. If the existing GPU is slow, it can be used to power the display only and the second card can be dedicated to OctaneRender™. This will allow the OS to be smooth and the computer will still be responsive while the second GPU is tasked with rendering.

Another option would be to add an additional GPU to assist in rendering. In this situation, it is best to have both GPU's match in model and ram content. This allows multi-GPU rendering but the OS interface may still be slowed as all the GPU processing power is dedicated to the rendering process. In multi-GPU setups, the amount of RAM available to OctaneRender™ is not equal to the sum of the RAM on the GPUs, but it is restricted to the GPU with the smallest amount of RAM. It is recommended to disable GPUs that don't have enough RAM to allow for rendering large scenes that can fit in the RAM of the remaining GPU.

A third option is to use an external expansion box in the second slot. This allows the use of multiple GPU's while having a video card dedicated to the OS which allows for no degradation in OS performance while realizing incredible multi-GPU rendering speed at the same time. A variation of this setup would

place a third rendering GPU in the motherboard in place of a basic GPU. This would allow three GPU's to be used for rendering.

Three or more PCI-E Slot Motherboard

If the computer has three PCI-E slots the user is presented with many additional upgrade options. If the power supply is sufficient, one GPU can be dedicated to the OS display while two or more GPU's can be used for rendering.

Multi GPU setups, power supply and energy consumption considerations:

It is very important to use a suitable power supply when using multiple GPUs. For more info on what power supply is best for your case, visit http://www.nvidia.com/object/slizone_build_psu.html

We recommend to use GPUs based on the Kepler architecture as these cards have more memory and consume less power than Fermi GPUs, but are just as fast with OctaneRender™.

3Dconnexion Space navigator support

OctaneRender™ supports camera movement with a 3D mouse on all platforms. The movement is camera-centric: movements you make will be translated to camera movements.

Setup

Make sure the correct drivers for your 3D mouse are installed. On Windows and Mac OS X your 3D mouse should work after you plug in the 3D mouse. On Linux you should make sure the driver is running before you start OctaneRender™. If you start the driver later, lock and unlock the viewport to detect the 3D mouse.

On Windows, the settings from the 3Dconnexion control panel have no effect. You can change the speed of the movements and invert setting in the menu's File → Preferences → Controls in OctaneRender.

6. Troubleshooting

Most problems with OctaneRender™ can be traced to the following situations. Please refer to the issue numbers listed to find common solutions.

Issue	Description
6.1	Cannot find driver for laptop or computer
6.2	OctaneRender™ won't open due to "No Cuda Devices"
6.3	OctaneRender™ won't open due to License Issues
6.4	OctaneRender™ crashes loading a file
6.5	Render looks strange or gives unexpected results
6.6	Navigation of Viewport is slow / UI is Unresponsive
6.7	OctaneRender™ works for a while then closes while rendering
6.8	Can't change settings or save renders
6.9	OctaneRender™ does not see all available video cards
6.10	Additional Helpful Hints

Special thanks to forum user pixelrush for the compilation of this troubleshooting information.

6.1 Cannot Find Drivers for Laptop or Computer

Problem: The available OEM drivers are not recent enough

Solution: As a work around, find a suitable official Nvidia driver, unzip the executable, and modify the device list to include your hardware. Then, manually install the driver. See forum or search internet for more detailed information.

Problem: Newly released card and waiting for updated Nvidia driver to support it

Solution: The new drivers should be released shortly. OctaneRender™ and Cuda are in constant development and new hardware and Cuda revisions are being released regularly. There are a few occasions where this situation occurs and causes a delay in getting the most out of your hardware and OctaneRender™.

6.2 OctaneRender™ Won't Open Due to "No Cuda Devices" Error Message

Problem: Incorrect Driver installed

Solution: Read the release notes to ensure that you have the correct driver version installed.

Attempt to remove the old driver versions and then install the proper version. It may be necessary to use a tool such as Driver Sweeper to get all driver components uninstalled.

Problem: Video Card is not Cuda enabled

Solution: Check the list below to ensure that your card is in fact Cuda enabled.

http://developer.nvidia.com/cuda-gpu

It is recommended to use a card with at least 128 Cuda cores and preferably a Fermi generation card with more than 300 Cuda cores or above for decent render performance. For Kepler cards, a minimum of 768 Cuda cores is recommended.

6.3 OctaneRender™ won't open due to License Issues

Problem: OctaneRender™ is not Licensed

Solution: Your customer details have been incorrectly entered into the licensing system. If you suspect a problem, contact us at license@octanerender.com

Problem: OctaneRender™ is not "Activated"

Solution: Either your license has not been processed or the current license is activated on another machine. Deactivate the copy of OctaneRender™ on the previous machine and activate the new machine after waiting 30 minutes. This can also be accomplished via the customer login area at http://render.otoy.com

Problem: OctaneRender™ cannot connect to the OctaneLive™ servers

Solution: This could be due to two issues:

1) Configure your firewall or router to allow outbound connections to the URL named live1.octanerender.com

2) Your customer details have been incorrectly entered by either you or members of the OctaneRender™ Team into the licensing system. If you suspect a problem, contact us at license@octanerender.com

6.4 OctaneRender™ Crashes Loading a File

If OctaneRender™ crashes upon loading a user created file, ensure that OctaneRender™ and the drivers are installed correctly by downloading and loading the demo suite files located at:

http://render.otoy.com/downloads/OctaneRender_1_0_DemoSuite.zip

Problem: Problems inside Obj file such as stray edges, vertices, etc.

Solution: Re-export the scene using different exporting options from the modeling program or export script

Problem: Special Characters inside Obj or MTL file.

Solution: OctaneRender recognises filenames containing spaces, and it should be able to use files with non-latin characters. An OBJ or MTL file containing special characters may be encoded in UTF-8.

Problem: Incompatibility of previous version macros and OCS file format.

Solution: Unfortunately, the only way to get around this is to recreate the macros or OCS file in the current version.

Problem: Insufficient system or video ram

Solution: It is recommended to use a 64 bit operating system with more than 4 GB of system ram. Also, if possible use a video card with more than 1 GB of vram.

For example, 1 GB vram is sufficient for 3 million polygons with medium texture use and a medium render size. To render in larger resolutions or to utilize more high resolution textures, a video card with more than 1 GB vram might be necessary.

Problem: Display Video Card is not active while CUDA enabled card is active

Solution: This may require swapping video card slots on the motherboard or changing bios settings so PCI-E slot with the display is "Initialized First". Review your motherboard documentation for the exact wording and location for this setting.

6.5 Render Looks Strange or Gives Unexpected Results

Problem: Concentric circles over the image or unusual effects including bump map not working

Solution: Check the scale of the imported scene and change the rayepsilon value. Typically this is due to the scale being incorrect by a factor of 100 or 1000X. Octane expects 1 unit in the scene to equal 1 meter. Adjust export settings in the modeling application or adjust the import settings in OctaneRender™.

Problem: Facetting occurs revealing the underlying polygonal mesh, Geometry or Normals issues

Solution: Ensure that the geometry and normals are correct in the modeling program. Re-export the scene if necessary. Make sure the Normal Smoothing boolean value ("smooth") is enabled for each material in the Node Inspector.

Problem: Bump map does not show up

Solution: When a bump map and normal map are both loaded, the normal map will take priority and the bump map will not be used.

Problem: Images do not look right on the model.

Solution: This may be due to the way the model was UV unwrapped. This may need to be redone more precisely in the 3d modeling application and re-exported.

6.6 Navigation of Viewport is Slow / UI is Unresponsive

Problem: Known issue with display refresh time out on Windows

Solution: This can be attributed to a function that is included in some operating systems that shut down any program after the OS has lost communication with the GPU. Since higher resolutions and Path Tracing both can take long periods of time to render a single frame, the OS loses contact with the GPU and shuts down Octane

This can be resolved one of two ways:

1. Purchase a second GPU and dedicate one to OctaneRender™ and one to the operating system

2. Adjust the time out values specific to the operating system.

As this typically involves adjusting critical OS files, it is not recommended and not supported by the OctaneRender™ Team.

For Microsoft Windows systems, more information can be read here:

http://www.microsoft.com/whdc/device/display/wddm_timeout.mspx

Problem: Render card has insufficient performance

Solution: 96 Cuda cores are considered the absolute minimum although OctaneRender™ will technically work with fewer. It is suggested that a more powerful GPU (Fermi or Kepler recommended) be purchased to get the most out of OctaneRender™.

Problem: Navigating is slow. Is there anything else I can do?

Solution: To increase the speed of navigating in OctaneRender™, you can:
- use the Shift key while rotating, moving or translating the Render Viewport
- use the Sub-Sampling settings (3 checkerboard icons in the viewport) to increase the speed of navigating in the viewport
- reduce the render resolution of the viewport while setting up materials, lights and camera.

6.7 Can't Change Settings or Save Renders in the demo

Problem: Insufficient Power Supply

Solution: The current generation of Cuda enabled GPU's can be very demanding on a computers power supply. When going with multiple video cards it can be even more demanding. Purchase a new power supply if necessary to ensure that all components have sufficient energy to do their task.

Problem: Graphics Card or Computer Overheating

Solution: Make sure the computer case has good ventilation which may include purchasing additional cooling fans or a different case altogether. Ensure the case has a good amount of space around all air intakes and vents. Heat sinks and fans will also build up dust and lose their cooling capacity. Use canned air to clean out computer cases, heat sinks and fans regularly.

Free software tools such as Speedfan, EVGA Precision and GPUZ can assist in determining temperatures of the GPU and will assist in setting fan speeds if necessary.

6.8 Can't Change Settings or Save Renders in the demo

Problem: Changed settings do not keep when closing and restarting Octane

Solution: This is currently not available for Demo Users.

Problem: I cannot save any renders or use the built-in animation tools

Solution: This is currently not available for Demo Users.

6.9 Windows and the Nvidia driver see all available GPU's, but OctaneRender™ does not.

There are occasions when using more than two video cards that Windows and the Nvidia driver properly register all cards, but OctaneRender™ does not see them. This can be addressed by updating the registry.

This involves adjusting critical OS files, it is not supported by the OctaneRender™ Team.

1) Start the registry editor (Start button, type "regedit" and launch it.)

2) Navigate to the following key:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\{4D36E968-E325-11CE-BFC1-08002BE10318}

3) You will see keys for each video card starting with "0000" and then "0001", etc.

4) Under each of the keys identified in 3 for each video card, add two dword values:

DisplayLessPolicy
LimitVideoPresentSources

and set each value to 1

5) Once these have been added to each of the video cards, shut down Regedit and then reboot.

6) OctaneRender™ should now see all video cards

6.10 Additional Helpful Hints

1) PCI-E 16X / 8X / 4X / 2X slots are sufficient to run OctaneRender™. PCI-E 1X slots are not as it slows down the transfer of data too much. PCI-E bandwidth sharing by mixing 16x and 8x slots is possible.

2) It is best to use two or more video cards of the same speed and ram configuration when using them with OctaneRender™

By Wojciech Migdal

Chapter 2

Program Overview

1. Interface Overview

Render Viewport (fig. 2.1)
The render is constantly updated in the Render Viewport. The scene can be navigated in real-time. Adjustments to materials, lights and camera can be made and viewed iinteractively.

Node Inspector (fig. 2.2)
The Node Inspector allows the user to make changes to the various settings in the scene, lighting and material nodes.

Graph Editor (fig. 2.3)
The scene and materials are represented by nodes in OctaneRender™. This allows for powerful material editing as well. Don't be scared, if you don't know how to use nodes because great renders can still be produced without needing to use them.

Outliner (fig. 2.4)
The Outliner allows the user to see an overview of all the elements in the scene and also allows them to use the local and online node databases.

2. The Render Viewport

fig. 2.4

Render progress

GPU quick information

The Render Viewport (fig. 2.4) is used to manipulate the scene interactively. Unlike traditional renderers, OctaneRender™ allows the user to adjust many aspects of the scene while maintaining a complete rendering environment. Horizontal and vertical scrollbars on the renderview allows viewing parts of the image that fall out of the display area.

The Render Viewport contains buttons (fig. 2.5) located at the bottom of the window that allow the user to control several aspects of the render process.

fig. 2.5

3. The Node Inspector

The Node Inspector (fig. 2.6) is used to make changes to nearly every aspect of the render / scene in OctaneRender™. Any nodes that are selected in the Graph Editor are displayed in the Node Inspector where their values can be adjusted or changed. When using the Material Picker, the currently selected material will also be displayed in the Node Inspector.

The Node Inspector also includes quick buttons (fig. 2.7) that allow the user to quickly jump to the most commonly used nodes (RenderTarget, Camera, Resolution, Environment, Imager, Kernel, Current Mesh). It also has context menus allowing to copy, paste, and fill empty node pins.

The bottom of the Node Inspector window also hosts the status for both the OctaneLive and Online status. (fig. 2.8)

fig. 2.6

fig. 2.7

fig. 2.8

4. The Graph Editor

The Graph Editor (fig. 2.9) allows the user to view the nodes associated with the current scene. The Render Target includes all of the scene related nodes including the Environment, Imager, Kernel, Resolution and Camera Nodes. The user can pan the node graph editor with the mouse. Selecting a node in the Graph Editor will bring that node's settings up in the Node Inspector along with its empty node pins. The user can fill empty node pins either in the Graph Editor or in the Node Inspector. Placing the mouse cursor over a node pin will show the name of the material contained in the pin.

fig. 2.9

Selecting multiple nodes

Start dragging in an empty area of the node graph editor to select multiple nodes with a box. Hold down Shift to add the selection to the current selection. Hold down Ctrl to deselect nodes. You can also add and remove nodes from the selection by holding Ctrl and clicking on a node. The node graph editor supports copy/paste with right clicking or keyboard shortcuts (Ctrl+C and Ctrl+V) and there are application-wide shortcuts for cut, copy, paste and delete commands which are placed in the application menu. Copying and pasting nodes will also duplicate connections coming from other nodes to

the copied nodes. Dropping of macro and mesh files on the nodegraph editor is also possible.

Right-click on a node for a context menu

Right clicking on a node invokes a context menu with options 'delete' allowing you to delete all selected nodes, 'save' saves the selected nodes as a macro file or in LiveDB, and 'render' (if available) which will render the node under the cursor. Node pin connections are saved when saving multiple nodes. The context menu also includes 'Show in Outliner' which will quickly pick and select the respective node's corresponding element in the Outliner.

fig. 2.10

Right-click in the node graph editor

By right-clicking in the node graph editor you can import nodes from a file and places the new node on the cursor location.

fig. 2.11

The Graph Editor also has buttons (fig. 2.12) that allow the display of the internal material preview scene when
a node is selected.

fig. 2.12

Quick material previews

It is possible to enable quick previews of materials and textures inside the node inspector. These will be rendered without interrupting the main render, and will update automatically when the material or texture is changed. The scale of the material can be updated as well.

There is a choice of a preview on a sphere and a flat 2D preview. The scale of the object shown is customizable, and users can choose default settings in the settings dialog.

5. The Outliner

The Outliner (fig. 2.11) allows the user to view the current project in an outliner format. This allows the user quick access to any of the parameters / nodes of the scene. Selecting a parameter in the Outliner brings that node to focus in the Node Inspector. The Outliner also has context menus allowing to copy, paste, and fill empty node pins.

fig. 2.11

The tabs in the Outliner also allow the user to view the Local and Live Databases that can house any Macro that is created. The Live Database ("Live DB" tab) allows instantaneous access to any macro that is uploaded from the entire Octane community. This allows the user to save a novel new material to the database where it will be accessible by every Octane user.

6. The OctaneLive™ Account Settings

The OctaneLive™ Account Settings dialog (fig. 2.12) allows for control over whether the account is logged into the current copy of OctaneRender™. If the user wants to use OctaneRender™ on another machine, they can deactivate the key from the current machine and re-use it to activate OctaneRender™ on another machine. Note that there is a thirty-minute to one hour stand-down period after each deactivation. Users can only log into another machine using the same license key after this period. To Open the Dialog, click on **File** and then choose **Preferences > OctaneLive**.

fig. 2.12

The Account Settings Dialog box is also used for entering:

- The Community / Forum Nickname
- The Users Full Name
- Credits (Used when publishing Macros to the Live DB)
- Copyright Information

7. The Application and Controls Settings

Settings related to default render resolution, viewport control mappings and default file locations are managed in the Applications Settings dialog and the Controls Settings dialog (fig. 2.13) . To open the Dialog, click on **File** and then choose **Preferences -> Application (or Controls)** tab. The settings saved here will be uploaded to the users Octane-Live™ account and will be available if they log into another copy of OctaneRender™.

The Viewport Control Mapping allows the user to adjust how the real-time viewport in Octane behaves. The Software viewport has a pure software display mode not using OpenGL.

The Preset drop down box allows the user to quickly set OctaneRender™ navigation to behave like a number of common 3D modeling packages.

The actions of the scroll wheel when used within the Node Graph Editor pane can be set to either zoom or scroll.

fig. 2.13b

8. The Device Manager

OctaneRender™ is a GPU based render engine and it is important to manage the GPU(s) in the system that are used for rendering. This is done through the Cuda Devices tab. Under this tab, the checkboxes for GPU's that are not supported are not shown and users can only enable GPU's with a supported compute model. [fig 2.14]

This allows the user to see the following:

1. **Cuda Driver** — This shows the current CUDA driver version.
2. **Active/inactive device(s)** — This allows selecting GPUs to use for rendering if more than one GPU is installed. The render priority option can throttle down rendering on one or more GPU's to improve system responsiveness especially when rendering on a GPU used for the display.
3. **Device information** — This shows specifications of the current selected device.
4. **Device Memory Usage** — This shows the user how the video card memory is allocated based on the current scenes geometry, textures, render target, etc.

fig. 2.14

9. The OBJ Mesh Import

This allows the user to customize the default settings for importing a mesh modelled from various 3D applications. There is an added option to invert opacity values from MTL files because some 3D applications write them inverted. Note that the reload button only reloads the geometry, users will need to delete the mesh node, change the setting in the **OBJ Mesh Import** tab and then import again.

10. Customizing the Interface

The toolbars for each area of the OctaneRender™ interface are customizable (Graph Editor, Render Viewport, Node Inspector and Outliner.) To customize the toolbar, click on the wrench icon. [fig 2.15]

fig. 2.15

This will open the **Add/Remove Items from Toolbar** dialog box. [fig 2.16]

The dialog allows the user to place the toolbar to any edge of the respective area. It also allows the buttons to be re-arranged, added or removed.

fig. 2.16

By Mike Logic

Chapter 3

Preparing and Exporting Scenes for Rendering

1. Export Scripts Overview

This section explains the workflow of rendering animations and stills from the host 3D application with OctaneRender™ by exporting via a script. Currently there are scripts for:

- Autodesk 3Ds Max
- Autodesk Maya
- Autodesk Softimage XSI
- Maxon Cinema 4D
- Google Sketchup
- Blender
- Luxology Modo
- Lightwave 3D
- Rhinoceros 3D

(Other scripts will be available soon)

To render using the script:

1. Install the script in the host 3D application
2. Finalize the scene in the host application. This includes assigning materials, UV mapping, placing the camera and a sun lamp (if you want a sun/sky system in OctaneRender™.)
3. Launch the script and set the required parameters
4. Render the still or animation via the script. The script will then transfer the geometry to OctaneRender™ and begin rendering.

1.1 Project Configuration

Upon launching the script, the project configuration options must be set. For illustration purposes, the export script for 3dsMax® is shown, but the same parameters discussed here are applicable to other 3D applications.

OctaneRender™ Binary:

Use the browse button to set the location of the OctaneRender™ program

Project Path:

Use the browse button to select a location where the script should place files related to the export.

Project Name:

If this is the first export, then enter a name in the text box that identifies the scene. If you'd like to use an existing OCS file (to retain the materials and other settings already configured in OctaneRender™) click on the Use Existing Project button to load the file. The Project Name will then be based on the selected OCS file.

fig. 3.1 - The Export Script for 3ds Max

Native Unit Size:(Not shown)

This setting is used to export the geometry at the proper scale. Select the units that best represent 1 unit in the host application. (The resulting object will then be in the proper units since OctaneRender™ assumes 1 unit = 1 meter.)

1.2 Export Configuration

Configuration of export options for film, camera and daylight environment:

Film

Resolution: Set the resolution of the final render

Camera

Place a checkmark next to any camera / scene element to include in the export and set any required parameter.

Camera / Active Camera: If checked, the selected Active Camera will be used for the export.

Lens Aperture: If checked, the entered Lens Aperture will be used for the export

Focal Depth: If checked, the entered Focal Depth will be used for the export

Camera Motion Blur: If checked, motion blur will be used. The Interpolate setting allows whether to use the next frame or the previous frame to set the two positions to calculate the camera motion blur.

Daylight Environment

Sun Direction: If checked, the position of the light specified in the Light Source box will be used as the position of the Sun in a Sun / Sky environment when exported.

1.3 Export

This section is used to actually start the export and begin rendering the scene in OctaneRender™.

Frame

This area controls exporting only the current single frame and is

useful for architecture, product shots, or any other static scene. There are two options:

Export OBJ/MTL Only: This exports the scene with all the currently selected options to an OBJ file and MTL file and does not start the render. The scene can then be manually imported into OctaneRender™ at a later time.

Render: This button performs the export with all the current options and then sends the scene to OctaneRender™.

CAMERA TIP :

Feel free to move about the scene and continue to refine it once it is exported. The original exported camera position can be obtained by clicking on the Reset Camera button on the toolbar.

Animation:

This area controls exporting an animation.

Image Output: use the Browse button to select the path where the rendered images are to be saved.

Range: Use the text boxes to supply the Start and End Frame of the animation. Use the nth Frame text box to set how many frames to step through when exporting. For example, if you rendered an animation of 30 frames with a step of 1, you'd get frames 1,2,3,4,5 etc. If you rendered the same animation with a step of 3, you'd get frames, 1,3,6,9,12, etc.

Pixel Samples: Specify the number of samples per pixels to render each frame. Either specify the value in the text box or select one of the presets.

Render Animation: Clicking this button will start the process of exporting and rendering each frame of the animation in OctaneRender™ and saving the images in the specified directory.

Example Animation Workflow

1. Export the scene as a single frame
2. Set up all the materials and scene settings in OctaneRender™

3. Save the scene as an OCS file and exit OctaneRender™
4. Set the script to point to the OCS file in 3)
5. Set all the motion blur, camera parameters, and animation frame range and render the animation

fig.3.2 - Placing Textures in 3ds Max

fig. 3.3 - The same model as in fig. 3.3 rendered in OctaneRender™

2. Manual Exporting

To export a scene for use in OctaneRender™, use your favorite 3D Modeling Software's Wavefront Object (obj) export function. The settings available are different for various software packages. The following are some general settings to export if available:

- Materials
- Normals
- Texture Coordinates
- Objects

By Pedrojafet

OTHER TIPS

Do not export Edges as currently this can cause a crash in OctaneRender™. The meshes should also be triangulated if possible as OctaneRender™ does not currently support n-Gons.

Screenshots of recommended exporter settings are included in the following pages for some common modeling programs.

2.1 Common Export Settings

Autodesk Maya:

fig. 3.4 - Autodesk Maya Export Settings

Autodesk 3ds Max:

fig. 3.5 - Autodesk 3ds Max Export Settings

Blender 2.63:

fig. 3.6 - Blender 2.63 Export Settings

Autodesk Softimage:

fig. 3.7 - Autodesk Softimage Export Settings

Daz Studio:

fig. 3.8 - Daz Studio Export Settings

Newtek Lightwave:

fig. 3.9 - Newtek Lightwave Export Settings

Daz Carrara

fig. 3.10 - Daz Carrara Export Settings

Walt by Riccardo Minervino

Chapter 4

Using OctaneRender™

1. Using the Preview Macro

To quickly prepare OctaneRender™ for a full render setup, a **Preview Configuration** node (fig. 4.1) is provided in the **Graph Editor** (fig. 4.2).

This is a **Macro Node** that will create a predefined setup when double clicked. A new tab is also created on the left side of the **Graph Editor** labelled **Preview Configuration**.

It is not required to use the Preview Configuration macro. Complex node setups can be created with multiple camera, environment and render target nodes.

fig. 4.1

fig. 4.2

2. Importing

2.1 Setting Import Preferences

The OBJ Mesh Import Preferences (fig. 3.3) can be accessed from the file menu and provide greater control of the importing process and OctaneRender™ handles materials and mesh geometry on import.

Override settings during individual import— Sets whether the scene or OctaneRender™ settings should be used.

Import MTL file —Determines whether OctaneRender™ imports any materials that were stored in the MTL file associated with the imported OBJ file.

Material Types—Allows the user to specify what material types are imported.

Import Image Textures—Uses the image textures as specified in the MTL file.

Texture Types—Allows the user to determine the data type of imported images.

Object Smoothing—Allows the user to set preferences related to material smoothing including using supplied vertex normals and smoothgroups.

Meta Objects—Allows the user to set a material in their modeling software to set the camera position in OctaneRender™. The object with the material specified in the Transform Material Name field will be used to position the camera.

Scale—Tells OctaneRender™ the unit of measurement used in the mesh. The default unit is in meters.

fig. 4.3

2.2 Importing the Scene

To import a scene into OctaneRender™, move the mouse over the **Graph Editor** and **right click**. This will bring up the **Add** Node toolbar. Select **Objects** and then **Mesh** (fig. 4.4).

Locate the exported OBJ file using the file dialog box which will be different depending on the operating system used. The scene will then be loaded and voxelized.

When the scene is loaded, it will be represented by a new node in the **Graph Editor**. Clicking on this new node will start the scene rendering in the **Render Viewport** and will display all the materials associated with the scene in the **Node Inspector**.

Each dot shaped connection pin at the top of the mesh node corresponds to a material in that object / scene. The identification of the node connection can be determined by hovering the mouse over the connection (fig. 4.5).

fig. 4.4

fig. 4.5

3. Navigating the Scene

OctaneRender™ provides a unique, refreshing and exciting rendering experience due to the ability to interact with the scene with final render quality. This interactivity allows for renders that might not be possible with traditional render engines. The user can continue to hunt for that perfect camera angle where all the reflections of the lights are just right or they can continue to adjust the DOF in real-time.

The **Render Viewport** can be manipulated like traditional 3D viewports with rotation, panning and zooming controls. Zooming the entire viewport is controlled with the mouse wheel while holding down the Control key.

Navigating in the Render Viewport (While holding your mouse over the Render Viewport):

Rotate: Left Mouse Button
Zoom in renderview: Mouse Wheel / Middle Mouse Button
Zoom Viewport Display Area: Mouse Wheel + CTRL key
Pan: Right Mouse

If the scene navigation is too slow, hold the **SHIFT key** while navigating with the mouse.

The **Node Graph Editor** can be scrolled with the mouse wheel when holding down the **Ctrl** (Control) key.

Controls for the camera multiplier and mouse presets can be set through the **Menu Preferences** --> **Controls tab.**

Sub-sampling Settings

Using sub-sampling allows for smoother navigation of the scene by reducing the render resolution. In order to improve navigation at the cost of visual quality, 2x2 or 4x4 sub-sampling settings can be adjusted by using the checkerboard buttons under the **Render Viewport**. The reduced settings apply when the scene is being navigated and then returns to the render settings after navigation has stopped. Figures 4.7 and 4.8 show the difference between navigating with no sub-sampling versus navigating with 4x4 sub-sampling.

Sub-sampling buttons (fig. 4.6) above the **Render Viewport**

fig. 4.6

fig. 4.7 - No sub-sampling while navigating

fig. 4.8 - 4 x 4 sub-sampling while navigating

Camera Target Zoom Picking

The Camera Target Zoom Picker tool helps navigating a scene that is very complex or that has become difficult to navigate. To enter Camera Target Zoom Picking, click on the icon located under the Render Viewport. It is then used to click on any part of the scene to make the point under the mouse pointer to become the center of rotation and zooming. A quick roll of the mouse wheel will cause the render to zoom into the newly selected point. Right-clicking on the mouse when this is enabled invokes a context menu to allow picking of objects along the path of a ray directly affecting that point in the scene.

Camera Reset

The Camera Reset button allows the camera to be reset back to the original position. If the scene was just created from an imported object, then the Camera Reset button will reset the camera position to the default coordinates similar to when the object was just imported. If the scene was saved as an Octane Scene File, then the camera would be reset to the position of the Octane Scene File.

Recenter View

The Recenter view button centers the render view display area in the render viewport. This is useful if the render view display area was moved and part of it is no longer visible or centered. This will recenter the render view display area without affecting the current zoom level.

Camera View

The Camera view button provides preset camera views of the scene in the render viewport.

Stop Render

Halts the rendering process and frees all resources being used by the scene currently loaded.

4. Render Settings

There are four major rendering kernels in **OctaneRender™**: **Direct Lighting**, **Path Tracing, PMC and Deep Channel**.

They are switchable by changing the type in the **Node Inspector**. To do this either click on the **Mesh Preview Kernel** node in the **Graph Editor** or click on the **Preview Kernel** Icon in the **Node Inspector**.

Users can switch the node types through the first dropdown menu in the node inspector.

fig. 4.9 - Changing the rendering kernel

4.1 Direct Lighting

Direct Lighting is used for faster preview rendering. Direct Lighting is not unbiased but is useful when creating quick animations or renders.

Specular Depth (specularDepth)

Specular depth controls the number of times a ray can be refracted before dying. Higher numbers mean higher render times but more color bleeding and more details in transparent materials. Low numbers can introduce artifacts, or turn some refractions into pure black.

Specular Depth 0
All the objects appear black

Specular Depth 2
Rays can enter transparent objects but cannot render the other chess pieces

Specular Depth 5
Rays can find the other chess pieces but not ones in their refraction

Specular Depth 8
All chess pieces are properly rendered

fig. 4.10 - Examples of various Specular Depth's using the Directlighting Kernel with GI Mode (0) None

Glossy Depth (glossydepth)
Glossy depth controls the number of times a ray can be reflected before dying. Higher numbers mean higher render time. Low numbers under "4" can introduce artifacts, or turn some reflections into pure black. You should setup this setting based on the complexity of the scene you are working on, and especially based on how many reflective parallel surfaces you have.

AO Distance (aodist)
The distance of the ambient occlusion in units. Always check if the amount is right related to your model scale. For example you don't need an amount of "3" units if your object is a small toy. But if your model is a house or something large, you can increase the value. The more you increase the value the darker your render will be.

fig. 4.11 - Setting the AO Distane to 1

fig. 4.12 - Setting the AO Distance to 32

Ray Epsilon (rayepsilon)

The ray epsilon is the distance to offset new rays so they don't intersect with the originating geometry. If the scale of your scene is too large, precision artifacts in the form of concentric circles may appear. In that case, increasing the ray epsilon can make these artifacts disappear.

Maximum Samples (maxsamples)

This sets the maximum number of samples per pixel before the rendering process stops. The higher the number of samples per pixel, the cleaner the render. For quick animations and scenes with predominantly direct lighting, a low amount of samples (500-1000) may suffice. In scenes with lots of indirect lighting and mesh lights, a few thousand samples may be required to obtain a clean render.

Filter Size (filtersize)

This sets the pixel size for filtering the render. This can improve aliasing artifacts in the render. Noise can also be reduced this way, but if the filter is set too high, the image can become blurry.

Alpha Channel (alphachannel)

This option removes the background and renders it as transparant (zero alpha). This can be useful if the user wants to composite the render over another image and does not want the background to be present.

Keep Environment (keep_environment)

This option is used in conjunction with the Alpha Channel setting. It allows the background to be rendered with zero alpha but is still visible in the final render. This allows even further flexiblity in compositing images.

Alpha Shadows (alphashadows)

This setting allows any object with transparency (specular materials, materials with opacity settings and alpha channels) to cast a proper shadow instead of behaving as a solid object.

GI Mode (GI_mode)

There are **five different Global Illumination modes in the Direct Lighting Kernel:**

None(0)

Only direct lighting from the sun or area lights is included. Shadowed areas receive no contribution and will be black.

Ambient(1)

Use a simple ambient colour from the environment above.

Sample Environment (2)

Use a simple ambient colour from the environment/horizon.

Together with ambient and none, these modes are all very fast, as no Monte Carlo sampling is required. These give a very unrealistic, classic z-buffer/whitted raytracing style look, but are very fast, and very handy for interactive tuning of complex scenes or on slow hardware.

Ambient Occlusion (3)

Standard ambient occlusion. This mode can often provide realistic images but offers no color bleeding.

Diffuse (4)

Indirect diffuse, with a configuration to set the number of indirect diffuse bounces to include. This gives a GI quality that is in between Ambient Occlusion and pathtracing, without caustics and a decent realistic quality (better than AO), but much faster than pathtracing/PMC.

It is very good for quick finals and animations. It is similar in some ways to 'bruteforce' indirect GI in other engines.

Diffuse Depth (diffusedepth)

Gives the maximum number of diffuse reflections if GI Mode is set to Diffuse (4)

Russian Roulette Probability (rrprob)

In path tracing, maxdepth is the maximum amount of bounces a ray can make, but, after 3 bounces, there is a 50 % chance that the ray is killed, if you set the rrprob parameter to 0.5. In practice it will rarely exceed more than 16-20 bounces once every million pixel samples (generating a firefly usually).

If the rrprob is set to 0, it uses a automatic setting. If it is set to anything else, the user directly controls the probability the ray is ended at random after 3 bounces and so forth.

4.2 Path Tracing

Path Tracing is best used for realistic results (together with PMC). The render times are higher than Direct Lighting but the results can be photorealistic. It can have some difficulties with small light sources and proper caustics (for which pmc is better suited).

Maximum Depth (maxdepth)
The maximum number of times a ray can bounce/reflect/refract in a surface. Higher amounts mean also higher render time but more realistic results. For outdoor renders a good setting is around 4 maxdepth. For lighting interior with natural light (the sun and the sky) you will need higher settings such as 8 or higher to allow enough light to bounce around in the scene. While high values are possible, in reality rays will not usually go beyond 16 ray depth.

Russian Roulette Probability (rrprob)
The RRprob is the probability of terminating the path randomly during raytracing. This value should be left as the default. A value of zero allows OctaneRender™ to determine the value.

Ray Epsilon (rayepsilon)
The ray epsilon is the distance to offset new rays so they don't intersect with the originating geometry. If the scale of your scene is too large, precision artifacts in the form of concentric circles may appear. In that case, increasing the ray epsilon can make these artifacts disappear.

Maximum Samples (maxsamples)
This sets the maximum number of samples per pixel before the rendering process stops. The higher the number of samples per pixel, the cleaner the render. There is no rule as to how many samples per pixel are required for a good render.

Filter Size (filtersize)
This sets the pixel size for filter for the render. This can improve aliasing artifacts in the render. If the filter is set too high, the image can become blurry.

Alpha Channel (alphachannel)
This option removes the background and renders it as transparant (zero alpha). This can be useful if the user wants to composite the render over another image and does not want the background to be present.

Keep Environment (keep_environment)
This option is used in conjunction with the Alpha Channel setting. It allows the background to be rendered with zero alpha but is still visible in the final render. This allows even further flexiblity in compositing images.

Alpha Shadows (alphashadows)
If alpha maps are used in the scene, this setting controls whether the shadows will calculated from the mesh geometry or from the alpha map.

Caustic Blur (caustic_blur)
This is used to approximate caustics on rough surfaces and increase or decrease the sharpness of caustic noise. A zero value provides the sharpest caustics and increasing this value increases the blurring effect to make caustics appear softer. The default value for this setting is 0.01

4.3 PMC

PMC is a custom mutating unbiased kernel written for GPUs. It allows for complex caustics and lighting to be resolved.

Maximum Depth (maxdepth)

The maximum number of times a ray can bounce/reflect/refract in a surface. Higher amounts mean also higher render time but more realistic results. For outdoor renders a good setting is around 4 maxdepth. For lighting interior with natural light (the sun and the sky) you will need higher settings such as 8 or higher. While high values are possible, in reality rays will not usually go beyond 16 ray depth.

Russian Roulette Probability (rrprob)

The RRprob is the probability of terminating the path randomly during raytracing. This value should be left as the default. A value of zero allows OctaneRender™ to determine the value.

Ray Epsilon (rayepsilon)

The ray epsilon is the distance to offset new rays so they don't intersect with the originating geometry. This value should be left as the default.

Exploration Strength (exporation_strength)

This specifies how long the kernel investigates good paths before it tries to find a new path. Low values can create a noisy image while larger values can create a splotchy image.

Direct Light Importance (direct_light_importance)

The direct light importance makes the kernel focus more on paths with indirect light. For example, imagine sunlight through a window that creates a bright spot on the floor. If the direct light importance is 1, the kernel would sample this area a lot, although it becomes clean very quickly. If the direct light importance is reduced, the kernel reduces its efforts to sample that area and focuses more on more tricky areas that are harded to render.

Max Rejects (maxrejects)

This can control the "bias" of the render. By reducing the value, the result will be more biased, but the render time will be shorter.

Maximum Samples (maxsamples)

This sets the maximum number of samples per pixel before the rendering process stops. The higher the number of samples per pixel, the cleaner the render.

Filter Size (filtersize)

This sets the pixel size for filter for the render. This can improve aliasing artifacts in the render. If the filter is set too high, the image can become blurry.

Alpha Shadows (alphashadows)

If alpha maps are used in the scene, this setting controls whether the shadows will be calculated from the mesh geometry or from the alpha map.

Alpha Channel (alphachannel)

This option removes the background and renders it as transparant (zero alpha). This can be useful if the user wants to composite the render over another image and does not want the background to be present.

Keep Environment (keep_environment)

This option is used in conjunction with the Alpha Channel setting. It allows the background to be rendered with zero alpha but is still visible in the final render. This allows even further flexiblity in compositing images.

Caustic Blur (caustic_blur)

This is used to approximate caustics on rough surfaces and increase or decrease the sharpness of caustic noise. A zero value provides the sharpest caustics and increasing this value increases the blurring effect to make caustics appear softer. The default value for this setting is 0.01

Parallelism (parallelism)

This is used to reduce the number of samples that are investigated in parallel to make caustics appear earlier at the expense of some performance.

4.4 Deep Channel Kernel

The deep_channel_kernel creates false-color images of the scene, containing various types of information about the scene. In scenes where the environment is visible you should enable the alpha channel.

The following modes are available:

- Geometric normals: the vectors perpendicular to the triangle faces of the mesh.
- Shading normals: the interpolated normals used for shading by calculating based on the face normals and discretely fixes distortion to keep a smooth appearance. This does not take into account the bump map of the object. For objects without smoothing this is identical to the geometric normals.
- Position: The position of the first intersection point.
- Z-depth: The distance between the intersection point and the camera, measured parallel to the view vector.
- Material ID: Every material pin is represented as a separate color.
- Texture Coordinates
- Wireframe : Shows the mesh as represented by edges, vertices and surfaces
- Interpolated Vertex Normals: Similar to shading normals preset but also strictly calculates the shading based on vertex normals provided by actual data in the mesh. This makes flawed normals resulting from stuffed vertices visible in the shading.

For display these values are scaled to get values approximately between 0 and 1. All tone mapping settings except for min_display_samples and gamma are ignored. Exposure is enabled for Z-depth, and will indicate the value which gets mapped to white. To save these channels you should use untonemapped EXR.

Maximum Samples (maxsamples)

This sets the maximum number of samples per pixel before the rendering process stops. The higher the number of samples per pixel, the cleaner the render. There is no rule as to how many samples per pixel are required for a good render.

Filter Size (filtersize)

This sets the pixel size for filter for the render. This can improve aliasing artifacts in the render. If the filter is set too high, the image can become blurry.

Maximum Z-Depth (z_depth_max)

Gives the maximum z-depth that can be shown.

Alpha Channel (alphachannel)

This option removes the background and renders it as transparant (zero alpha). This can be useful if the user wants to composite the render over another image and does not want the background to be present.

Ray Epsilon (rayepsilon)

The ray epsilon is the distance to offset new rays so they don't intersect with the originating geometry. This value should be left as the default.

Maximum UV value (uv_max)

Gives the maximum value that can be shown for the texture coordinates.

5. Adjusting Materials

Materials can be edited by either selecting the material in the **Outliner** (fig. 4.12), selecting the mesh node and then finding the material in the **Node Inspector** (fig. 4.13), or by using the **Material Picker** and selecting the material in the **Render Viewport** (fig. 4.14). Right-clicking on the viewport with the material picker invokes a context screen to select hidden materials. Users can also see the number of textures in the mesh by clicking on the render progress bar (fig. 4.15).

fig. 4.12

fig. 4.13

fig. 4.14

fig. 4.15

fig. 4.16

There are five types of materials in **OctaneRender™** currently.

1. **Diffuse**—Used for dull, non-reflecting materials or mesh emitters
2. **Glossy**—Used for shiny materials such as plastics or metals
3. **Specular**—Used for transparent materials such as glass and water
4. **Mix** - Used to mix any two material types
5. **Portal** - Used to designate openings in scenes to allow the render kernel to better sample light from those areas

Materials can be switched to different types by using the drop down box associated with the material (fig. 4.16).

5.1 Working with Material Data

All of the materials can be adjusted by using sub parameters. These parameters can be set to various data types / nodes to provide for flexible rendering. They can be broken into two main classes: Textures and Values.

Textures are used to create and manipulate the colour and appearance of the actual material. There are four different Texture types: Colours, Generators, Images and Mappings.

Values are used when only numeric input is required.

Any parameter that requires a **Value** can not use a **Texture** type as it's source and a **Texture** can not accept a **Value** as its source.

5.2 Values

The **Values** available are:

Bool—A value that can be either true or false

Float—A single value slider adjusts the value

Float2—Two value sliders adjusts the value (X,Y). The range of the values are dictated by the parameter it is controlling.

Float3—Three value sliders adjusts the value (X,Y,Z). The range of the values are dictated by the parameter it is controlling.

Float3DaylightSystem—Used for setting all the properties of the Sun / Sky Environment.

Int—A single value slider that adjusts the value in whole integer steps

Int2—Two value sliders adjust the value of (X,Y) in whole integer steps

Int2resolution—Two parameters adjust the resolution of the render

int2XY - Two value sliders adjust the value of (X,Y) in whole integers steps

5.3 Texture Types

The Texture types allow for creating very flexible materials. There are four main types of Texture Node Types:

Colours: Colour textures provide methods of applying a colour to a material.

Generators: Generator textures are used to actually create or modulate other textures. They are grey scale.

Images: Image textures use image files to create the texture.

Mappings: Mappings are Nodes that allow mixing and manipulation of other texture nodes.

5.3.1 Colour Textures

RGBspectrum—The texture is based on the RGB colour that is selected

GaussianSpectrum— The texture is based on a Gaussian distribution spectrum. The wavelength is used to set the center of the spectrum and the width is used to set how wide the curve is. The narrower the width, the more pure and saturated the colour.

5.3.2 Image Textures

In order to properly utilize Image Textures, the mesh must be UV mapped prior to export from the Modelling software.

FloatImage—The image is interpreted as gray scale even if it is a full colour image, thus saving GPU ram. The **Invert** checkbox can be used to invert the image (useful for bump and opacity maps.)

Image—An image texture is used for the parameter (mesh must be UV mapped prior to export to properly use the Image type). The image is interpreted as being full colour even if it is a grey scale image, and therefore taking up more GPU memory.

AlphaImage - An alpha image utilizes the images native Alpha Channel to provide transparency. This type will only accept PNG and TIF image types.

When to use Floatimage versus Image Data Type?

There are some parameters where full colour data is not used (or useful). If a full colour image is loaded, it can take much more memory in the GPU than a grey scale image, even though the user only really wants the grey scale data. Since memory management is very critical for GPU rendering, the Floatimage type allows a user to load a full colour texture but it will be interpreted as a grey scale image and therefore use less video ram. If the full colour data is needed then use the Image data type (normal maps, diffuse maps)

5.3.3 Texture Generators

Texture Generators are used to create patterns that can be used alone or in combination with the Mapping and Colour textures to create memory-efficient, procedural textures. Procedural Textures can be used to create textures, bump maps and other advanced materials with minimal impact to GPU memory. It is therefore advantageous to explore creating materials using these textures before resorting to image based textures.

The current types of generators include:

Checks
Marble
Ridged Fractal
Saw Wave
Sine Wave
Triangle Wave
Turbulence

Generator Texture Examples

Procedural Textures can be used to create textures, bump maps and other advanced materials with minimal impact to GPU memory. It is therefore advantageous to explore creating materials using these textures before resorting to image based textures.

Check (Checksmix)

The Check procedural texture is useful for making stripes, checker board and grid patterns. It is controlled by a float3 value. It is most useful when mixed with other textures.

fig. 4.16 - Checks Example with X,Y,Z scaled

fig. 4.17 - Checks Example

Sine Wave, Saw Wave and Triangle Wave

These textures can be used to create various banding effects.

fig. 4.18 - Saw Wave

fig. 4.19 - Triangle Wave - example 1

fig. 4.20 - Triangle Wave - example 2

Turbulence

The Turbulence texture can be used to create many different effects based on banded noise. This flexible texture can be used to create wood, marble, flesh, and many other useful textures.

fig. 4.21 - Turbulence Example 1

fig. 4.22 -Turbulence Example 2

fig. 4.23 - Turbulence Example 3

Mapping Texture Examples

Clamp

The Clamp Texture requires a texture input and then allows for the texture to be "clamped" with the minimum and maximum slider.

fig. 4.24 - Minimum 0 / Maximum 0.5

fig. 4.25 - Minimum 0.5 / Maximum 1.0

Mix / Cosine Mix

The Mix textures are used for mixing two textures together (either linearly or according to a cosine wave). In the example below, a Checks Mix was combined with a GaussianSpectrum using a Cosine Mix Texture and connected to the Diffuse channel of a Diffuse material.

fig. 4.26 - Combining a Checks Texture with a Gaussian Spectrum by using a Cosine Mix Texture which is set to a Diffuse Channel of a Diffuse Material

fig. 4.27 - The resulting material from Figure 4.23

Wood Example

fig. 4.28 - Using Turbulence, Mix, and RGB Spectrums to create a wood material

5.3.4 Fall Off Texture Map

The fall off map is a texture node typically used to control the blend of two materials depending on the viewing angle of the materials geometry.

Normal
This is the value/lightness (0 to 1) of the map at straight on viewing angles. When used as an input to a mix material node, the normal is the spectral shade value between material 0 and material 1.

Grazing
This is the value/lightness (0 to 1) of the map at grazing angles. When used as an input to a mix material node, the grazing is the spectral shade value between material 0 and material 1.

Falloff Index
The relative amount of the two values (normal and grazing). 0.1 will lead to almost complete coverage by the grazing value regardless of viewing angle, where as 15 will lead to complete coverage by the normal value.

The fall off map can also be used for other things, like the input to the opacity of glass.

Falloff is useful for car shaders (at 90 degrees it should have the desired color and in less somewhat darker, but at the same time a bit more reflective), water shaders (tends to be more reflective to low angles of incidence), fabrics like velvet (tend to become almost white at low angles). It is also useful for some metals to simulate some coating effects.

Sample implementation of the fall off texture node:

Image without fall-off

Image with fall-off

5.3.5 Dirt Texture Map

The dirt map is a texture node typically used to control the appearance of intentional noise or dirt overlayed on a material.

Strength
This is the value/lightness (0.1 to 10) of the overlaying material spread across the map.

Details
This is the density (1 to 100) of the overlaying material at certain angles as tiny specs of it are closely distributed across the constrained areas along the surface of the normal.

Radius
The relative size of the map set against the surface directly visible to the viewer. 100 will lead to almost complete coverage by the overlaying material.

Invert Normal
An added option to invert the normal and overlaying material.

By Icelaglace

Sample implementation of the dirt texture node:

Image with dirt

Image without dirt

5.4 Diffuse Materials

Diffuse materials have the following parameters to adjust:

fig. 4.29 - Viewing a Diffuse Material in the Node Inspector

Diffuse

The Diffuse value gives the material it's color.

Bump / Normal

Both the Bump and Normal channels can load images to control the amount of bump mapping and normal mapping. The **Bump** channel should be set to **floatimage** to load a bump map. The **Normal** channel should be set to the **image** data type to load a full color normal map.

Opacity

Opacity sets the transparency of the material. Set the data type to alphaimage (if the image has an alpha channel) or floatimage (for black/white images) to load an image to set the transparency (use the Invert checkbox if necessary to adjust whether black or white regions are considered transparent.

Normal Smoothing

Normal Smoothing is a Boolean value that sets whether to smooth the normals of all meshes sharing that material. When off, the materials can be faceted and polygonal.

Emission
The Emission setting controls whether the material acts as a light source.

Matte
This is a bolean value to enable or disable a matte mask of a diffuse material.

For applying absorption, SubSurface Scattering and emission on Diffuse Material, refer to Chapter 5 Section 5.9.

5.5 Glossy Materials

Glossy materials have these parameters to adjust:

Diffuse (diffuse)
The value gives the material its color.

Specularity (specular)
The value determines the amount of specularity on the mesh.

Roughness (roughness)
The roughness determines the amount of reflection that will be present. A low roughness value will create blurry reflections and a high value will produce a mirror like reflection. Bump / Normal
Both the Bump and Normal channels can load images to control the amount of bump mapping and normal mapping (respectively.) The Bump channel should be set to floatimage to load a bump map. The Normal channel should be set to the image data type to load a full color normal map.

Film Width (filmwidth)
This controls the thickness of a optical, thin film on the material. This is useful in creating rainbow or oil slick effects.

Film Index (filmindex)
This controls the Index of Refraction of the thin film.

Opacity (opacity)
Opacity sets the transparency of the material. Set the data type to alphaimage(if the image has an alpha channel) or floatimage(for black/white images) to load an image to set the transparency (use the Invert checkbox if necessary to adjust whether black or white regions are considered transparent.

Normal Smoothing (smooth)
Normal Smoothing is a Boolean value that sets whether to smooth the normals of all meshes sharing that material. When off, the materials can be faceted and polygonal.

Index of Refraction (index)
Index of refraction sets the fresnel effect applied on the glossy material. Setting a value smaller than 1.0 will disable the fresnel effect, so the glossy color will be the color in the glossy input pin, regardless of viewing angle. When selecting a value of 1.0 or bigger, the glossy reflection color will be modulated according to the fresnel law: at grazing angles the color will be the color set in the glossy input pin, at perpendicular angles it will be darker. Fresnel reflection produced becomes stronger as the index of refraction is set higher.

If you have a measured index of refraction, set the glossy color to 1.0.

In the following examples, the six balls have roughness 0, 0.2, 0.4, 0.6, 0.8, 1.0 (left to right) and only the specular value and index of refraction have been modified for each rendered image:

[Fig 5.5 A] specular = 1.0
index = 2.0 (strong Fresnel reflection)

[Fig 5.5 B] specular = 0.3
index = 3.0 (very strong Fresnel reflection)

[Fig 5.5 C] specular = 1.0
index = 1.5 (normal Fresnel reflection)

[Fig 5.5 D] specular = 0.3
index = 0.0 (no Fresnel reflection)

[Fig 5.5 E] specular = 1.0
index = 0.0 (no Fresnel reflection)

5.6 Specular (Glass) materials

Specular materials have these parameters to adjust:

Reflection (reflection)
The Reflection value determines the glossiness of the mesh.

Transmission (transmission)
The Transmission value gives the base color to the mesh.

Index of Refraction (index)
The Index represents the Index of Refraction of the material. Standard values of Index of Refraction (IOR) can be readily found via searching the internet. Glass typically has a value of 1.53 and water 1.33.

Film Width (filmwidth)
This controls the thickness of a optical, thin film on the material. This is useful in creating rainbow or oil slick effects.

Film Index (filmindex)
This controls the Index of Refraction of the thin film.**Bump / Normal**
Both the Bump and Normal channels can load images to control the amount of bump mapping and normal mapping (respectively.) The Bump channel should be set to floatimage to load a bump map. The Normal channel should be set to the image data type to load a full color normal map.

Opacity (opacity)
Opacity sets the transparency of the material. Set the data type to alphaimage(if the image has an alpha channel) or floatimage(for black/white images) to load an image to set the transparency (use the Invert checkbox if necessary to adjust whether black or white regions are considered transparent.

Normal Smoothing (smooth)
Normal Smoothing is a Boolean value that sets whether to smooth the normals of all meshes sharing that material. When off, the materials can be faceted and polygonal.

Dispersion Coefficient (dispersion_coefficient_B)
The dispersion in OctaneRender™ is based on Cauchy's equation which has two terms: **A** which is the index of refraction and **B** which is the dispersion coefficient. Increasing the value increases the amount of coloration and dispersion in the object and in caustics.

Absorption or Scattering Medium (medium)

Absorption Medium
Absorption means that the material slightly absorbs light while passing through. The color resulting from this absorption is dependent on the distance light travels through the material. With increased distance it will get darker, and if the absorption is colored it will get more saturated.

Scattering Medium
Similar to the absorption medium but with the option to simulate subsuburface scattering.

The scale parameter multiplies the absorption texture, allowing a wide range of values to be set more easily. For applying absorption, SubSurface Scattering and emission on Specular and Glossy Materials, refer to Chapter 5 Section 5.9.

Fake Shadows
Fake Shadows is a Boolean value that sets the architectural glass option for all meshes sharing that material. This setting is off by default. When enabled, the specular material exhibits the characteristics of Architectural glass with its transparent feature allowing light to illuminate enclosed spaces or frame an exterior view.

5.7 Material Mix

The Material Mix option is used to combine two different materials. It accepts any two material nodes and the mix is controlled by a texture node. In the example below, a white glossy material is mixed with a red specular material. A checks texture node is used to control the mixing of the two materials.

fig. 4.30 - A simple Material Mix Set up

fig. 4.31 - The resulting material

5.8 Portal Materials

A portal is a special material applied to a plane to allow the render kernel to efficiently find openings / windows in interior renders. The use of portals will be covered in the next section covering lighting options.

A scene with no portal over a small window lighting a room with glass sphere. The scene was rendered for 500 samples and is overall noisy.

The same scene with a plane over the window with a Portal material applied. Rendered at 500 samples, the image is cleaner.

5.9 Using Medium Nodes

OctaneRender™ supports participating media inside objects (absorption, SubSurface Scattering and emission). These settings are stored in medium nodes, which are attached to the corresponding input pin of diffuse or specular material nodes.

There are two types of medium nodes, absorption and scattering. Scattering has parameters for absorption and scattering of light passing through the medium, and emission inside the medium. Absorption is a simple version with only absorption.

Rendering a medium requires the path tracing or PMC kernel, with a sufficiently large maxdepth setting. For media inside diffuse transmitting materials the direct light kernel with Diffuse (4) GI mode can be used as well.

Meshes

Participating media should only be added to meshes that define a closed volume, rather than planes. Using planes to model leaves of a plant with SSS will for instance not work. Using a single plane as ground plane should be OK (it will be treated as an infinively deep material). The mesh can have opaque objects nested inside, but nested participating media are not supported.

How to make a medium node work:

A specular material is the easiest: by default it is set up properly. Transmission must be nonzero; for the best effect reflection and transmission should be set to 1.0.

On diffuse materials subsurface scattering only works after they are set up with diffuse transmission.

To do so, connect a node to the transmission input pin.

The reflection value needs to be set to a sufficiently low value, as only the part of the spectrum that is not reflected can enter the inside of the object. If the reflection is set to 1.0, all light gets reflected regardless of the transmission value. If set to 0.0, all light gets transmitted, but this gives an unnatural appearance. Values of 0.1–0.2 are a good starting point.

Also, if the reflection is coloured, the transmitted light will have the complementary color (e.g. if the reflection is set to yellow, the transmitted light is blueish).

The transmission value works the same as in the previous releases, and is multiplied with the complement of the reflection spectrum. This should be set to a high value.

If possible, use a diffuse transmitting material

Medium node parameters

Absorption is controlled with the absorption texture, which defines how fast light is absorbed while passing through a medium. A setting of 0.0 means no absorption. The higher the value the faster light is absorbed by the medium. This setting is wavelength-dependent, in the following setup for example it is set to absorb blue light faster than other colors, giving the object a yellow appearance.

The absorption texture is multiplied with the scale parameter. This allows setting a wide range of values more easily.

Subsurface scattering is controlled by the scatter texture (multiplied by the scale value), and the phase function. The scattering texture defines how fast light gets scattered when traveling through the medium, in a similar way to how absorption is defined. A very high value means light gets scattered very fast, a value of 0.0 means no scattering.

The phase function controls in what direction light gets scattered. There is currently one kind of phase function defined, with one parameter, scattering_direction. If set to 0.0, it means light gets scattered the same amount in any direction. A setting larger than 0.0 means forward scattering, the larger the value, the more light is scattered in a similar direction as it was traveling. 1.0 means it doesn't change direction. A negative value means backscattering, so more light is scattered back to where it came from.

The following setup uses a wavelength dependent scattering. Blue light is scattered more, so it has more tendency to scatter back out of the material before it gets absorbed. Yellow-red light is scattered less, so more of it goes straight through the material, giving shadowed areas the yellow color.

Scattering inside a specular material will introduce a lot of noise. It will work best with smooth illumination.

Finally emission is defined by attaching an emission node to the emission input pin. When connecting an emission node to a medium node, it defines emission inside the volume instead of at the surface of the object. The power parameter gets a different meaning: it controls how fast the radiance along a ray increases while traveling through the volume, and not the total power. It is not multiplied with the scale parameter.

This effect works best with large and not too bright objects, very small bright objects will create a lot of noise.

The following image shows a normal mesh emitter (left) and a volume emission (right). The emitter in the right side has specular material with an index of refraction of 1.0 (making it invisible without the emission).

The stepsize parameter allows lowering the average distance between points where Octane samples the absorption, scattering and emission textures. If these textures are not constant, lowering this

parameter may improve the appearance of the material, but if set too low the ray tracing may terminate before the ray is traced back out of the material.

The priority input is currently not used.

6. Adjusting Lighting

OctaneRender™ currently supports Environment Maps / HDRI files, Sun / Sky environments and mesh emitters as lighting options.

To apply / change the Environment Type either select the **Mesh Preview Environment Node** in the **Outliner** (fig. 4.32), select the **Mesh Preview Environment Node** in the **Graph Editor** (fig. 4.33) or select the **Preview Environment** (fig. 4.34) icon in the **Node Inspector**.

fig. 4.32

fig. 4.33

fig. 4.34

6.1 Environment Maps / HDRI Environments

Texture

The Texture environment affects the color of the environment (fig.4.35). If it is left as a float, it can be scaled from white to black as a uniform color. If an HDRI map is used as texture environment, it must be rectangular and should be explicitly specified in the Mesh Preview Environment Node.

To use an HDRI file as the environment, the **Image** data type must be selected from the 'texture' drop down menu. The user will then be prompted to load the image file.

fig. 4.35 - Setting the Texture to "Image" to load an HDRI file

The following parameters are used to adjust the proper brightness and bearings of the map:

Image Power

Controls the power of the HDRI image lighting, increasing this value makes the scene brighter.

Image Gamma

Controls the Gamma of the HDRI file

Image Scale

Allows the user to adjust the scale of the HDRI file (this is mostly useful for image textures and not HDRI files)

Image Invert
Inverts the HDRI Image (this is mostly useful for floatimage textures for bump or opacity maps)

The following parameters are used to adjust the degree of illumination and the orientation of the environment map as it is applied on the scene:

Power
As the HDRI image illuminates the scene, its effect on the scene can be adjusted through the Power parameter.

Rotation
If the environment is not in the correct directional orientation, it can be adjusted in real-time by using the Rotation parameter.

Importance Sampling
Enables quicker convergence (noise reduction) for HRDI images by applying importance to certain areas of the HDRI so as to sample rays that resolve to the important areas more often than unimportant areas. This means the ray tracing is more efficient as it is not wasting time on rays that do not contribute much to the overall image quality. Due to the added complexity this will reduce the Ms/sec of rendering, but each Ms will be more effective, therefore resulting in a higher image quality in less time. Importance sampling is enabled by default.

The HDRI Environment Importance Sampling

6.2 Sun / Sky Environment

To use the Sun / Sky Environment, change the Mesh Preview Environment to the Daylight setting.

fig. 4.36 - Changing the environment to the Daylight System

That will display the **float3daylightsystem:**

Longitude / Latitude

These parameters can be set to get realistic sun settings for the specified geographic location.

Month / Day / GMT Offset / Hour

These parameters can be used to accurately place the sun in the sky according to the date / time for the sun at the current longitude / latitude

Interactive Map

The map can be used to interactively set the geographic location of the scene. This can allow the user to adjust the position of the sun by simply dragging the cross hairs around on the map.

fig. 4.37 - The Daylight System parameters

Turbidity

The Turbidity can be used to adjust the sharpness of the sun lights shadows. A low value creates sharp shadows (like on a sunny day) and a higher value diffuses the shadows similarly to a cloudy day.

Power

The Power slider can be used to adjust the strength of the light. This can affect overall contrast and exposure level of the image.

North Offset

The North offset slider can be used to adjust the actual North direction of the scene. This is useful for Architecture Visualization to ensure the direction of the sun is accurate to the scene.

Model (old/new)

This specifies which daylight model to be used as the current environment. The old daylight model lights a scene with basic spectral radiance assuming that the sun is moving over the horizon at a constant distance from the object. The new daylight model is used to simulate full spectrum daylight providing more sky color variation as the sun moves along and then bears shorter rays as the sun moves closer to the normal plane.

Sky Color/Sunset Color

These settings are used by the new daylight model to customize the spectral shade of light. This can affect overall mood expressed by the image.

fig. 4.38 - The Interactive Map can be used to set the location of the scene for accurate lighting

Sun Size

This allows users to control the sun radius in the daylight environment.

6.3 Mesh Emitters

Mesh Emitters allow an object to be used as a light source. This can be used with both **Texture** and **Sun / Sky** lighting systems.

In order to use a mesh as a light source, it needs to be changed to a Diffuse material type. The Emission parameter has two different options:

Blackbody -
The Blackbody Emission type uses Colour Temperature (in Kelvin) and Power to control the colour and intensity of the light.

Texture Emission -
This allows any valid texture type to set the light intensity. This can be used to create neat effects such as TV screens by using an Image Texture as the source.

Light source sampling rates - in earlier versions of OctaneRender™ light sources were sampled according to area. In some scenes this will lead to a poor balance between light sources. In a room with a big TV (which emits some light) and a couple of small bright spotlights, the TV would have been sampled most of the time, leading to a lot of noise in the light from the spotlights.

Emission nodes have a parameter called **sampling_rate**, to control how much weight is given to the emitter when picking an emitter to sample. This allows you to choose which light sources will receive more samples. In the above example you can increase the rate for the spotlights, so they get sampled adequately.

Here are screenshots of the emission settings with the new control:

The following settings are listed for the Blackbody emission settings, but many of the settings are shared with the Texture emission settings. The main difference is whether the colour comes from the Blackbody temperature or from the texture settings of the diffuse material.

Temperature - The temperature (in K) of the light emission.

Power - This is the wattage of the light source. Each light in the scene should be set to its real world wattage. For example, a desk lamp could be set to 25 watts, a ceiling lamp to 100 watts, and an LED light to 0.25 watts. This setting should not be used to balance the lighting power of the scene.

Efficiency or Texture - This setting is used to set the efficiency of the light source. No light is 100% efficient at delivering the power at the specified wattage (a 100 watt light bulb does not actually deliver 100 watts of light.) The efficiency setting can be used to enter the real-world values.

These values can be used to create very realistic light settings. For example, a standard 100 watt incandescent bulb would only be approximately 2.0% efficient where as a 25 watt compact fluorescent light will be 10% efficient. These will both produce around the same quantity of light in real life.

Orientation - This setting is used to adjust the direction the light is pointed in the scene. This setting only affects lights using a non-uniform distribution (textures or IES files).

Distribution - The distribution controls the pattern of the light. This can be set to a floattexture and an image or IES file can be loaded.

A diffuse sphere with an image texture (a jpg of an Audi R8) used for the distribution of a blackbody emission spectrum

A diffuse sphere with an IES file used for the distribution of a blackbody emission spectrum

6.4 Clay Rendering Modes

There are also two different clay rendering modes that allow the scene to be viewed in a preview environment. The Clay Rendering modes assist in tuning the lights of the environments. The icons to enable either clay or colored clay mode are located on the Render Viewport toolbar (Fig 6.4).

Fig. 6.4

Clay Rendering Mode

Renders the scene with only one material (diffuse white) for all objects.

Colored Clay Rendering Mode

Renders the scene with only the diffuse colors of the materials for all objects.

6.5 Using Portals

Portals are a technique to help the render kernel find important light sources. In interior renderings with windows, it is difficult for the path tracer to find light from the outside environment and optimally render the scene. Portals are planes that are added to the scene in the host modeling program that are used by OctaneRender™ to more efficiently render the scene.

In the image to the right, a room is being prepared with a small, single window. This would be a difficult scene to light with a sun/sky or HDRI file with no lighting on the interior of the room.

A single plane was placed over the window (orange) with the normal for the plane facing into the room (blue line).

Portal Usage Notes:

When using Portals, all opening must be covered with a portal. It will not work if only one window has a portal over it when all other windows do not have a portal over them.

The normals on the Portal object MUST be pointed into the scene or the render kernel will not use it properly.

Currently, portals cannot be placed in openings which are not open, eg a window with a portal cannot contain glass at this time.

In some complex scenes and situations, portals might slow down the render, so a bit of experimentation with/without should be done.

Portals only apply to pathtracing type kernels, eg pathtracing and PMC. (not directlighting/ambient occlusion)

It is best to try to use the least amount of geometry for portals, eg only a few simple rectangular planes are best, the more geometry your portals contain, the slower the engine might become.

Sometimes it is better to place one large portal over many small windows due to the above. It's ok to make a portal larger than the opening, just make sure it closes/covers all opening(s). A portal which is unnecessarily large will end up slowing down the efficiency, as some of the rays through the covered parts of the portal will not go outside the space.

Portals, when defined with the portal material, will not show up in your render, eg this will be invisible geometry.

7. Adjusting the Camera

To adjust the **Camera** select the **Mesh Preview Camera** Node in the **Graph Editor** or select the **Preview Camera** icon in the **Node Inspector**.

There are two node types available for adjusting the camera settings: Thinlens Camera and Panoramic Camera.

The Thinlens Camera Node

Field of View (fov)

This sets the field of view for the camera in the scene. When choosing a large value, more of the scene can be viewed from the camera. A smaller value will reduce the amount visible through the camera.

Aperture (aperture)

The aperture of the camera in the scene. Choosing a low value will have a wide depth of field where everything is in focus. Choosing a high value will create a shallow depth of field (DOF) where objects in the foreground and background will be out of focus.

Position (pos)

The position of the camera in the scene.

Target (target)

This is the target position where the camera is pointed in the scene.

Adjusting Thinlens Camera Parameters

Up (up)
This is the up direction of the camera in the scene. By default this is in the Y-direction (0,1,0).

Stereo (stereo)
This enables whether anaglyphic stereo rendering is active. When active, the render will be able to be viewed with Red / Blue 3D glasses

LeftFilter (leftFilter)/ RightFilter (righFilter)
The left and right filter colors are used to adjust the colors used to create the anaglyphic stereo affect in the render.

Lens Shift (lensShift)
This is useful for architectural rendering, when you want to render images of tall buildings/structures from a similar height as the human eye, but keeping the vertical lines parallel

Near Clip Depth (nearClipDepth)
The main purpose was for interior scenes where you want to get a good shot of the whole room but you cannot do so without a very large FOV, because you need to keep the camera inside the room.

With camera clipping (near plane), you can position the camera outside the room - lower the FOV and increase the clipping plane distance in front of you until the closest walls are clipped out. The geometry is not altered, only the clipping of the camera, which means that shadows, reflections and refractions are still affected by the clipped geometry.

Orthographic (orthographic)
This enables or disables Orthographic Camera mode. When active, all same-length parallel edges display as the same length regardless of the perspective that should result from the object's orientation.

Scale (scale)
This sets the viewing width, in meters, when in orthographic camera mode. The scale is linked to the FOV parameter.

Aperture Edge (aperture_edge)

This controls aperture edge detection at all points within the aperture. The lower values will give more pronounced edges to out of focus objects affected by the a shallow depth of field (DOF) such as objects in the foreground and background.

Distortion (distortion)

This adjusts the spherical and cylindrical distortion. The rendered image displays the entire sphere and uses equidistant cylindrical projection also known as lat-lon projection.

The Panoramic Camera Node

Adjusting Panoramic Camera Parameters

Camera Mode (cameramode)

Provide the option to use either a Spherical Camera Lens or a Cylindrical Camera Lens

Field of View (fovx)

This sets the x coordinate for horizontal field of view of the camera in the scene.

Field of View (fovy)

This sets the y coordinate for the vertical field of view of the camera in the scene.

Position (pos)

The position of the camera in the scene.

Target (target)

This is the target position where the camera is pointed in the scene.

Up (up)

This is the up direction of the camera in the scene. By default this is in the Y-direction (0,1,0).

Near Clip Depth (nearClipDepth)
The main purpose was for interior scenes where you want to get a good shot of the whole room but you cannot do so without a very large FOV, because you need to keep the camera inside the room.

With camera clipping (near plane), you can position the camera outside the room - lower the FOV coordinate values and increase the clipping plane distance in front of you until the closest walls are clipped out. The geometry is not altered, only the clipping of the camera, which means that shadows, reflections and refractions are still affected by the clipped geometry.

8. Adjusting the Camera Imager

To adjust the Imager select the **Mesh Preview Imager** Node in the **Graph Editor** or select the **Preview Imager** icon in the **Node Inspector**.

fig. 4.41 - The Camera Imager Parameters

Exposure (exposure)
Controls the exposure of the scene. Smaller values will create a dark scene while higher values will brighten the scene.

f-Stop (fstop)
This controls the f-Stop just as in a real camera. Lower values allow more light into the camera and therefore brighter scenes. Higher values allow less light in, so the scene will be darker.

ISO (iso)
This controls the ISO setting as in real photography. The higher the ISO setting, the noisier the final picture.

Gamma (gamma)
This adjusts the gamma of the render and controls the overall brightness of an image. Images which are not properly corrected can look either bleached out, or too dark. Varying the amount of gamma correction changes not only the brightness, but also the ratios of red to green to blue.

Response (response)
The use of measured camera response curves can be selected. Please see Appendix 2 for examples of all the settings.

Vignetting (vignetting)
Adjusting this parameter increases the amount of darkening in the corners of the render. Used sparingly, it can greatly increase the realism of the render.

Saturation (saturation)
Adjusts the amount of color saturation of the render

Hot Pixel Removal (hotpixel_removal)
The Hot Pixel Removal slider is used to remove the bright pixels (fireflies) during the rendering process. While many of the pixels can dissappear if the render is allowed to progress, the Hot Pixel Removal feature allows the bright pixels to be removed at a much lower Sample per Pixel.

Pre-multiplied Alpha (premultiplied_alpha)
Checking the Pre-multiplied Alpha button multiplies any transparency value of the output pixel by the pixels color.

sRGB Colour Picker Space

To invoke the sRGB Colour Picker Space, click on the coloured square found in the diffuse sliders in the Node Inspector to show a panel of colours that allows easier color picking.

Minimum Display Samples (min_display_samples)
This is minimum amount of samples that is calculated before the image is displayed. This feature can significantly reduce the noise when navigating and is useful for real-time walkthroughs. When using multiple GPUs, it's recommended to set this value as a multiple of the number of available GPUs for rendering, e.g. if you're rendering with 4 GPUs, set this value at 4 or 8.

Dithering (dithering)
Adds random noise which removes banding in very clean images.

Saturate To White (saturate_to_white)
When the sun is too bright, it can create multicolored reflections. Increasing this value will change the colours to white. This is also applicable to all sources of light. Fully saturated parts of the render can be pushed towards pure white with this option. This helps avoid large patches of fully saturated colours caused by over-bright light sources such as very bright coloured emitters or reflected sunlight off coloured surfaces.

White Balance (white_balance)
White Balance is used to adjust the temperature in the image resulting from the tints produced by different light sources. This allows you to acheive the most accurate colors possible. White Balance is on by default.

Image rendered without White Balance

Image rendered with White Balance

9. Adjusting the Post-processing Preview

To add and adjust post processing effects, select the **Post-processing Preview** icon in the **Node Inspector** (Fig. 9.1). Connecting a post processing node will not restart the renderer.

Fig. 9.1

On/Off (on_off)

This is a boolean value used to enable or disable post-processing effects on the resulting render. Post-processing is disabled by default.

Bloom Power

Controls the size of the glow originating from an emitter, the size of the halo of light orginating from the sun and/or concentrated light on reflective glossy materials to add a bloom effect to the rendered image.

Glare Power

Controls the size of the visible rays originating from an emitter, the size of the glare orginating from reflective glossy materials at a point where concentration of light is at the higest to add a glare effect to the rendered image.

Glare Ray Amount

Controls the number of visible rays radiated or reflected.

Glare Angle

This is used to adjust the direction of the glare relative to the object. A glare angle of -90 and 90 results to one main horizontal glare, and a glare angle of 0 results to one main vertical glare.

Glare Blur

Controls the sharpness of the glare. Smaller values will result to a crisp linear glare and this is softened as the value is adjusted and set higher.

Fig. 9.2

Bloom Power: 0.0010
Glare Power: 0.0010
Glare Ray Amount: 1
Glare Angle: -90
Glare Blur: 0.0010

Fig. 9.3

Bloom Power: 50
Glare Power: 0.0010
Glare Ray Amount: 1
Glare Angle: -90
Glare Blur: 0.0010

Fig. 9.4

Bloom Power: 50
Glare Power: 20
Glare Ray Amount: 1
Glare Angle: -90
Glare Blur: 0.0010

Fig. 9.5

Bloom Power: 50
Glare Power: 20
Glare Ray Amount: 2
Glare Angle: -90
Glare Blur: 0.0010

Fig. 9.6

Bloom Power: 50
Glare Power: 20
Glare Ray Amount: 2
Glare Angle: -50
Glare Blur: 0.0010

Fig. 9.7

Bloom Power: 50
Glare Power: 20
Glare Ray Amount: 2
Glare Angle: -50
Glare Blur: 0.0900

(Bloom and Glare on a ring)

(Bloom effect)

(Sun glare)

10. Creating Macro Nodes

OctaneRender™ allows the user to create Macro Nodes to store their most used materials, textures, and emission nodes for later use. The materials can be stored locally or to the Octane Live Database for all users to access.

fig. 4.42 - Adding a Material Node

Material Macro Example:

1) Add a material Macro Node

Right click on the **Graph Editor** and select **Material -> Material Macro** (fig. 4.42)

fig. 4.43 - The Macro Node and New Tab

2) Build the Material

Double click the Material Macro Node to open up the new tab labeled "Material Macro" (fig. 4.43). Click on the new Tab to see "inside" the macro. This is where the actual material is created.

Add a Material (in this example a Glossy material). Connect the output of the **Glossy Material** to the **Material Macro (Out)** node. Add any other textures to the material until it is complete (fig. 4.44).

fig. 4.44 - Creating the Material "Inside" the Macro

Input Nodes can also be added to the macro. In (fig. 4.45), the RGB Spectrum Texture has been replaced with a Texture Input Pin. This will allow a user to attach the texture of their choice to the Material Macro and it will be processed however the Macro is defined. The macro in essence then acts as a "Black Box."

fig. 4.45 - Creating a custom "Input" texture node

fig. 4.46 - The Material Macro with Texture Input

Renaming the Nodes

Nodes in the Graph Editor pane can be renamed by renaming their counterparts in the Node Inspector pane.

3) Save the Node

When the macro is completed, it can be saved for later use. Right click on the Macro Node and choose **Save Node**. The Store Node dialog box appears (fig. 4.47).

Enter all the information related to the material.

The location drop down allows the user to either store the macro locally or the to the **Octane Live Database**. Click **OK** to store the macro for later use.

IMPORTANT:
All types of nodes, and groups of them can be saved to the harddisk, including the connections between them.

The LiveDB accepts only macro nodes.

When used in a scene, a macro node is represented on the Node Inspector and users can choose to have the Node Inspector display the macro's entire contents or only its input pins. Switching between these views for the macro node is controlled by the **Macro Display Mode** button (FIG 4.47b).

fig. 4.47 - Saving a custom Material Macro Node

fig. 4.47b - Macro Display Mode

11. The Shadow Catcher

OctaneRender™ improves realism by implementing the shadow catcher to create shadows cast by objects to its surroundings. The shadows are visible even with the object is in alpha and this is mainly used for compositing. The casted shadows are not limited to the ground plane but also on walls and other objects in the scene all of which are rendered natively using HDRI environment maps.

Using the shadow catcher:

1. Make sure there is a source of light in the scene, this may be a direct lighting source or some image on environment.

2. To make objects transparent, set it as a diffuse material and enable the "Matte" option at the bottom of the diffuse material properties.

3. In the kernel settings, turn on alpha channel and make sure "keep environment" is disabled.

12. The Live Material Database

OctaneRender™ includes a material database that includes both materials submitted by users and those from the OctaneRender™ Team and their contractors. It can be located in the Outliner by selecting the LiveDB tab.

The materials are sorted by category and include a preview to better assist in locating a material to add to your scene.

Clicking on the preview loads the current material preview ball but does not add the material to the current scene. To Add the material to the current scene, drag the preview picture to the Graph Editor or to an object in the scene in the viewport. The matereial can also be dragged and dropped into the Node Inspector.

The material will be placed in the Graph Editor as a Material Macro which can then be double clicked to enter into the material for fine tuning.

Chapter 5

Saving and Loading Scenes in OctaneRender™

1. Saving / Loading Scenes

After you are done setting up your scenes, you can save them to an OCS file. This will allow the scene to be reopened and worked on at a later date.

fig. 5.1 - Saving scenes from the file menu

To save your scene, click on **Save As**... from the **File** menu (fig. 5.1)

To reload a scene, click on **Open** and select the file to open.

You can also drag and drop the OCS file from the folder window directly to the OctaneRender graphic user interface.

2. Reloading Textures / Images / Objects

During the process of working on a scene some textures or objects may need to be reloaded. Want to add some more detail to that great model? No problem.

At the top of any Object Node or Image Node the active path to that image or object is displayed. Click on the load icon to the left of the path to choose a different file while keeping the rest of the scene intact. Click on the arrow icon to reload the object / image.

fig. 5.2 - Reloading images can be done by clicking the small icon shown here

Stanford dragon textured by face

Chapter 6

Geometry

1. Using Instances

OctaneRender™ allows the user to create individually customizable instances of an object node without the need for voxelizing each representation of the object node. The simplest object node is a single mesh loaded from an OBJ file. Each instance of the base object node, whether if it is a mesh or a more complex set of nodes, will present the same materials and textures applied on its base object node. The relative position, rotation and scale of each instance, can then be altered by specifying parameters using a placement node.

A placement node creates the transformed instance of its input and the transform is specified through the following parameters: a transform, rotation, or scale node, all of which can be manipulated interactively. The placement node has only one transform input and one geometry input, and this one transform is given as a transform node (translation, rotation, scale).

Instances represented by the placement nodes are grouped together as inputs of a geometry group node, which allows the user to preview all instances of the mesh together. Users can further create instances of a geometry group node.

Instancing Usage Example

1) Load a mesh node
   Right click on the Graph Editor and select Add Node -> Object-> Mesh (fig. 6.1.1a)

2) Load a placement node Right click on the Graph Editor and select Add Node -> Objects -> Placement

   Users can manipulate the instance through parameters of its respective placement node.

Rotation- is used to rotate the instance of the mesh on a specified axis.

Scale- is used to scale the instance of the mesh on a specified axis.

Translation - is used to move the instance of the mesh on a specified axis.

With instancing, users can now duplicate the mesh multlipe times by connecting more placement nodes (fig. 6.1.2a)

Fig. 6.1.1a

Fig. 6.1.2a

3) Copy the placement node a few times in order to duplicate the object.

4) To preview all the instances together, connect them to a geometry group node that acts as a placeholder node of all the instances (placement nodes) within that group (fig. 6.1.3a).
Add Node -→ Objects -→ Geometry Group

By default, a geometry group node has two inputs, and this number of inputs can be increased or decreased.

The Add Input button adds a new geometry input to the end. The Remove Input button removes the last geometry input.

Fig. 6.1.4a

Fig. 6.1.4b

Users can further manipulate the placement of each instance by adjusting the parameters of each respective placement node.Selecting the geometry group node will allow users to see the group of instances for that group.

Fig. 6.1.3a

The are many possibilities of using these object nodes to implement instancing. For example, users can create instances of the same geometery group by selecting an entire group of nodes including its dependent placement nodes and copy-pasting them into the graph editor.

The geometry groups or its placement nodes can be connected and nested further as inputs of a new geometry group. Selecting the new geometry group node will allow users to preview all instances within the collection of nodes.

2. Scatter

The Scatter Node

The scatter node creates multiple instances of its input.

The number of transformed instances is virtually unlimited and are represented as a list of transforms. The transforms are given as groups of 12 numbers, which are the first three rows of the transformation matrix. The fourth row is assumed to be [0 0 0 1]. This gives exporters a practical way to create lots of instances.

You can visualize and transfrom individual instances by clicking on the
"Enable/disable viewing mesh nodes when selected" icon.

Users will need an exporter that can export these positions from the 3D-application into a file that can be loaded to the scatter node. Once exported, Mesh files and CSV files can be loaded into the scatter node. The coordinates in a scatter node are given as the first three rows of the transformation matrices (the fourth is always [0, 0, 0, 1]).

For example the matrix for a 30° rotation around the Z axis looks like this:

[.87, –.50, 0, 0]
[.50, .87, 0, 0]
[0, 0, 1, 0]
[0, 0, 0, 1]

The scatter node will contain these 12 values:
.87 –.50 0 0 .50 .87 0 0 0 0 1 0

For a translation:

[1, 0, 0, tx]
[0, 1, 0, ty]
[0, 0, 1, tz]
[0, 0, 0, 1]

The scatter node will contain these 12 values:
1 0 0 tx 0 1 0 ty 0 0 1 tz

These values have to be exported from modeling applications and then loaded unto a scatter node.

Scatter plug-ins for 3ds Max (MultiScatter and Forest Pack)

The 3dsMax scatter plugins MultiScatter from iCube R&D and Forest Pack from iToo Software are both supported and can be used with the integrated plugin editions of OctaneRender (please contact iToo to get a version that supports Forest Pack for Octane Render). MultiScatter is not native to OctaneRender Standalone Edition but it can recognize MultiScatter loaded from exported files.

3. The Material Map Node

The Material Map Node takes one geometry input and creates unfilled input pins equal to the number of materials applied on the original geometry. It retains the names of the materials used on the original geometry it is connected to and allows the user to connect new materials on each of its material input pins. Using a Material Map Node allows the user to retain all the original elements of the mesh or geometry by making the material mapping changes only on the material map node.

The material map node can further be used as the input for a placement node, a scatter node, or a geometry group node.

Appendix I

Advanced Topics

1. Launching Octane from the Command Line

OctaneRender™ supports passing command line parameters to utilize scripting or other automated tasks.

The following is an example of the workflow for working with OctaneRender™ from the Command Line.

To utilize the command line options, you must do the following:

1. Save the scene to an OCS file. You must know the full path to this scene.
   Example: C:\Temp\OctaneTest.ocs

2. Remember the name of the mesh node that you want to render. This typically is the node for the imported OBJ. Example "OctaneTest.obj"

3. If the scene geometry has changed and needs to be reloaded, note the full path
   Example: C:\Temp\NewGeom.obj

4. Octane can then be launched from the command line using the following syntax

By lechu

USAGE :

octane [-m <string>] [-r <filename>] [-l<filename>] [-n<filename>] [--imager-exposure <float>]

[--daylight-sundir-z <float>] [--daylight-sundir-y <float>] [--daylight-sundir-x <float>]

[--cam-aperture <float>] [--cam-focaldepth <float>]

[--cam-fov <float>] [--cam-motion-up-z <float>]

--cam-motion-up-y <float>] [--cam-motion-up-x <float>] [--cam-motion-target-z <float>]

[--cam-motion-target-y <float>]

[--cam-motion-target-x <float>] [--cam-motion-pos-z <float>] [--cam-motion-pos-y <float>]

[--cam-motion-pos-x <float>] [--cam-up-z <float>]

[--cam-up-y <float>] [--cam-up-x <float>]

[--cam-target-z <float>] [--cam-target-y <float>]

[--cam-target-x <float>] [--cam-pos-z <float>]

[--cam-pos-y <float>] [--cam-pos-x <float>] [-q] [-g <int>] ... [-s <int>] [-o <filename>]

[--film-height <int>] [--film-width <int>] [-e] [--]

[--version] [-h] <filename>

WHERE :

-t <node name>, --target-node <node name>
Name of the render target node to render

-m <string>, --mesh-node <string>
Name of meshnode to render

-r <filename>, --relink-meshnode <filename>
Name of OBJ mesh file to relink rendered meshnoded with

-l <filename>, --link-meshnode <filename>
Name of OBJ mesh file to link after startup

-n <filename>, --new <filename>
Create a new OCS project file from given command line arguments

--imager-exposure ←float→
Imager Exposure Amount

--daylight-sundir-z ←float→
Daylight Sun Direction Vector Z Component

--daylight-sundir-y ←float→
Daylight Sun Direction Vector Y Component

--daylight-sundir-x ←float→
Daylight Sun Direction Vector X Component

--cam-aperture ←float→
Camera Aperture Radius

--cam-focaldepth ←float→
Camera Focal Depth

--cam-fov ←float→
Camera FOV (degrees)

--cam-motion-up-z ←float→
Camera Up Motion 2nd Vector Z Component

--cam-motion-up-y ←float→
Camera Up Motion 2nd Vector Y Component

--cam-motion-up-x ←float→
Camera Up Motion 2nd Vector X Component

--cam-motion-target-z ←float→
Camera Target Motion 2nd Position Z Component

--cam-motion-target-y ←float→
Camera Target Motion 2nd Position Y Component

--cam-motion-target-x ←float→
Camera Target Motion 2nd Position X Component

--cam-motion-pos-z ←float→
Camera Motion 2nd Position Z Component

--cam-motion-pos-y ←float→
Camera Motion 2nd Position Y Component

--cam-motion-pos-x ←float→
Camera Motion 2nd Position X Component

--cam-up-z ←float→
Camera Up Vector Z Component

--cam-up-y ←float→
Camera Up Vector Y Component

--cam-up-x ←float→
Camera Up Vector X Component

--cam-target-z ←float→
Camera Target Position Z Component

--cam-target-y ←float→
Camera Target Position Y Component

--cam-target-x ←float→
Camera Target Position X Component

--cam-pos-z ←float→
Camera Position Z Component

--cam-pos-y ←float→
Camera Position Y Component

--cam-pos-x ←float→
Camera Position X Component

-q, --quiet
Start Application without splash and minimized window

-g ←int→, --gpu ←int→ (accepted multiple times)
add GPU device to use for rendering (0 = first)

-s ←int→, --samples ←int→
Maximum number of samples per pixel (maxsamples)

-o ←filename→, --output-png ←filename→
Output PNG imagefile when maxsamples is reached

--film-height ←int→
Film height

--film-width ←int→
Film width

-e, --exit
Close the application when rendering is done

--, --ignore_rest
Ignores the rest of the labeled arguments following this flag.

--version
Displays version information and exits.

-h, --help
Displays usage information and exits.

←filename→
.OCS Project scene file

For example, to open a file (C:\Temp\OctaneTest.ocs), relink the geometry (C:\Temp\NewGeometry.obj), select the meshnode (OctaneTest.obj) and render the frame for 1000 samples per pixel, save the render and exit:

octane –e –r C:\Temp\NewGeometry.obj –m OctaneTest.obj –s 1000 –o C:\temp\test.png C:\Temp\OctaneTest.ocs

Other examples:

$ octane "OctaneBenchmark/octane_benchmark for 1022 beta 2.2rc.ocs"
$ octane "some test scene.ocs"

Why are there two sets of Camera Parameters?

The second camera control (-- cam-motion) is used to specify the camera position in the next frame. OctaneRender™ will then use the current position and the next frame position to calculate motion blur between the two camera positions.

2. One-Click Turn-Table Animations

OctaneRender™ supports the ability to perform turntable animations with a single click of a button. This doesn't require any knowledge of programming camera paths or any other advanced knowledge.

1. Position the camera so that the object or scene is centered properly in the viewport

2. Set the center of rotation by using the Focus Picker and clicking on the center of the object (or by setting the center of rotation by setting the Camera Target X,Y, and Z values manually)

3. Open the Turn Table Animation Setting Window by clicking on the icon:

fig. I.1 - The Turntable Animation Settings Dialog

4. Adjust the settings as required to get the desired motion, length and quality.

5. Set the Image Output by clicking on the Set button. Select a folder where the resulting images will be stored and type a file prefix. All the images in the animation will then be stored in that directory with a number sequence after the entered file prefix.

6. Click the Render Button to create the image sequence.

How do I create an animation from the Image sequence?

To convert the images into an animation requires the use of a second program. Both Virtualdub and Blender can be used to complete this task.

3. One-Click Sun / Sky Animations

OctaneRender™ supports the ability to perform sun/sky animations with a single click of a button. This doesn't require any knowledge of programming light paths or any other advanced knowledge. This creates an easy way to make impressive architectural visualization animations.

1. Adjust the scene and position of the camera

2. Set the Preview Environment type to Daylight

3. Set the sun position (via the map or longitude / latitude)

4. Preview the motion of the sun by sliding the Hour slider. Continue to tweak the position of the sun and the North Offset until adjusting the Hour slider produces the desired sun path.

5) Click on the Daylight Simulation Animation icon.

6) Adjust the Daylight, output and quality settings.

7) Set the Image Output by clicking on the Set button. Select a folder where the resulting images will be stored and type a file prefix. All the images in the animation will then be stored in that directory with a number sequence after the entered file prefix.

8) Click on the Render button to generate the image sequence.

fig. I.2 - The Daylight Simulation Settings Dialog

4. Normal Maps and Bump Maps

Normal Maps and Bump Maps both serve the same purpose. By using an image (Bump or Normal), the geometry of the surface can have the appearance of more detail. This should not be confused with displacement mapping where the image used actually affects the geometry.

Bump Maps are typically grey scale images and OctaneRender™ uses the values to determine how much to affect the geometry at that location of the pixel.

Normal Maps work slightly different. They are color images that use RGB values to add directionality to the raised or lowered areas.

Note: If both Normal Maps and Bump maps are used on the same material, the Normal Map will take a higher priority and be used and the Bump Map will be ignored.

In OctaneRender™, the normal map is interpreted in tangent space. The X-axis is the tangent vector in the dP/dU direction, the Y-axis is the other tangent vector and the Z-axis is the normal direction.

My Normal Maps from Z-Brush don' t export properly. What can I do?

To get Z-Brush normal maps to work in OctaneRender™, you must enable the "Flip G" button under the Normal Map settings and the "Flip V" on the File Export

fig. I.3 - Z-Brush Normal Map Settings

fig. I.4 - Click on the "Flip V" button prior to export

Appendix II

Camera Response Curve Examples

Credits : Scene modeled and rendered by Dave Girard

fig. II.1 - Advantix 100CD

fig. II.4 - Agfachrome CT Precisa 100CD

fig. II.2 - Advantix 200CD

fig. II.5 - Agfachrome CT Precisa 200CD

fig. II.3 - Advantix 400CD

fig. II.6 - Agfachrome RSX2 050CD

fig. II.7 - Agfachrome RSX2 100CD

fig. II.10 - Agfacolor Futura II 200

fig. II.8 - Agfachrome RSX2 200CD

fig. II.11 - Agfacolor Futura II 400

fig. II.9 - Agfaccolor Futura II 100

fig. II.12 - Agfacolor Futura 100

fig. II.13 - Agfacolor Futura 200

fig. II.16 - Agfacolor HDC 200

fig. II.14 - Agfacolor Futura 400

fig. II.17 - Agfacolor HDC 400

fig. II.15 - Agfacolor HDC 100

fig. II.18 - Agfacolor Optima II 100

fig. II.19 - Agfacolor Optima II 200

fig. II.22 - Agfacolor Vista 200

fig. II.20 - Agfacolor Ultra 050

fig. II.23 - Agfacolor Vista 400

fig. II.21 - Agfacolor Vista 100

fig. II.24 - Agfacolor Vista 800

fig. II.25 - DSCS 315 1

fig. II.26 - DSCS 315 2

fig. II.27 - DSCS 315 3

fig. II.28 - DSCS 315 4

fig. II.29 - DSCS 315 5

fig. II.30 - DSCS 315 6

fig. II.31 - Ektachrome 64CD

fig. II.34 - Ektachrome 100 CD

fig. II.32 - Ektachrome 64TCD

fig. II.35 - Ektachrome 320 TCD

fig. II.33 - Ektachrome 100 Plus CD

fig. II.36 - Ektachrome 400 XCD

fig. II.37 - Ektachrome E100 SCD

fig. II.40 - F 400 CD

fig. II.38 - F 125 CD

fig. II.41 - FCICD

fig. II.39 - F 250 CD

fig. II.42 - FP290Z

fig. II.43 - Gold 100 CD

fig. II.46 - Kodachrome 64CD

fig. II.44 - Gold 200 CD

fig. II.47 - Kodachrome 200CD

fig. II.45 - Kodachrome 25

fig. II.48 - Max Zoom 800CD

fig. II.49 - Porta 100TCD

fig. II.52 - Porta 400NCCD

fig. II.50 - Porta 160NCCD

fig. II.53 - Porta 400VCCD

fig. II.51 - Porta 160VCCD

fig. II.54 - Porta 800CD

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