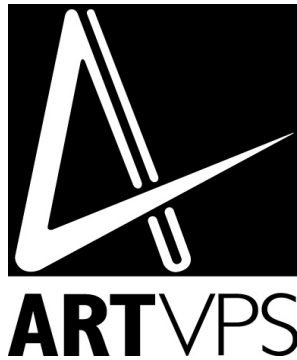
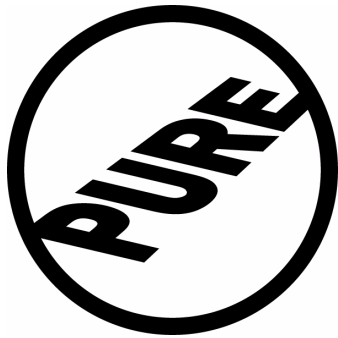


# Release Notes

*PURE Software v3.0, RenderDrive Software v3.0, RenderPipe MAX v2.7 and  
RenderPipe for Maya v1.5*

Updated: 5th December 2003



These are the release notes accompanying version 3.0 of the PURE software, version 3.0 of the RenderDrive software and RenderPipe RIB, version 1.5 of RenderPipe for Maya and version 2.7 of RenderPipe MAX. These release notes:

- Explain how to install the software and plug-ins
- List the changes compared to the previous release
- Describe any outstanding problems
- Contain an up to date description of compatibility with Maya and with 3dsmax and VIZ

For upgrade instructions from previous releases read:

- ‘Updating the PURE Software’ on page 7
- ‘Installing the RenderDrive Software’ on page 9.
- ‘Installing the RenderPipe MAX Plug-in’ on page 13.
- ‘Installing RenderPipe for Maya’ on page 37.

The release notes are split into these chapters:

- Page 1: Introduction and contents  
(including contacting ART, product overview and compatibility, release contents)
- Page 7: PURE  
(including installation, a list of changes from version 1.4 and usage instructions)
- Page 9: RenderDrive  
(including installation instructions and a list of changes from version 2.9)
- Page 13: RenderPipe MAX  
(including installation, changes since version 2.6 and a detailed summary of compatibility with 3dsmax / VIZ)
- Page 31: RenderPipe RIB
- Page 33: RenderPipe for Maya  
(including installation, changes since version 1.4 and a detailed summary of compatibility with Maya)

## *Contacting ART VPS*

If you have any problems with this beta release, please contact ART VPS directly. You can contact ART VPS in the following ways:

- Send e-mail to 'support@artvps.com'.
- Phone us on +44 1223 424466
- Fax us on +44 1223 424467

For further advice please see the support area of our web site where you can find a growing section of questions and answers. Browse to <http://www.artvps.com/> and click on support or use this link:  
<http://www.artvps.com/support.ihtml?page=contact>.

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## *Release Contents*

This release contains the following software versions:

- PURE Software version 3.0
- RenderDrive software version 3.0
- RenderPipe for Maya version 1.5
- RenderPipe MAX version 2.7
- RenderPipe MAX Shaders version 2.7
- RenderPipe RIB version 3.0

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## *PURE, RenderDrive and RenderPipe*

ART VPS has two rendering products, PURE and RenderDrive.

- PURE is a PCI card that is installed in a computer. The software to drive the card runs on the computer.
- RenderDrive is a rendering appliance. It is a self-contained rendering device, connected by fast ethernet and all processing is done internally to the RenderDrive.

ART VPS also provides a family of interfaces called 'RenderPipe'. Currently there are RenderPipe plugins for 3ds max / VIZ and for Maya. There is also a RenderPipe interface for rendering RIB files.

All types of RenderPipe can interface to both PURE and RenderDrive, so throughout these notes you will see references to both types of rendering device.

PURE and RenderDrive both use the same underlying rendering software and algorithms, so produce identical results.

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## *Installation*

There are three stages to installation.

1. Install the PURE card or RenderDrive.  
The User Manual contains instructions for this.
2. Install or upgrade the PURE / RenderDrive software.  
Installation of the PURE software is explained in chapter 2 of the PURE User Manual and installation of the update is explained in 'Updating the PURE Software' on page 7 of these release notes.  
Installation of the RenderDrive software is explained in 'Installing the RenderDrive Software' on page 9 of these release notes.
3. Install or upgrade the RenderPipe plug-in being used.  
See 'Installing RenderPipe for Maya' on page 37 of these release notes or 'Installing the RenderPipe MAX Plug-in' on page 13.

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## *PURE Card Compatibility*

### **Recommended Minimum Requirement**

- Windows XP, Windows 2000 or Windows NT 4.0 (SP5 or greater)
- 400MHz Pentium processor (or equivalent)
- 512Mb RAM
- 550Mb free disk space
- ATX power supply, 235W minimum
- 1 free full-length PCI slot, version 2.2 compliant. \*

This is a minimum requirement. A faster processor and increased memory will significantly enhance PURE's performance.

To increase the amount of geometry that PURE can render, increase system RAM and increase the disk space allocated to Windows virtual memory.

PURE can also be used in computers with 256Mb of RAM and 120Mb of disk space, but this will seriously limit PURE's performance. Note that the computer will be running a 3d modelling application, such as 3dsmax or Maya, as well as the PURE software (unless it is only used to render RIB files).

\* If in doubt about whether your computer is PCI version 2.2 compliant, check your computer's documentation or ask the manufacturer. The PCI slot must be a 5 volt PCI slot. PURE requires the PCI slot to have a 3.3v PCI rail, which was optional under earlier versions of the PCI specification. If your computer provides this 3.3v PCI rail, then the PURE card should work.

## *RenderPipe Compatibility*

### **RenderPipe RIB and RenderDrive Software Development Kit (SDK)**

RenderPipe RIB is PURE / RenderDrive's interface for rendering RenderMan RIB files. Two versions of RenderPipe RIB and the SDK are provided: Windows and Linux (i386 glibc2).

### **RenderPipe MAX**

RenderPipe MAX is compatible with releases R3.\*, R4.\*, R5.\* and R6 of 3ds max, and with releases R3, R3i and R4 of Autodesk VIZ.

### **RenderPipe for Maya**

RenderPipe for Maya is compatible with versions 3, 4, 4.5 and 5.0 of Maya, running on either Windows or IRIX.

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## *CD Contents*

The software accompanying this release is provided on the CD and consists of the components described below:

- Acrobat\_install
- Documents
- PURE\_Software
- RenderCoat
- RenderPipe\_for\_Maya
- RenderPipe\_MAX
- RenderPipe\_RIB
- RD2000\_Software
- RD3000\_Software
- RD5000\_Software

### **Acrobat\_install**

This directory contains the programs to install the Adobe® Acrobat® Reader software. The Acrobat Reader software can be used to view the PDF files in the documents directory.

There are three versions of the program, one for Windows, one for Linux and one for IRIX.

*Windows* – to run the Windows Acrobat Reader software installer, simply double click on the `AdbeRdr60_enu_full.exe` file in the `Acrobat_install` directory, then follow the on-screen instructions.

*IRIX and Linux* – the Acrobat Reader software should be installed by the system administrator. There is an installation bundle for each of IRIX (`irix-rs-405.tar.gz`) and Linux (`linux-508.tar.gz`). The installation bundle contains a text file, `INSTALL.txt`, giving detailed instructions.

Adobe, Acrobat and Acrobat Reader are trademarks of Adobe Systems Incorporated.

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## Documents

This directory contains various useful documents, including a copy of the PURE / RenderDrive User Manual in PDF format.

To read PDF documents, you need to install version 3 (or later) of the Acrobat Reader software, as described above. (We recommend you use a recent version, 4.0 or later, otherwise images will look poor.)

This document is a copy of these release notes:

`release_notes_3.0.pdf`

These documents describe the procedure for setting up RenderDrive, as provided on a printed sheet accompanying your RenderDrive when it was first delivered. They are in Word 97 format:

`getting_started_RD2000.doc`  
`getting_started_RD3000_and_RD5000.doc`

This is the RenderDrive user manual in PDF format.

`RenderDrive_user_manual_v3.0.pdf`

This document contains a copy of the Licence agreement, and other licence notices for the RenderDrive and RenderPipe software:

`LICENCE.html`

This document describes the procedure for setting up PURE, as provided on a printed sheet accompanying PURE when it was first delivered. It is in Word 97 format:

`getting_started_PURE.doc`

This is the PURE user manual in PDF format.

`PURE_user_manual_v3.0.pdf`

This document contains a copy of the Licence agreement, and other licence notices for the PURE and RenderPipe software:

`PURE-LICENCE.html`

This document explains how to use the IES to RenderMan light shader MAXScript that is provided with RenderPipe MAX:

`using_ies_lights_script.pdf`

## PURE\_Software

This directory contains the PURE Software installer. Note that the file PURE.pdf is not an Acrobat file – it is a package definition file.

## RenderCoat

This directory contains the RenderCoat material libraries for RenderPipe MAX. There are five material libraries:

- *RC-object-materials*. Various opaque materials, for example stainless steel and terracotta tile.
- *RC-paint-finishes*. Materials for painted surfaces, particularly designed for automotive designers. Uses the RenderPipe Shiny material. This library includes a Dent Map that can be applied to the Lacquer channel of the RenderPipe Shiny material to make the paint finish look like a metal surface.
- *RC-semi-transparent*. Materials for semi-transparent surfaces for example frosted glass and acrylic. This library makes extensive use of composites and blends of the RenderPipe Glass material with other materials.

- *RPGlass*. A set of materials with the correct physical properties of various types of clear material, for example emerald, glass and water.
- *RPMirror*. A set of materials with the correct physical properties of various types of opaque reflective materials, for example gold and silver.

The `RenderCoat` directory also contains the maps used by the libraries and some images demonstrating the materials. The `ReadMe.rtf` file gives more information.

### **RenderPipe\_for\_Maya**

This directory contains the RenderPipe for Maya plug-in and associated files. There are two sub-directories, one for Windows and one for IRIX. In turn these contain versions for Maya versions 3, 4, 4.5 and 5.0

### **RenderPipe\_MAX**

This directory contains the RenderPipe MAX plug-in, interface files and some example RenderMan shaders.

There are four versions of the RenderPipe plug-in, `rpmax.dll`. The version in the `max3` directory is for use with 3dsmax R3 / R3.1 and VIZ R3, the version in the `max4` directory is for use with 3ds max versions 4 and 4.2 and VIZ R4, the version in the `max5` directory is for use with 3dsmax versions 5 and 5.1 and the version in the `max6` directory is for use with 3dsmax version 6. The appropriate version should be installed in your `Plugins` directory.

### **RenderPipe\_RIB**

This directory contains RenderPipe RIB RenderMan interface and software development kit.

### **RD2000\_Software, RD3000\_Software and RD5000\_Software**

Three versions of RenderDrive's embedded software are provided. The five files in the `RD2000_Software` directory should be installed on RD2000s. The five files in the `RD3000_Software` directory should be installed on RD3000s and RD3500s. The five files in the `RD5000_Software` directory should be installed on RD5000s. See below for installation instructions. Note that if you have received these notes and CD with a RenderDrive shipment, this software is pre-installed.

# PURE

This section of the release notes is specific to the PURE card and its associated software.

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## *Installing the PURE Card in a Computer*

For instructions on installing the PURE card, please see chapters 1 and 2 of the PURE User Manual.

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## *Updating the PURE Software*

**If this is the first time you have installed PURE software on your PC, then please follow the instructions in chapter 1 of the PURE User Manual.**

To install the new software:

- If you downloaded the PURE software then unzip it, being sure to switch on the option to recreate directories
- Browse to the PURE\_Software directory on the CD or in the unzipped software
- Double click on setup.exe.
- Follow through the panels, referring to pages 1-11 to 1-17 of the PURE manual if necessary.
- On Windows NT you will need to reboot.
- If PURE Starter does not run automatically, run it from the Start Menu > Programs > Startup menu.

*Note:* The file 'PURE 3.0-4.PDF' in the PURE install directory is a package definition file, not an Adobe Acrobat file.

*Tip:* If Windows Explorer crashes, PURE Starter will not reappear in the task bar. PURE Starter may then give errors when you render. If this happens, reboot the PC. Alternatively, use the Task Manager to kill PURE Starter, then restart it using the 'PURE Starter' entry in the Start Menu > Programs > Startup menu.

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## *Changes in the PURE Software*

These are the changes in version 3.0 of the PURE software compared to version 1.4.

### **Sampling**

An improvement has been made to PURE / RenderDrive's sampling. It eliminates banding that could sometimes be seen in depth of field. It also reduces noise in some scenes.

### **Speed & Capacity**

Sending geometry from RenderPipe to PURE may now be faster.

CPU usage during PURE renders is generally reduced – processor usage will tend not to stay at 100% but will fall much lower for periods during the render.

Handling of large bitmaps and rendered images has been improved. Less memory is required by RenderPipe and the PURE / RenderDrive software. Additionally the transfer between RenderPipe and PURE / RenderDrive is faster.

Polygon capacity has been improved. Some improvements will help all interfaces, others are specific to the type of RenderPipe being used.

### Object Caching

PURE / RenderDrive now supports object caching.

Object caching is where an object's description, for example its polygon mesh, is sent to PURE / RenderDrive once and then re-used in a subsequent frame without being sent again.

Object caching is particularly valuable when rendering a sequence of frames that contains many non-deforming objects. For example, if you are rendering an architectural fly through, virtually all the geometry is static and just the camera is moving. With object caching the geometry is only sent to PURE / RenderDrive once for the first frame, then is re-used on subsequent frames.

This has three key advantages:

- It can significantly reduce the time taken to send the scene description at the start of the second and subsequent frames.
- It reduces the load on the workstation running RenderPipe.
- Because the objects are held in a partly processed state, it slightly reduces render time.

In general it is recommended that you use object caching all the time. It imposes no noticeable overhead even when rendering a single frame.

If your scene uses a lot of objects (several thousand or more) and has a high polygon count (several million or more), then it may be necessary to switch off object caching. This is because there is a small overhead in storing the objects and their instances. Even with caching switched on, the overall capacity *is not reduced* in this release compared to the previous release (PURE version 1.4 / RenderDrive version 2.9). If you have a lot of objects you may be able to achieve a higher polygon capacity than was possible in the previous release by switching caching off.

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## Changing the PURE Driver

There is an alternative PURE driver available for use on Windows 2000 and Windows XP. It has been written specifically for these operating systems. If you are already using an earlier driver without any problems then there is no reason to change.

To install the new driver:

- Right-mouse click on My Computer and choose Manage
- Go to Computer management (Local) > System Tools > Device Manager
- Open System Devices
- Right-mouse click on PURE and choose Properties
- Swap to the Driver tab and click on Update Driver...
- Press 'Next >', leave 'Search for a suitable driver for my device' selected and press 'Next >' again
- Switch on 'Specify a location' and switch off the other 3 options, then click on 'Next >'
- Browse to the WinXP sub-directory of the PURE software and press on 'OK'
- If the panel says a suitable driver is already installed, then switch on the 'Install one of the other drivers' option and press 'Next >'
- Choose 'ART VPS PURE 3.0' and click on 'Next >'
- The driver will install then press on 'Finish' and you may now be prompted to reboot.

The new driver will behave exactly the same as the old driver. In the device manager, the new PURE driver is listed in a separate sub-category called PURE rather than with the System devices.

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# RenderDrive

This chapter of the release notes is specific to RenderDrive users.

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## *Installing the RenderDrive Software*

**Please follow these instructions precisely. If you encounter problems with the upgrade, please contact ART immediately for advice, before rebooting or switching off the RenderDrive.**

The software that is installed on RenderDrive is provided in various files, which should be transferred to the RenderDrive using ftp. The files prefixed rd2000 are for RD2000 RenderDrives, the files prefixed rd5000 are for RD3000, RD3500 RenderDrives and RD5000 RenderDrives.

The five new files to be installed are:

- *rd5000-3.0-4* – the rendering software.
- *rd5000-slc-3.0-4* – the shading language compiler.
- *rpxmax-shaders-2.7-0* – the shaders used by the RenderPipe MAX plug-in.
- *rd5000-asm-3.0-1* – the assembler required to use shaders
- *rd5000-ui-3.0-1* – the web interface server

The first part of the filename indicates the RenderDrive model and what the file does. The first number, e.g. 3.0, is the software version number. The final number, e.g. 1, is the build number.

The exact details of this install process will depend on the ftp program you use. Below we describe the procedure if you use the MS-DOS command line, but the procedure for IRIX and Linux is very similar.

To install the files:

- Open an MS-DOS command window (or IRIX / Linux shell)
- Change to the disk on which the files to be installed are located, e.g.:  
D:
- Change to the directory where the files to be installed are located using the `cd` command. Be sure to choose the directory matching the model type of your RenderDrive, i.e. RD2000 or RD5000 (for the RD3000 and RD3500 as well as the RD5000). E.g.:  
`cd RD5000_Software`
- Connect to the RenderDrive using an ftp program, e.g.:  
`ftp`  
`open 192.0.1.200`
- Login as user 'upgrade' with password 'upgrade'. (On the RD3000, RD3500 and RD5000 the password is ignored and it is possible to change the user name - see page 2-5 of the RenderDrive User Manual.)
- Change directory to the upgrade directory on the RenderDrive using the `cd` command:  
`cd upgrade`

- List the files already installed using the `ls` command:

```
ls
```

- Delete the files that are to be replaced using the `del` command. e.g.:

```
del rd5000-2.9-5
```

```
del rd5000-asm-2.9-1
```

```
del rd5000-slc-2.9-5
```

```
del rd5000-ui-2.9-1
```

```
del rpmax-shaders-2.6-0
```

Alternatively use this command to delete all the files:

```
mdel r*
```

For each of the 5 files it will ask you to confirm deletion, so answer `y` to each prompt

- There should not be a file called 'reboot' in the listing. If there is, delete it:

```
del reboot
```

- **Set the transfer mode to binary, using the `bin` command:**

```
bin
```

- ftp the new files in their place using the `put` command. Be sure to install the correct version of each files, taking into account the RenderDrive's model number. E.g.:

```
put rd5000-3.0-4
```

```
put rd5000-slc-3.0-4
```

```
put rd5000-asm-3.0-1
```

```
put rd5000-ui-3.0-1
```

```
put rpmax-shaders-2.7-0
```

Alternatively use this command to put all 5 files onto RenderDrive:

```
mput r*
```

For each of the 5 files it will ask you to confirm the transfer, so answer `y` to each prompt

- Enter the command below. It is very important that the RenderDrive does not reboot while this command is running, and that the commands are entered in the correct order.

```
quote site exec upgrade
```

- Enter the command:

```
quote site exec reboot
```

- Leave ftp by entering the command:

```
quit
```

- RD3000, RD3500 and RD5000 RenderDrives will start to reboot immediately. RD2000 RenderDrives will start to reboot within a minute and will be ready to use a few minutes later. The reboot takes a few minutes.

- To see when the RenderDrive is ready to use, run a continuous ping on it, e.g.:

```
ping -t 192.0.1.200
```

To stop the pinging, press `Ctrl-C`.

On Linux & Irix, the `-t` is not required, e.g.: `ping 192.0.1.200`

On Irix you may need to use the full path for ping, e.g.: `/usr/etc/ping 192.0.1.200`

### **Important Notes**

- Do not reboot RenderDrive using the restart switch on its back while performing the upgrade.
- Enter the `upgrade` and `reboot` commands in the correct order.
- If you encounter problems with the upgrade, please contact ART immediately for advice, *before* rebooting or switching off the RenderDrive.
- The most common problem is to have missed the 'bin' command before doing the 'put' commands.

## *Changes in the RenderDrive Software*

These are the changes in version 3.0 of the RenderDrive software compared to version 2.9:

### **Sampling**

An improvement has been made to PURE / RenderDrive's sampling. It eliminates banding that could sometimes be seen in depth of field. It also reduces noise in some scenes.

### **Speed & Capacity**

Handling of large bitmaps has been improved. Less memory is required by both the RenderPipe interface and the PURE / RenderDrive software. Additionally the transfer between RenderPipe and PURE / RenderDrive is faster.

Polygon capacity has been improved. Some improvements will help all interfaces, others are specific to the type of RenderPipe being used.

### **Object Caching**

PURE / RenderDrive now support object caching.

Object caching is where an object's description, for example its polygon mesh, is sent to PURE / RenderDrive once and then re-used in a subsequent frame without being sent again.

Object caching is particularly valuable when rendering a sequence of frames that contains many non-deforming objects. For example, if you are rendering an architectural fly through, virtually all the geometry is static and just the camera is moving. With object caching the geometry is only sent to PURE / RenderDrive once for the first frame, then is instanced on subsequent frames.

This has three key advantages:

- It can significantly reduce the time taken to send the scene description at the start of the second and subsequent frames.
- It reduces the load on the workstation running RenderPipe.
- Because the objects are held in a partly processed state, it slightly reduces render time.

In general it is recommended that you use object caching all the time. It imposes no noticeable overhead even when rendering a single frame.

If your scene uses a lot of objects (several thousand or more) and has a high polygon count (several million or more), then it may be necessary to switch off object caching. This is because there is a small overhead in storing the objects and their instances. Even with caching switched on, the overall capacity is not reduced in this release compared to the previous release (PURE version 1.4 / RenderDrive version 2.9). If you have a lot of objects you may be able to achieve a higher polygon capacity than was possible in the previous release by switching caching off.

## RenderPipe MAX

This section of the release notes is about RenderPipe MAX, the plug-in for 3d studio max / VIZ. It explains how to install RenderPipe MAX and has an up to date summary of known problems and compatibility with 3d studio max / VIZ.

### *Installing the RenderPipe MAX Plug-in*

The RenderPipe MAX plug-in is a single file called `rpmax.dll`. Three versions of RenderPipe MAX are provided on the software CD:

- `RenderPipe_MAX\max3` – for use with max R3 / R3.1 and VIZ R3
- `RenderPipe_MAX\max4` – for use with max R4 and R4.2 and VIZ R4
- `RenderPipe_MAX\max5` – for use with max R5 and R5.1
- `RenderPipe_MAX\max6` – for use with max R6

The appropriate `rpmax.dll` file should be copied to the `Plugins` directory of your 3d studio max / VIZ installation. For 3d studio max R4 this is normally `C:\3dsmax4\Plugins` and for 3D Studio VIZ R3 it is normally `C:\3dsviz3\Plugins`. The next time you run max or VIZ, the plug-in will be available.

Using a file browser, drag the `ui` directory from the `RenderPipe_MAX\max3`, `max4` or `max5` directory on the CD to your installed max / VIZ folder. Windows will merge the contents with the existing `ui` directory. Answer ‘Yes to all’ when prompted. This installs icons should you wish to customize the interface and more importantly updated Light Lister scripts to list RenderPipe lights as well as built-in lights.

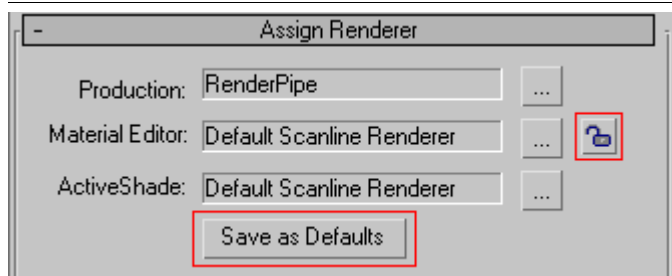
### 3ds max 6 Renderer Assignment

*We strongly recommend you do the following when you first run 3ds max 6:*

- Open the Render panel
- Swap to the Common tab
- Scroll to the bottom of the common tab view and open the Assign Renderer rollout
- Switch off the lock button to right of the Material Editor line
- Set the Production renderer to be RenderPipe
- Click on the ‘Save as Defaults’ button

3ds max will then use RenderPipe as the default renderer, and continue to use the default scanline renderer for material previews, which is what we recommend.

#### Assign renderer rollout with the lock button switched off



Additionally, go to the Preferences panel, swap to the mental ray tab and switch off ‘Enable mental ray Extensions’.

## Plug-in search paths

To install the RenderPipe MAX plug-in in a directory other than the default `Plugins` directory, simply include the used directory in the `max / VIZ` search paths list using the Configure Paths panel. It is recommended that the default `Plugins` directory be used.

## Requirements

RenderPipe should be used with 3d studio max R3.\*, R4.\*, R5.\* or R6, or 3D Studio VIZ R3 or R4, running on Windows NT 4 for Intel, Windows 2000, Windows XP or Windows 98.

## Examples directory

This directory contains some example RenderMan shaders for use with RenderPipe MAX. The shaders are outlined in chapter 17 of the RenderDrive User Manual and chapter 15 of the PURE User Manual.

Additionally it contains `skylight.sl`, the shader which gives sky lighting from a hemisphere, and `qtv.sl`, the camera transform shader used to create QuickTime VR style projected images.

## Scripts directory

The scripts directory contains three scripts and some additional release notes:

### **iesconv.ms**

A script that converts some types of IES light data in 3d studio max. The IES files are converted into RenderMan light shaders. See the document `using_ies_lights_script.pdf` for full instructions.

### **rplighter.ms**

This script can be used to convert all the standard MAX lights in a scene into RenderPipe lights. Much of the light data is preserved.

Before you use this script, take a backup copy of your scene, in case you are not happy with the results.

The script does not preserve all data, e.g. include / exclude data, and does not convert lights that are within groups. It does not convert photometric lights.

### **index\_of\_refraction.ms**

The default setting for Index of refraction in MAX materials is 1.5. When rendered through RenderPipe MAX they appear glass-like. The `index_of_refraction.ms` script can be used to change the index of refraction of every MAX material to 1.0, so they will behave like air. You can then go back and reset those materials that you do want to be refractive.

## *Customizing the User Interface*

It is possible to customize the user interface. In particular, you can add buttons to the interface to use as short cuts to create RenderPipe lights and cameras.

### **Installation**

The optional user interface files are located in the RenderPipe\_MAX\max3\ui (or max4 / max5 / max6) directory of your release. To install them, drag the ui directory from the RenderPipe\_MAX\max3 (or max4 / max5 / max6) directory on the RenderPipe CD and drop it in your max / VIZ directory. Answer 'Yes to all' when prompted.

When you next run max, it will be possible to add buttons to the interface for creating RenderPipe lights and cameras.

A new macro\_lightlist.mcr file is also provided, except for max 3. It is a version of the light lister script that has been updated to recognize RenderPipe lights.

### **Customizing the Interface**

See page 6-8 of the RenderDrive User Manual or page 4-8 of the PURE User Manual for instructions on adding buttons to the interface.

## Changes in RenderPipe MAX version 2.7

These are the changes that are specific to RenderPipe MAX version 2.7, compared to the previous release, version 2.6:

### Object Caching

#### Overview

Object caching is where an object's description, for example its polygon mesh, is sent to PURE / RenderDrive once and then re-used in a subsequent frame without being sent again.

Object caching is particularly valuable when rendering a sequence of frames that contains many non-deforming objects. For example, if you are rendering an architectural fly through, virtually all the geometry is static and just the camera is moving. With object caching the geometry is only sent to PURE / RenderDrive once for the first frame, then is instanced on subsequent frames.

This has three key advantages:

- It can significantly reduce the time taken to send the scene description at the start of the second and subsequent frames.
- It reduces the load on the workstation running RenderPipe.
- Because the objects are held in a partly processed state, it slightly reduces render time.

In general it is recommended that you use object caching all the time. It imposes no noticeable overhead even when rendering a single frame.

Only objects which are not deforming can be cached. Objects which are deforming, that is changing shape, are exported at every frame where they have changed from the previous frame.

#### Optimize for Animation switch

A new switch has been added to the RenderPipe rollout on the render panel. The switch is called 'Optimize for Animation'. When it is switched on, objects are cached and thus saved between frames, which saves time regenerating and re-exporting the mesh for the second and subsequent frames of a sequence.

Object caching is also used if Render Alpha is switched on or if you are rendering fields.

For MAX Script users, the Optimize For Animation flag is exposed as the `Optimize_animation` parameter of `renderpipe`.

#### Capacity

If you have a lot of objects (several thousand or more) you may be able to achieve a higher polygon capacity than was possible in the previous release by switching off 'Optimize for Animation'. This is because there is a small overhead in storing the objects and their instances.

Even with 'Optimize for Animation' switched on, the overall capacity *is not reduced* in this release compared to the previous release (PURE version 1.4 / RenderDrive version 2.9).

#### Face and Object Count on Render progress Panel

The render progress panel counts both the objects being rendered and the faces being rendered. Objects that have been cached are counted in the object count, but are not included in the faces count.

For both static and moving objects, any object that does not have Detail set to 0 is re-exported if its size on screen has changed by more than a factor of 1.5 from when it was first exported. This is because Detail controls de-tessellation and de-tessellation depends on the size of the object relative to pixel size.

*Note:* Detail is set globally with the Detail control on the RenderPipe rollout on the render panel. It can be overridden for an object using the object's user defined properties tab (see page 16-9 of the RenderDrive manual or page 14-9 of the PURE user manual).

The 'detailTolerance' key in the [RenderDrive] section of rpmax.ini controls this factor expressed as an integer 100 times the factor. A setting of 100 gives a tolerance factor of 1.0 and thus forces re-export of anything moving; 150 is the default (1.5). Values less than 100 are meaningless.

Due to the way Video Post is executed by 3ds max, it is not possible to cache objects when using Video Post to drive the render.

## Polygon Capacity

The polygon capacity of PURE / RenderDrive depends on the UVW coordinates used by the polygons. Polygons that have no UVW coordinates, as is the case for plain glass, use less memory than polygons that use UVW coordinates.

RenderPipe now treats as a special case polygons that have a single set of UV coordinates, numbered 1, and set to UV (not UW nor VW). This is a very common case, it being the default when a 2D map is first applied to an object. Polygons that meet these conditions use less memory and are faster to render.

## Support for 3ds max 6

RenderPipe MAX supports 3ds max 6. All the new features in 3ds max 6 that are not renderer specific are supported with a single exception – the new Architectural material is not yet supported.

Some of the main changes in 3ds max 6 that affect RenderPipe are:

- The render panel has been significantly changed, so RenderPipe has been updated to conform with the changes. Rather than having a Production and Draft renderer there is now a single renderer, and a new Presets mechanism for creating and choosing sets of renderer options.
- When using the Assign renderer rollout we recommend you unlock the Production and Material Editor renderers, thus continuing to use the Default scanline renderer for Material Editor previews.
- The 'Area Lights / Shadows as Points' switch is supported. When switched on the size of area lights is ignored and they are treated as point lights.
- A Renderable switch has been added to the light's Properties panel. RenderPipe supports this switch.
- In 3ds max 6 there is a new option on the Material / Map Browser, which hides Maps and Materials that are not compatible with the current renderer. If the 'Incompatible' switch is off, the browser only shows Maps and Materials that are compatible with the current renderer.

RenderPipe supports the Incompatible switch. RenderPipe materials and maps that are compatible with the current renderer are shown with magenta icons (3ds max uses Blue and Green as before, mental ray uses yellow).

Unsupported mental ray and max materials and textures are no longer listed in the Material/Map Browser when RenderPipe is the current renderer, unless the 'Incompatible' switch is on. Likewise, when the scanline renderer is the current renderer, the RenderPipe SSI material, the RenderPipe RenderMan material and the RenderPipe Texture are not shown.

All 2D and 3D textures are shown as compatible because they are converted automatically using the RenderPipe Texture mechanism.

## New Sky Light Shaders

A new version of the skylight shader is available. The skylight shader is used for giving sky style lighting – acting as illumination from a hemisphere surrounding the scene.

The light's texture map support has been improved so it will now match the map used as a spherical environment map. One of the light's also has a simplified interface. See 'Sky light shader' on page 19 for a fuller description.

## Other Changes

- Backgrounds are now rendered for perspective viewports as well as perspective cameras. If there is no background environment map, the background color is rendered instead. Backgrounds are not rendered in orthographic viewports, nor in orthographic cameras.
- Export of surfaces that have sparse material ids and have multi-sub object materials applied is now much more efficient. An object with sparse material ids is one where the material id numbers are not contiguous – for example one with material ids 3; 100; 101; 213.
- Spotlights and direct lights set to overshoot now illuminate behind the light as well as in front. This has been changed to match the behavior of 3ds max.
- Scaled cameras, or cameras linked to scaled parents, now draw their in-focus planes correctly
- RenderPipe Camera viewport icons and colors have been updated to match the way 3ds max and Autodesk VIZ draw cameras.
- RPC temporary files are now generated only once per frame when rendering using frame splitting. In the previous release the temporary images were re-generated for each rendering device.
- Material editor previews of RenderPipe materials no longer appear as green when the background for the slot is switched on. However, previews of glass always appear clear and don't show the glass's volume color. This is because there is no concept in the previews of unit size and scale, which is needed to calculate the correct effect of the volume color.
- When RenderPipe materials are being scanline rendered, there is no longer an erroneous warning message about missing UVW coordinates in the case where the object has no UVW coordinates and contains a map that is switched off.

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## *Known Problems in Version 2.7 of RenderPipe MAX*

This section lists problems that you may encounter with version 2.7 of RenderPipe MAX.

- If the disk containing your TEMP directory is full, RenderPipe Texture may give an error when rendering. Also note that if the disk is nearly full, 3dsmax may refuse to load your scene – this problem is not connected to RenderPipe.
- If your TEMP directory is on a FAT file system, max may report that it is full when it is not. This is because there is a limit on the number of files that a FAT file system can contain. The two possible solutions are to either convert the file system to NTFS or to move temp to an NTFS local disk and update the TMP and TEMP system variables.
- If you use a Bitmap map in the Bump channel and set the Bitmap to be mirrored, the bitmap will not be used.
- If you use a RenderPipe RenderMan Material set to Custom with no shader file selected, sometimes renders will fail without warning.
- RenderPipe Glass – saturated volume colors have an incorrect effect in some cases. To avoid this, change the volume color to be less saturated, updating the rate value to compensate.
- Some problems in 3dsmax 4 where specific geometry causes the render to fail without warning or even cause max to exit can be solved by upgrading to 3dsmax 4.2.
- Using the Camera Options button on the RenderPipe rollout of the render panel can cause max to crash, so use the RenderPipe Camera interface instead.
- To avoid 3ds max 6 crashing when you select an RP light created in an older version of max, go to the Preferences panel, swap to the mental ray tab and switch off 'Enable mental ray Extensions'.

---

## *RPC (RealPeople, RealTrees) – Important Notes*

RenderPipe MAX supports versions 1.6, 2.0 and 3.0 of RPC. Please take note of these important points:

- RPC objects do not support instancing or referencing, so if you duplicate an RPC object you must create a copy. This also applies to the default scanline renderer.
- If an RPC is currently selected when a render is started, then you may get a warning about missing UV coordinates. The affected RPC will then render incorrectly. To avoid this, ensure that no RPCs are selected when you start to render.
- Put the RPC files on a local disk in the computer running 3dsmax. If you attempt to use RPC files located on a disk in a different computer, you may find that performance is very poor.

---

## *RenderMan Shaders*

There are several RenderMan shaders in RenderPipe MAX's `example_shaders` sub-directory. This section describes the most useful ones.

For general advice about using RenderMan shaders in 3ds max, see chapter 17 of the RenderDrive user manual or chapter 15 of the PURE user manual.

### **Sky light shader**

There is a new sky light shader `RP_hdr_skylight.sl`. The shader is designed to work with HDRI rendering. The same HDR image should be used as the background (set on the Environment panel, use spherical environment coordinates) and within the light. The HDR image should be a spherical map.

*Note:* In this release PURE / RenderDrive do not support floating point input images. Floating point images will be clamped to be at most 100% in each component. Support for floating point input images is being released shortly.

To use the shaders create a RenderPipe RenderMan light. Swap to the modifier view, then click on the 'None' button under 'Shader:' and choose one of the shader files. We recommend that you leave the area light geometry for the sky light shaders set to 'None'.

Open the 'Light Shader Parameters' rollout to see the light's parameters:

*intensity* – a multiplier, as for any light

*lightcolor* – the light color used if there is not texture. If there is a texture, then the color multiplies the texture. Leave *lightcolor* set to white to have no effect on the texture.

*texturename* – using the right hand button with a black triangle icon, set the texture type to a 'Spherical environment'. Then click on the 'Pick Bitmap' button and choose a suitable bitmap. The coordinates used by the light are the same as if the bitmap is put in the environment background in 3ds max and set to be a spherical environment.

*spread* – this is the cone angle used by the light. Using the right hand button with a black triangle icon, set the field to be displayed as an angle. For a sky hemisphere it should be set to 90 degrees ( $\text{PI} / 2$  or 1.57). It can be set to 180 degrees ( $\text{PI}$ ) for all round lighting but this behavior may change in a future release. Set to values less than 90 degrees for a less diffuse effect.

*from* – leave this field set to 'automatic', then it is controlled by the light's position in the viewports

*to* – leave this field set to 'automatic', then it is controlled by the light's target position in the viewports

*use\_from\_to* – using the right hand button with a black triangle icon, set this field to be displayed as a check box. When it is on (or non zero) then the shader uses the from and to values. If it is off or set to zero then the shader ignores from and to and points downwards in 3ds max's coordinate system – and the bitmap position will exactly match 3ds max's background.

*filterwidth* – controls the filter size used with the bitmap. If set to zero there is no filtering, as the value is increased there is more filtering. The default 0.1 is a good value to use. With high values the bitmap is very blurred. At low values the bitmap is much sharper, so usually takes longer to render and is susceptible to noise.

*Note:* The old skylight.sl shader is no longer supported.

### QTVRCam

This is a camera projection shader designed to produce a QuickTime VR projection. It gives a panoramic view as though you rotated 360 degrees about the camera position.

To use the shader select or create a RenderPipe Camera. On the modifier side bar go to the 'Custom projection shader' box, click on the 'None' button and choose `qtvrcam.sl`.

The interface in 3ds max does not give access to the camera projection shader's parameters, so you need to edit the shader directly if you need to change its parameters.

It has the following parameters:

*minaz*, *maxaz* – these parameters specify the minimum and maximum azimuth angles, the horizontal coverage of the image. At the default values of -180 and +180 degrees, the image will start from 180 degrees behind the camera and swing through 360 degrees to finish 180 degrees behind the camera. Note that ranges of more than 360 degrees are not supported.

*minel*, *maxel* – these parameters specify the minimum and maximum elevation angles, the vertical coverage of the image.

*seat* – this parameter controls the point about which the rotation occurs. We recommend you leave it set to (0, 0, 0), which is the camera position.

*fov* – the field of view. RenderPipe automatically sets this to be the value set as FOV in the max interface.

*aspect* – this is the image aspect ratio. **You must set this value to be the image width divided by height.** So if your image is 640 x 480, set aspect to 1.3333. To do this change the line near the top of the shader from:

```
uniform float aspect = 1)
```

to:

```
uniform float aspect = 1.3333)
```

The rendered image is a flat panorama. You can then use the QuickTime package to create a QuickTime VR file. The same shader and procedure can be used to create files for equivalent formats too.

This is a very good way to produce high quality QuickTime VR. Most other methods rely on several flat renders, which are then stitched together, so introduces projection artefacts. The PURE / RenderDrive method produces a single image with no artefacts.

### RPMetallicShiny

The RPMetallicShiny shader is a RenderMan shader very similar to the RenderPipe Shiny material. It extends RenderPipe Shiny with the ability to create a two tone color as seen on cars with metallic paint – the usual Surface color plus a brighter version of the color for a metallic effect highlight.

To use the shader:

- Go to the Material Editor and create a new RenderPipe RenderMan material.
- In the 'Shader' section click on the 'None' button and choose the RPMetallicShiny.sl file.
- In the 'Implicit Parameters' section switch on 'Texture Coordinates' and switch off both 'Color' and 'Opacity'.
- Open the 'Surface Shaders Parameters' rollout
- By default the st parameter is set to use UV coordinates numbered 1

- The next few parameters are exactly the same as in RenderPipe Shiny – Refractive index, Roughness, Coating, Lacquer, Surface and Surface Map. Set the Surface color to a suitable color.
- Set a suitable Highlight color (usually set this to a blush / brighter version of the surface color).
- Set Glossiness to a high value (i.e. close to 1). The higher the value the smaller the highlight area becomes. If your scene contains bright white objects such as visible lights then it is possible to make the highlight too small so it is hidden by the reflection of the white object.
- Use specularlevel to increase (or reduce) the specular effect

## Compatibility with 3d studio max & VIZ, Including Known Problems

This section describes RenderPipe MAX's compatibility with 3d studio max and VIZ. It also explains the limitations and problems in version 2.6 of RenderPipe MAX and the PURE / RenderDrive software that could affect a max / VIZ user.

The items in this list apply to all versions of max and VIZ, unless stated otherwise.

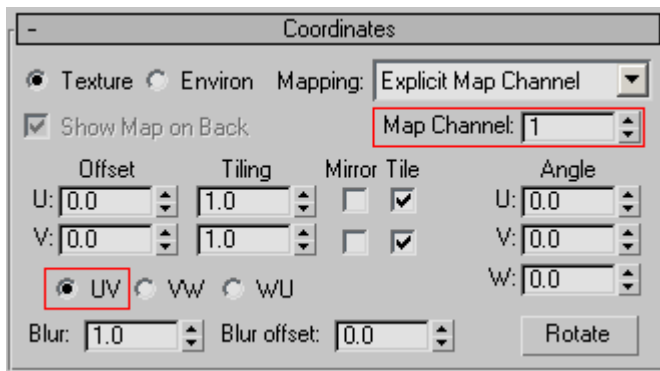
All terminology corresponds to that used by 3dsmax and VIZ. Where max is referred to, the same applies to VIZ.

### Geometry

The number of faces that PURE and RenderDrive can cope with depends on what is in your scene. One factor is how many sets of UVW coordinates the geometry has.

Polygons that use a single set of UVW coordinates, set to be type 'UV' and Map Channel set to 1 are handled specially so have a much higher capacity. These are the most common type of UVW coordinates, being the default.

#### Coordinates rollout showing Map Channel set to 1 and type set to 'UV'



The polygon capacity of PURE is dependent on the workstation's RAM and swap space, and also the memory taken by other applications.

This table shows the maximum polygon capacities recorded for various models of RenderDrive and for PURE:.

|   | No UVW Coordinates | 1 Set of UV Coordinates in channel 1 | 1 Set of VW or WU Coordinates, or UV not in channel 1 |
|---|--------------------|--------------------------------------|---|
| PURE, 1Gb PC RAM, 1Gb PC virtual memory | 20 million         | 17 million                           | 11 million  |
| RD16 / RD2000                           | 6.1 million        | 5.0 million                          | 3.2 million   |
| RD3000 / RD3500 / RD5000                | 30 million         | 25 million                           | 17 million  |

Typically scenes fall somewhere between the first two limits, because most faces in the scene either have no UVW coordinates (e.g. plain glass) or have a single set of UV coordinates (e.g. a single bitmap applied to a surface). However, if multiple sets of UVW coordinates are used the number of faces that can be rendered will be lower.

The actual capacity is also dependent on the structure of the scene. If there are a lot of objects in the scene (several thousand or more) the polygon capacity will be lower than the figures above.

In general the polygon capacity is highest when 'Optimize for Animation' switched on. However, if there are thousands of objects in the scene, the capacity may be slightly less than with 'Optimize for Animation' switched off.

The Detail control on the RenderPipe render panel can be used to combine very small faces into larger faces automatically, effectively increasing the number of faces that can be rendered.

If you have an RD2000 and need to render scenes with more faces than your RenderDrive can cope with, please contact your local support office. The limit on the RD2000 can be raised by adding extra RAM. Adding extra RAM to the RD3000 / RD3500 / RD5000 does not increase the polygon capacity because the RD3000, RD3500 and RD5000 have a swap disk.

To increase the number of faces that PURE can render, either increase the RAM in your workstation, or increase the Windows Virtual Memory setting (Control Panel > System > Performance).

## Materials

RenderPipe supports most of the normal max materials: Standard, Blend, Double Sided, Top / Bottom, Multi / Sub Object, Composite, Matte / Shadow, Morpher, Shellac, Advanced Lighting Override, Lightscape and Shell. There are some differences in the way RenderPipe MAX treats materials compared to the default scanline renderer, which are detailed in the following sections.

These materials are not supported by RenderPipe MAX: Architectural, Ink 'n Paint and Ray Trace.

### Standard Material

As PURE / RenderDrive uses a physical model for rendering, the behavior of non-opaque materials differs from max; see the user manual for explanation.

When rendering objects which are not completely opaque and have an index of refraction that is not 1.0, make sure that the material's 2-sided flag is checked, otherwise you will not get the correct refraction effect.

The Bump channel in the Standard material may not give quite the same effect as max, but the results are similar. If there is a difference, try adjusting the Bump amount – it can vary between -999 and +999. Bump maps which make use of noise can be harder to match, because PURE / RenderDrive uses a noise function different from that used by max. See below for more details on bump mapping.

The Wire option in the Material Editor behaves differently from max. The wire frame it produces is based on triangles rather than rectangles.

The Reflection Dimming parameters are ignored.

The Face Map option is ignored. Instead, add a UVW Map modifier to the object and set it to 'Face'.

The SuperSampling rollout is ignored.

When using the Strauss material shader with high Metalness values, the specular highlights take account of the color of the light source. In max, the highlights do not take account of the color of the light source.

### Matte / Shadow Material

The Matte / Shadow material is supported with a couple of differences

- The Opaque Alpha and Affect Alpha options are honored. Remember to switch on the Render Alpha option on the RenderPipe section of the Render panel.
- The Receive Shadows, Shadow Brightness and Shadow Color options are honored, but where lights overlap the intensity in the shadow is different to max.
- The Apply Atmosphere and the Atmosphere depth options are ignored. Atmospheres are always applied and always at object depth.
- The reflection amount and map are treated like the Reflection map slot in Standard material; the map is ignored and the object is created as semi-mirrored by the amount. Unlike Standard however, the map is enabled by default and defaults to an amount of 50. Since the amount cannot be altered unless there is a map in the slot, RenderPipe only treats the reflections as enabled when a dummy map is inserted in the slot, even though the map is ignored.

### **Composite Material**

The transparency of the sub-materials is ignored by the compositing.

### **Morpher Material**

Up to 10 morph channels may be active. If more than 10 morph channels are active, the 10 channels with the highest channel amounts are used.

The transparency of the sub-materials is ignored by the Morpher material.

### **Shellac material**

If the base material is transparent, RenderPipe produces a different result from max.

### **Advanced Lighting Override and Lightscape materials**

The Advanced Lighting (Lighting Override) material and LightScape material render as their base material, the lighting parameters being ignored.

### **Texture Maps**

RenderPipe supports almost all types of built-in Map and third-party plug-in Maps. Those maps that are not directly supported are automatically converted to bitmaps – see page 8-7 of the RenderDrive User Manual or page 6-7 of the PURE User Manual.

RenderPipe ignores some types of texture map since it can perform the equivalent operation directly by ray tracing, and by using a physical model of the object and material. The texture maps ignored are Flat Mirror, Ray Trace, Reflect / Refract and Thin Wall Refraction.

### **Bitmap Map**

In the Bitmap texture map, if the bitmap does not have an alpha channel, and the Pre-multiplied option is checked, the result may be entirely black in some cases. To correct this, uncheck the Pre-multiplied option.

### **Falloff Map**

Shadow / Light falloff is not supported.

The Override Material IOR switch in Fresnel falloff is treated as though it is always checked; with RenderPipe the Falloff map always uses its own Index of Refraction value.

The behavior of some of the Falloff Directions when rendered by RenderPipe may be different from max.

### **Output Map and Output Rollouts**

The Output map and the Output rollouts contain a Color Map curve. RenderPipe clamps this Color Map curve to lie in the range 0 to 1.

### **Mapping Coordinates**

On any one material and its maps only 5 extra UVW or WorldXYZ mapping coordinate channels may be used at once. UVW1 and Vertex Color do not count towards this total.

### **Material and Texture Number Limits**

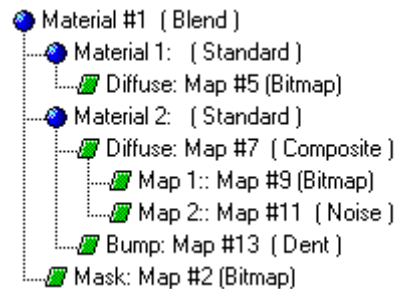
The maximum number of texture maps in a single material is 50 and the maximum number of materials within a single material is 20. These limits apply to a single material and texture map hierarchy. If the material is a Blend, the total number of textures used by the material is the sum of the numbers of textures used by the two blended materials, and the number of textures used by the blend mask. The total number of materials in a Blend is three –

the Blend itself and the two blended materials. The materials in a Multi Sub object material are each dealt with independently.

---

**Example Blend material, with a material total of 3, texture map total of 6.**

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The maximum number of sub-texture maps supported by the Composite texture map is 8. To composite more than 8 textures, use another Composite map as one of the first eight textures.

The limit on the number of maps projected from a single light is 20.

The limit on the number of maps within Fog is 5.

The Double Sided, Top/Bottom and Shellac materials each count as 3 materials.

Make use of texture instancing. Textures which have been instanced from another texture in the single material hierarchy are not counted towards the total. The exception to this is maps in either the Bump or Shadow channels are counted separately to maps in other channels.

## Cameras and Rendering

The Radiosity advanced lighting option is supported. The solution is calculated with 3dsmax and the solution is cached with the geometry. The solution is passed to PURE / RenderDrive and applied in an efficient way – in most cases switching on Radiosity has less impact in RenderPipe than in the default scanline renderer. See below for more details.

The Light Tracer advanced lighting option in 3dsmax 5 and VIZ R4 is not supported by RenderPipe.

The Super Black render option is not supported.

The maximum size of image to which lens effects may be applied is approximately 7 million pixels (e.g. 2500 x 2500), the exact limit depending on available PC memory. If you apply a lens effect to an image larger than this, RenderDrive may appear to freeze and the web queue will not respond. If this happens you should restart RenderDrive using its stop / start button on the rear panel. If you are using PURE, you may need to use the Kill render option in PURE Starter.

If there is unwanted noise visible when playing an animated sequence, increase the image quality. Increasing image quality usually eliminates noise in soft shadows and other shaded areas. Also, note that noise is usually much less apparent in print or on film / video.

Thin lines may partly disappear. This only happens at lower image quality settings and for very thin lines. If you need to use very thin lines, increase the image quality for production renders and set the RPDdetail value for the object to be 0.0 (see chapter 16 of the RenderDrive User Manual or chapter 14 of the PURE User Manual).

The default maximum ray level is 16 – if a light ray passes through more than 16 reflections and refractions, it will stop and give a sample of black. On passing through a 2-sided transparent box, the light ray uses two steps. It is rare for a ray to travel through as many as 16 steps; cases such as total internal reflection, which can occur in a glass surface, are spotted and dealt with. The ray level can be controlled with the controls on the render panel.

Coincident geometry can cause surface speckling or artifact. For example, a 0 height box where the top and bottom are coincident, or an extruded shape with 0 extrusion. To solve this, give the box a small non-zero height, or remodel using a Plane. Also be very careful where two objects touch or intersect, make sure that visible surfaces are not coincident – this is a common problem when modelling buildings.

Unwanted shadowing may be visible on the surface, typically with polygonized edges. This can be caused by one of the following problems:

- The object is a lathe and needs its normals to be flipped.
- The geometry intersects itself. (In this case, you may find that max produces the same result when the material is set to be 2-sided.)
- Max is producing poor surface tessellation, which is particularly visible if a bump map is applied, or the light hits the surface at a shallow inclination. If there is a bump map on the surface, ensure that the UVW mapping in channel 1 is suitable - it should be set to be a shape as close to the surface shape as possible and be a shape that covers the surface. Planar is often inappropriate. See 'Bump mapping artefact elimination' on page 26.
- To see the tessellation, add a Tessellate modifier to the object. The best solution is to remodel the object in such a way that the tessellation behaves better. The MeshSmooth modifier may also be helpful.

If a RenderPipe Camera's lens preview area references an object, and the camera is imported into a scene using Merge, a copy of the object will be created.

ActiveShade can be used, but it is not possible to set RenderPipe MAX to render into it.

Render Elements are not supported.

Depth of Field / Motion Blur – PURE / RenderDrive's ray traced depth of field and motion blur give better and more accurate results than max's depth of field and motion blur. See chapter 9 of the RenderDrive user manual or chapter 7 of the PURE user manual.

### Advanced Lighting – Radiosity

Radiosity in 3dsmax R5 and later and VIZ R4 is supported by RenderPipe MAX. The radiosity solution is calculated by 3dsmax / VIZ on the workstation, then passed to PURE / RenderDrive and used in the render.

Though the calculation of the radiosity solution is not accelerated by RenderDrive, the use of the solution is accelerated. In most cases switching on radiosity when using RenderPipe MAX has a smaller time penalty than when using the scanline renderer.

For best results use simple geometry and ensure that geometry is not peeking into dark space because this will result in the triangles along that edge looking darker (for example, if a wall is partly under the floor).

A draw back with the radiosity solution is that where two triangles share vertices the stored radiosity value may be good for one triangle but bad for the other. For example, each vertex of a box is shared by at least three triangles, one for each side of the box. If the lighting is uneven the radiosity value stored for the vertex can only be perfect for one of the three sides.

Meshing parameters are not honored, so objects should be tessellated manually if the quality of radiosity solution needs increasing.

The Advanced Lighting (Lighting Override) material and LightScape material render as their base material, the lighting parameters being ignored.

A variable is available to adjust the radiosity bias. The variable is called 'radiosityBias' and should be added in the file RPSMax.ini under the [RenderDrive] section. It should take a value from 0.0 to 1.0. The default value is 0.01, and values between 0.01 and 0.1 should yield the best results. If a scene shows persistent radiosity problems which cannot be fixed by either re-tessellation of the geometry or increasing the solution quality, try adjusting this value slightly. Note that you have to reload the scene after editing the variable.

### Bump mapping artefact elimination

Sometimes triangular artefacts are seen on bump mapped surfaces. This section explains how to quickly eliminate them.

For surfaces with bump mapped materials, RenderPipe outputs a separate co-ordinate system for use by the bump mapping. By default this co-ordinate system is the UVW mapping in channel 1. As a result, all bump mapped surfaces must have a UVW mapping in channel 1, even though it may seem that none of the textures on the object uses the channel. A warning will be given if the channel is absent and it cannot be auto-generated.

The UVW mapping in channel 1 must be carefully chosen. Choose a type that is closest in shape to the object as possible and that will cover all parts of the surface. For bump mapping to work well the mapping must be smooth and continuous.

The *map* in bump map channel does not have to use the same UVW mapping as that used as the bump mapping coordinate system. If you need the bump map to use a different UVW mapping to that used as the bump mapping coordinate system apply an additional UVW mapping to the object, change its channel number and set the bump map to use the new channel number.

It is possible to specify a different channel for the UVW mapping used as the bump mapping coordinate system. To do this:

- Select the object
- Right mouse click on the object and choose Properties...
- Swap to the 'User Defined' tab
- Type in a new property 'RPUV='. For example, if you wish to use UVW mapping number 4, type in RPUV=4
- Press the OK button

There are two special values that can be used – the vertex color channel is number 0 and to prevent the output of the additional surface parameterization use -1.

Even if present, the UVW channel 1 mapping may not always be suited to the purpose. Either renumber the channels on the object (and applied textures) to leave the underlying default mapping co-ordinates exposed, or add the RPUV user parameter to specify an alternate mapping.

For new scenes, avoid using channel 1 for UVW Mapping modifiers on objects with bumped materials, unless the mapping is actually intended for the bump itself and known to be well-formed for it.

This method of using the UVW1 coordinates as the bump mapping coordinate system can be disabled. To globally disable it for all scenes by add the line 'betterBumps=0' to the '[RenderDrive]' section of the rpmax.ini file.

## Lights and Shadows

The shadows from materials set to be one-sided do not behave in the same way as they do in max. In max, light shining on the front of a face casts a shadow; light shining on the rear of a face does not. With PURE / RenderDrive, the reverse is true. In most cases this does not cause a problem as the single sided material is applied to a solid object. The difference is noticed on single-sided objects such as a Plane, or if the camera is inside a solid object.

Direct lights can shadow incorrectly. They always behave as though they are outside the bounds of the scene, at infinity. Geometry that is behind the light can cast a shadow. Note that direct lights are intended to give the effect of sun light, where the light source is distant so the light rays are parallel. Because PURE / RenderDrive is physically based, it is not possible to model this effect from a light source within the scene. If a light is required to cast shadows within the scene, use a spotlight as this is physically correct. If using a direct light, always put it outside the scene or set it not to cast shadows.

The Contrast and Soften Diff. Edge colors in lights are ignored.

The options to control shadows are not supported, i.e. the Shadow Color, Density, Map and Light Affects Shadow Color controls. Additionally, the Atmosphere Shadows options are not supported.

Lights that have had a non-uniform scale applied, or have been squashed, are not rendered correctly.

Each piece of geometry can be lit by up to 256 lights, but there is no maximum limit on the number of lights in the scene. If you have a lot of lights in the scene, use attenuation to ensure the light has a finite bounding box.

Photometric lights in VIZ R4 and 3dsmax 5 / 6 are not supported.

## Effects Panel

The Effects panel is fully supported and effects are applied as necessary when rendering.

The Depth of Field effect is not supported; use RenderPipe's depth of field which is fully ray traced and physically accurate, not a post process.

Note that some third-party effects may make use of image channels that PURE / RenderDrive does not render, so will not be applied correctly.

## Environment Panel

PURE / RenderDrive supports all four standard environment effects, i.e. volume light, volume fog, fire and fog. There are some differences between the way PURE / RenderDrive renders these effects and the way max renders them, outlined above. You will find that PURE / RenderDrive produces a more intense and photorealistic result.

The Background settings (i.e. the Background Color and the Background Environment Map) are supported by RenderPipe in perspective cameras and viewports. However, the Background settings are ignored by RenderPipe in orthographic cameras and all views. To give an orthographic camera a background:

- Surround the scene with a sphere (or similar geometry).
- Apply a two-sided material to the sphere.
- Set the material to have 100% or white Self-Illumination, unchecking the Self-Illumination check box first.
- Set the sphere neither to cast nor receive shadows.
- Put the background map in the material's Diffuse / Ambient channel.
- Set the map to use the appropriate Environ coordinates.

Global Lighting, both Tint and Ambient light, is supported by RenderPipe. Tint only applies to max and RenderPipe lights – it does not affect RenderPipe RenderMan lights.

## Image Channels

The image channels that are supported are as follows:

- RGB
- Z / Depth
- Alpha
- Material Effects
- Object
- Unclamped Color
- Normals
- UV Coordinates

The unsupported channels are Coverage (every pixel in this channel is set to value 255) and the scanline-specific channels (Color, Transparency, Velocity, Node render ID and Sub-Pixel Weight).

G-buffer layers are specific to scanline rendering so are not supported.

## Video Post

Video Post effects should be set up in the same way as for the max Default Scanline Renderer. Set RenderPipe to be both the Production and the Draft renderer. When a scene event (a camera or other view input) is added, RenderPipe's parameters can be edited by selecting the event, clicking the Edit Current Event button (Properties) and then clicking the Render Options button.

Filters that are not fully supported are the Lens Effect filters and the Starfield filter:

- *Lens Effect Flare*. This filter uses the Z coverage and background channels. As a result, the effect may be incorrectly aliased.
- *Lens Effect Focus*. This requires the Z coverage and background channels and as a result, the effect may be incorrectly aliased; use RenderPipe's depth of field instead. Depth of field is fully ray traced; Max's Lens Effect Focus is a post-processed effect. For example, with RenderPipe, objects that are in focus can be seen through the blur of objects that are out of focus. It is hard to achieve this effect with the post-processed Lens Effect Focus filter.
- *Lens Effect Glow*. Most options are supported, unless you choose to use one of the three unsupported channel types (background, Z coverage, UV coordinates).
- *Lens Effect Hilight*. As Lens Effect Glow.
- *Starfield*. This filter requires the background channel, so is not supported by RenderPipe.

*Note:* The mask on the Properties panel may be set to an unsupported channel, which will then be rendered incorrectly by RenderPipe.

### Third-Party Plug-ins

RenderPipe is compatible with most types of third-party plug-in. Any type of plug-in that creates or affects geometry is compatible, as are those plug-ins which do not perform any shading tasks. The types compatible with RenderPipe include:

- Geometry
- Object Modifiers
- Particle Systems
- Space Warps
- Dynamics
- Utilities
- File Input and Output converters, including Bitmap file formats
- Output Device Support
- Motion Capture
- Hardware support (e.g. tablets)

There are a few types of third-party plug-in that RenderPipe is not compatible with. The plug-in types affected are:

- Materials
- Lighting
- Environment Effects
- Material Shaders
- Anti Aliasing plug-ins

RenderPipe does not directly support other third-party renderers, but some can be used alongside it. The main issue is material type compatibility.

Third-party Maps are partially supported, using the RenderPipe Texture map to convert them to bitmaps – see page 8-7 of the RenderDrive User Manual or page 6-7 of the PURE User Manual.

Render Effect and Video Post plug-ins are usually compatible with RenderPipe, although note the minor limitations, outlined above.

## Particle Systems

When using ParticleAge or ParticleMBlur map in the Opacity channel, it is important to remember that RenderPipe renders objects in a photorealistic manner, so the Index of Refraction should be set to 1.0 to get the same effect as you would with max.

## MAXScript

Some of the RenderPipe parameters are accessible to MAXScript and the Macro Recorder. To see the parameters that are available, use the 'showclass' MAXScript command, for example:

```
showclass "RP_Target.*"
```

The RenderPipe classes include:

```
RP_Target  
RP_Free  
RP_Omni  
RP_FSpot  
RP_TSpot  
RenderPipe_Shiny  
RenderPipe_Mirror  
RenderPipe_Glass
```

Though you can access the RenderPipe RenderMan classes from MAXScript, it is not recommended because it may cause max to exit without warning.

## Miscellaneous

The Visibility Track is only partially obeyed – if it sets an object to be hidden, then the object is not rendered, and if it is set to be visible the object is rendered. However, if an object is set to be partially visible the object is still rendered fully visible.

The Level of Detail utility is not supported by RenderPipe. This is because it makes use of the Visibility track, which is only partially supported.

# RenderPipe RIB

For details of installing RenderPipe RIB see chapter 18 of the RenderDrive User Manual or chapter 21 of the PURE User Manual.

---

## *Changes in this Release*

### **Object Caching & Instancing**

#### **Overview**

PURE / RenderDrive now supports true object instancing. Previously retained objects were instanced by storing and replaying the objects definition like a macro. Now by default they are processed immediately and almost all data is shared between instances

Object instancing is where an object's description is sent to PURE / RenderDrive once and then re-used in the current frame or a subsequent frame without being sent again.

Object instancing is particularly valuable when rendering a sequence of frames that contains many non-deforming objects. For example, if you are rendering an architectural fly through, virtually all the geometry is static and just the camera is moving. With object caching the geometry is only sent to PURE / RenderDrive once for the first frame, then is instanced on subsequent frames.

This has two key advantages – firstly, it can significantly reduce the time taken to send the scene description at the start of the second and subsequent frames. Secondly, it reduces the load on the PC running RenderPipe.

#### **RenderMan Details**

The render option 'retaingeometry' controls how objects are retained. It's syntax is:

```
Option "render" "retaingeometry" [ "raw" ] | [ "processed" ]
```

It is set to processed by default. When set to 'raw' the objects are stored as the series of RIB calls used to create them. When set to 'processed' objects are stored in their processed form, i.e. tessellated and in a hierarchy ready to render, which is usually more efficient.

For example, when the retaingeometry option is set to 'raw' a NURBS would be saved as an NUPatch call. When instanced that NURBS has to be tessellated and put into a hierarchy ready to render. When the retaingeometry option is set to 'processed' the NURBS would be saved as its tessellated triangle mesh, together with a hierarchy ready to render.

Objects are defined within ObjectBegin / ObjectEnd blocks and they are instanced using ObjectInstance. See the RenderMan specification for details of the syntax of these calls.

Instance parameters are supported on geometry inside Object Begin / End blocks.

The geometry for area lights can contain instanced objects.

Tokens, once declared, are valid globally until the end of the job, as specified in the RenderMan specification.

Tokens may not be redefined during multi device rendering. No warning will be issued, but the new redefinitions will not be synced between servers, leading to unpredictable results.

A multi-frame input stream, which defines new tokens every frame, will use progressively more memory from frame to frame. Such cases should be avoided and are expected to be very rare.

Servers and clients with this change are backward compatible to a limited extent only. Old clients connecting to new servers may not free retained geometry properly at end of frame. There may be other unexpected side effects. For this reason, we recommend you do not mix versions.

### Object Validity

Object handles are still valid by default only to the end of the frame or world in which they are defined, as laid down in the RenderMan specification. However, this is not actually how PURE / RenderDrive operates, so any un-freed handles are explicitly freed with an extension to the RenderMan specification, (Ri)ObjectFree.

Objects can be freed and their handles reused even if they have already been instanced in the same world

Option "netcontrol" "persistentobjects" ["on"] may be used to prevent objects being discarded until they are explicitly freed with the extension ObjectFree. Provided no objects have been defined, Option "netcontrol" "persistentobjects" ["off"] returns the switch to its initial state.

It is not possible to render a RIB file that makes use of persistent objects to multiple rendering devices. The object state will not be correctly synchronized.

### Frame Splitting

A new option to RenderPipe RIB has been added. The '-f' option can be used with a RIB file containing a single frame to indicate that it should be split between the rendering devices specified. The RIB file must contain a CropWindow and must not contain an Option call disabling frame splitting.

### Other Changes

- Client applications can now tell which RenderDrive is in use. An additional routine RdDeviceID and a new pre-processor constant RD\_MAX\_SERVERS have been added to the SDK header rd.h.
- Netrib is the program used to save RIB files to disk. In previous releases netrib created a subdirectory for each frame, into which it put the bitmaps and shaders used by that frame. Netrib no longer creates a subdirectory for each frame, the bitmaps and shaders are output to the same directory as the RIB file. This is because resource name tokens are now unique for the whole rendering job.
- A problem with shaders that used multiple textures has been solved. The problem could cause the textures to be wrongly sampled giving erroneous patterns.

---

# RenderPipe for Maya

This section of the release notes is about RenderPipe for Maya, the plug-in for Maya. It explains how to install and use RenderPipe for Maya. It also has an up to date summary of known problems and compatibility with Maya.

---

## *Changes in Version 1.5 of RenderPipe for Maya*

These are the changes that are specific to RenderPipe for Maya version 1.5, compared to the previous release, version 1.4:

### **Geometry Instancing and Caching**

#### **Overview**

PURE / RenderDrive now support object instancing. Object instancing is where an object's description is sent to PURE / RenderDrive once and then re-used in the current frame or a subsequent frame without being sent again.

Object instancing is particularly valuable when rendering a sequence of frames that contains many non-deforming objects. For example, if you are rendering an architectural fly through, virtually all the geometry is static and just the camera is moving. With object caching the geometry is only sent to PURE / RenderDrive once for the first frame, then is instanced on subsequent frames.

This has three key advantages:

- It can significantly reduce the time taken to send the scene description at the start of the second and subsequent frames.
- It reduces the load on the workstation running RenderPipe.
- Because the objects are held in a partly processed state, it slightly reduces render time.

RenderPipe for Maya also uses instancing for objects that have been instanced within a single frame.

#### **Interface**

There is a new 'Instance Geometry' switch in RenderPipe's render globals. When it is switched on, objects are cached and thus saved between frames, which saves time regenerating and re-exporting the mesh for the second and subsequent frames of a sequence. Only non-deforming, non-displaced NURBS and polygon meshes are cached.

RenderPipe for Maya also caches and reuses instanced geometry even within a single frame, provided they have the same orientation and similar size relative to the camera.

This switch can be controlled in the RenderPipe MEL command using the `-instanceGeometry (-ig)` flag to override the stored value.

The Instance Geometry switch is enabled by default for new files (or new render globals), but is off when old files are loaded, preserving previous behavior.

#### **Test resolution**

The Test Resolution submenu is now supported by RenderPipe, both from the Render menu and from the Render View's Options menu.

Additionally, the RenderPipe MEL command now takes an optional flag with two arguments:

```
-resolution [width] [height]
```

with short form `'-res'`. If specified it overrides the width and height in the render globals.

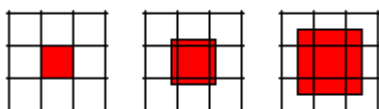
## Pixel Filter Width

RenderPipe for Maya now uses PURE / RenderDrive's filtering, which will give superior results to the old filtering.

Pixel Filter Width is a new control that has been added to the RenderPipe section of render globals. It determines the size of the area in which samples are taken to determine the color of a pixel.

The default setting of RenderPipe's Pixel Filter Width is 1.4, because at this value the filter area slightly overlaps the adjacent pixels. The image will be reasonably sharp with little aliasing. At a value of 1.0 the sample area lies entirely within the pixel, without covering the adjacent pixels, and therefore the overall image may appear slightly aliased. At the maximum setting of 2.0 the sample area overlaps all the adjacent pixels by a significant amount, therefore the image may appear slightly blurred.

### Pixel Filter Width – set to 1.0 (left), 1.4 (middle), 2.0 (right)



### Pixel Filter Width and Scenes Saved in Older Plugins

When an old scene is loaded the filtering behavior depends on whether or not the 'Use Multi Pixel Filtering' switch is enabled in the saved scene.

If 'Use Multi Pixel Filtering' was enabled when the file was saved, the 'Pixel Filter Width' control will be disabled and the old style of filtering will be used. To change the filter settings while Pixel Filter Width is disabled it is necessary to go to the Maya software renderer globals.

To enable the Pixel Filter Width and swap to the new filtering use the MEL command:

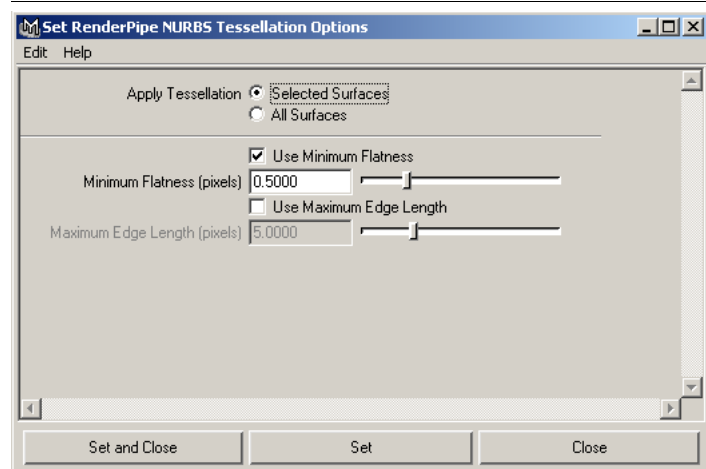
```
RenderPipeUseMayaFilters 0;
```

If the 'Use Multi Pixel Filtering' switch was off when the scene was saved, then Pixel Filter Width defaults to 1.0 to match the previous rendering behaviour.

## Tessellation Controls

In Maya 5.0 there is now a new RenderPipe specific 'Set NURBS Tessellation' option box in the Render Menu. It gives graphical control over flatness and edgelenh, which in version 1.4 of RenderPipe (and in Maya 4.5 and earlier) could only be controlled using MEL commands. See pages 17-14 and 17-15 of the PURE user manual or pages 22-14 and 22-15 of the RenderDrive user manual for a description of these parameters.

### RenderPipe NURBS Tessellation Panel



The flatness slider runs in the range 0.1 to 5, default 0.5, and is enabled in the factory defaults.

The edgelenh slide runs in the range 0.1 to 50, default 5, and is disabled in the factory defaults.

### **Important Note About Tessellation Controls in Maya 5.0.1**

The render menu is broken in Maya 5.0.1 and as a result the standard NURBS Tessellation box will be shown.

To get access to the RenderPipe specific tessellation controls, make a shelf button for the command:

```
'performRenderPipeTessellationSetup 1;'
```

To apply the previous settings without showing the properties box, make a shelf button for the command:

```
'performRenderPipeTessellationSetup 0;'
```

## **Maya 5.0.1**

Maya 5.0.1 is an updated version of Maya 5.0 released by Alias in September 2003. Unfortunately it reverses some of the improvements they had made to the Render Menu in Maya 5.0.

- Rather than being removed menu options that are not supported by RenderPipe are shown as disabled.
- It breaks access to the new RenderPipe specific NURBS Tessellation panel, see above.

## **Shading Nodes**

### **Quad Shading Switch**

The new Quad Shading Switch node introduced in Maya 5.0 is now supported.

### **PhongE**

A problem that could cause PhongE to be rendered incorrectly has been fixed. The problem occurred if PhongE had non-zero roughness and if a directional light with non-zero spread angle was used.

### **Projection**

Projection and other 3d textures are now more reliable – they make a more sensible decision about whether to use coordinates from the object they are applied to in place of a (possibly non-existent) texture reference object.

## **Motion Blur**

### **2D Motion Blur and Maya 5.0**

PURE / RenderDrive always use 3D motion blur. PURE / RenderDrive ray trace motion blur, sampling over time, so 2D motion blur would be inappropriate and unnecessary.

In previous releases of RenderPipe, when 2D blur was enabled RenderPipe made use of the 2D Blur Length control in addition to the 3D Blur By Frame control (see 'Motion Blur' on page 42). However, the 2D Blur Length control is redundant and serves no useful purpose from PURE / RenderDrive's point of view.

In Maya 5 and later the RenderPipe render globals now only show the Blur By Frame value, and only this value is interpreted, whether 2D or 3D blur is enabled in the Maya render globals. Scenes which previously relied on a Blur Length will need to be modified.

When motion blur is enabled in the RenderPipe tab, the Maya type is switched to 3D to match, but if the motion blur is disabled or not touched the Maya setting is preserved.

### Nodes

A number of nodes which were previously not spotted as deformation-capable now are. In some cases this means objects which were previously handled as non-deforming will now be tested for deformation and will thus now be correctly motion blurred.

However, it is worth remembering that there is an overhead in checking for motion blurred objects (in addition to the overhead of exporting the objects if they are deforming) – so if you don't need motion blur, switch it off.

### New Version Warnings

If an old scene is loaded, i.e. one which was saved when using an older version of RenderPipe, the message 'Updated renderPipeGlobals for new version of RenderPipe' is issued in the Script Editor. This is harmless and of no concern.

If you open a scene that was saved with the new RenderPipe plug-in in a session of Maya using an old RenderPipe plug-in then, in addition to any warnings about unknown attributes that Maya may issue anyway, the warning message 'Scene renderPipeGlobals are more recent than loaded version of RenderPipe' is issued.

---

## Installing RenderPipe for Maya

The RenderPipe for Maya plug-in can be found in the `RenderPipe_for_Maya` directory on the PURE / RenderDrive CD.

The `RenderPipe_for_Maya` directory contains two sub-directories, `RPMaya_Windows_Module` and `RPMaya_Irix_Module`.

In turn each of these directories contains four sub-directories, `rpmaya3` for Maya 3.0, `rpmaya4` for Maya 4.0, `rpmaya45` for Maya 4.5 and `rpmaya5.0` for Maya 5.0. The `RenderPipe_for_Maya` directory also contains an `Examples` sub-directory.

Installation consists of two simple steps:

- Copy the appropriate module directory to disk
- Copy the appropriate module file to Maya's modules directory

**IMPORTANT:** If you have used a previous version of RenderPipe for Maya, you also need to delete any out of date `.SL` files in all your project directories.

The following sections explain the install procedure in detail.

---

## Installing RenderPipe for Maya on Windows

We now recommend a new method of installing RenderPipe for Maya, using Maya's module mechanism.

If you have used RenderPipe for Maya before, please see 'Removing Old Releases of RenderPipe for Maya' on page 39 for instructions on uninstalling the old version of RenderPipe.

Installing a module is a simple 3 step process:

1. Copy the '`RPMaya_Windows_Module`' directory from the '`RenderPipe_for_Maya`' directory on the PURE / RenderDrive CD to the root of your C: disk.  
If you downloaded RenderPipe from the web site, the directory will be provided as a ZIP file. Unzip it to the root of your C: disk, being sure to choose the option to recreate directories.
2. Go to your personal Maya modules directory, which on Windows 2000 and XP is usually:  
`C:\Documents and Settings\username\My Documents\maya\modules`  
(where you replace `username` by your user name)  
You may need to create the final directory in this path.
3. Copy the appropriate '`RenderPipeversion.mod`' file, where `version` is either 3, 4, 45 or 5 depending on your version of Maya, from the '`C:\RPMaya_Windows_Module`' directory into the modules directory located in step 2.

*Note:* In step 1 you can put the `RPMaya_Windows_Module` directory in a different location to the root of C:, but will then need to update the path in the module file you install in step 3.

*Note:* If you use Muster or Smedge, use 'Alternative Method for Installation' on page 39 instead.

### Personal Maya Application Directory

On Windows NT the personal application directory is usually `C:\Winnt\Profiles\username\maya`.

The location of this directory can be changed using the `MAYA_APP_DIR` environment variable.

## *Installing RenderPipe for Maya on Irix*

We now recommend a new method of installing RenderPipe for Maya, using Maya's module mechanism.

If you have used RenderPipe for Maya before, please see 'Removing Old Releases of RenderPipe for Maya' on page 39 for instructions on uninstalling the old version of RenderPipe.

Installing a module is a simple 3 step process:

1. Copy the 'RPMaya\_Irix\_Module' directory from the 'RenderPipe\_for\_Maya' directory on the PURE / RenderDrive CD to the root of your disk (i.e. /).  
If you downloaded RenderPipe from the web site, the directory will be provided as a .tar.gz file – the instructions for unpacking this are in 'Gzipped Release' on page 38.
2. Go to the central Maya modules directory for your version of Maya. For Maya 5.0 it is:  
`/usr/aw/modules/maya/5.0`  
For other versions of Maya replace the 5.0 by 3.0, 4.0 or 4.5.  
You may need to create some or all of the directories in this path.
3. Copy the appropriate 'RenderPipeversion.mod' file, where *version* is either 3, 4, 45 or 5 depending on your version of Maya, from the '/RPMaya\_Irix\_Module' directory into the modules directory located in step 2.  
For Maya 5.0 the directory is `/usr/aw/modules/maya/5.0`

*Note:* In step 1 you can put the RPMaya\_Irix\_Module directory in a different location, but will then need to update the path in the module file you install in step 3.

*Note:* If you use Muster or Smedge, use 'Alternative Method for Installation' on page 39 instead.

### **Gzipped Release**

If you receive the release by e-mail, the IRIX version of the plug-in will be provided as a gzipped tar file, e.g. `RPMAYA-IRIX-REL-1.4-1.tar.gz`.

Copy the file to your disk, e.g to /tmp. Expand it using these commands:

```
cd /  
gzip -d < /tmp/RPMAYA-IRIX-1.4-1.tar.gz | tar xf -
```

Then follow the instructions above to install.

### **Personal Maya Application Directory**

Instead of the central modules directory you can put the module file into the personal Maya application directory.

On Irix your personal Maya application directory is usually `~/maya`.

The location of this directory can be changed using the `MAYA_APP_DIR` environment variable.

---

## Alternative Method for Installation

There is an alternative way to install RenderPipe for Maya, which avoids the use of a module, by copying files from the module structure on the CD directly into the Maya install. The four steps are:

1. Delete the old version of the plugin, following the instructions in the Release Notes.
2. Copy the plug-in, `rpmaya.mll` or `rpmaya.so` and the `shaders` directory from the `plug-ins` directory to Maya's `plugins` directory.
3. Copy the `.mel` files in the `scripts` directory to Maya's `scripts\AETemplates` directory.
4. Copy the `.xpm` files in the `icons` directory to Maya's `icons` directory.

---

## Removing Old Releases of RenderPipe for Maya

In the past there were two methods of installing RenderPipe for Maya.

- The first method was to copy an `rpmaya` directory to the Maya install directory and tell Maya where to find it using variables in the `Maya.env` file.
- The second method was to copy the components of the release directly into the Maya install.

To clear up both types of install:

- Go to your Maya install directory. On Windows in Maya 3.0 or 4.0 this defaults to `C:\AW\Maya3.0` or `4.0` and in Maya 4.5 it defaults to `C:\Program Files\AliasWavefront\Maya4.5`. On Irix it defaults to `/usr/aw/Maya3.0, 4.0` or `4.5`.
- If there are any directories called `rpmaya3`, `rpmaya4`, `rpmaya45` or `rpmaya45` then delete them
- Go in to the `bin` directory. If there is a file called `rpmaya.mll` or `rpmaya.so` then delete it. If there is a directory called `shaders` then delete it and all its contents.
- Go out of the `bin` directory and in to the `icons` directory. If any of these files exist then delete them: `render_lensFX.xpm`, `render_RPGlass.xpm`, `render_RPMirror.xpm`, `render_RPShiny.xpm`, `render_RPSSI.xpm`.
- Go out of the `icons` directory and in to the `scripts\AETemplates` directory. If any of these files exist then delete them: `AElensFXTemplate.mel`, `AERenderPipeGlobalsTemplate.mel`, `AERPGLassTemplate.mel`, `AERPMirrorTemplate.mel`, `AERPShinyTemplate.mel`, `AERPSSITemplate.mel`, `RenderPipeUI.mel`.
- To be thorough, also go to your `Maya.env` file and remove the redundant variables that refer to `rpmaya`. `Maya.env` is typically in `C:\Documents and Settings\username\My Documents\maya` on Windows 2000 and XP, in `C:\Winnt\Profiles\username\maya` on Windows NT and in `~/maya` on Irix. It may also be in a numbered sub-directory of one of these.

---

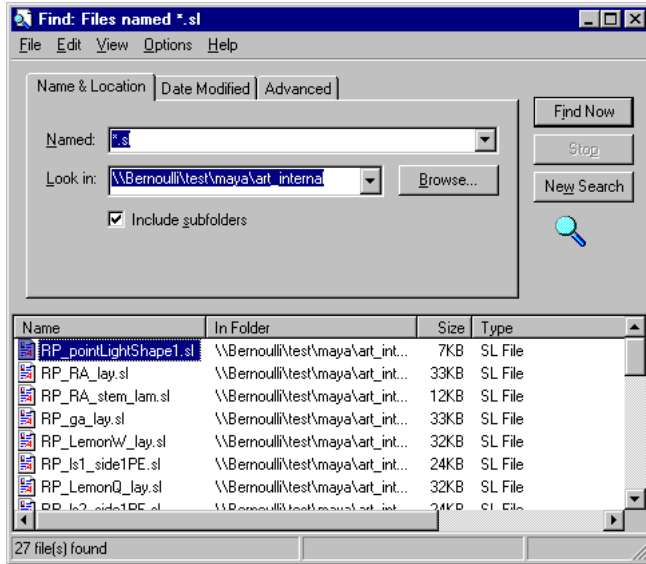
## Removing Out of Date .SL Files

If you have used a previous version of RenderPipe for Maya, you need to remove all the cached out of date '`.SL`' files. These files are created automatically by RenderPipe at render time and stored in the current project directory.

On Windows, use the Find panel, enter `*.sl` as the search string, choose a disk and then press Find Now. Once Windows has found all the '`.SL`' files, select all of those that you need to delete and use the Delete option in the file menu.

*Note:* Do not delete the '`.SL`' files in the `rpmaya\shaders` directory, nor any '`.SL`' files that are not in a project directory.

## Loading RenderPipe for Maya



On IRIX you can use the find command to list all the shader files. For example, this command would list all the shaders starting in the root directory, but skip those in the rpmaya directory:

```
find / -name rpmaya -type d -prune -o -name \*.sl -type f -print
```

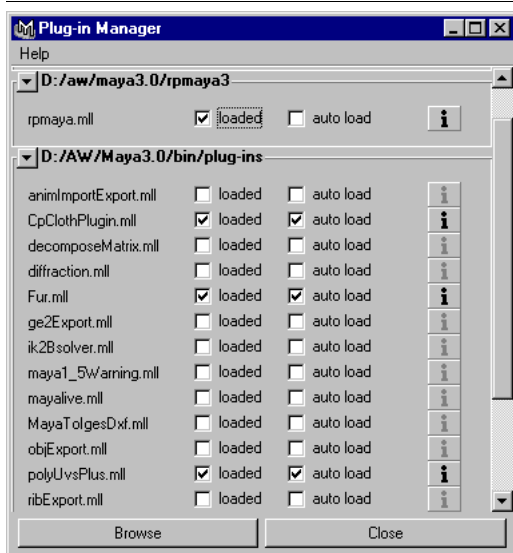
## Loading RenderPipe for Maya

You need to load the RenderPipe for Maya plug-in using the Plug-in Manager (Window menu -> Settings/Preferences -> Plug-in Manager...).

If the variables are correctly set, RenderPipe will appear in the plug-in manager. Switch on the 'loaded' switch.

If you set 'auto load' to be on, the plug-in will be automatically loaded whenever you run Maya. However, if you do this in Maya 3.0 or Maya 4.0 the interface to the RenderPipe Material nodes will be incorrect due to a bug in Maya. (The icon will be incorrect and the menu in Hypershade will not contain the material specific options.) This problem does not affect Maya 4.5 or later.

## Maya's Plug in Manager



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## Maya Compatibility

This section of the release notes outlines which Maya features are supported by RenderPipe for Maya, and which are not supported.

### Cameras

#### Summary

Cameras are fully supported. PURE / RenderDrive's fully ray-traced depth of field and motion blur are supported using the built-in Maya interface, but give superior results.

Motion blur uses 3 motion steps.

The ImagePlane, used as a background, is fully supported. Background Color is not supported.

#### Details

Cameras are fully supported:

- Camera Attributes – everything supported.
- Film Back – everything supported, but 'Film Offset' and 'Overscan' are ignored.
- Depth of Field – everything supported.
- Output Settings – Renderable / Image / Mask / Depth flags supported. Other attributes ignored. RenderPipe depth is first object through centre of pixel, not closest or farthest visible.
- Environment – Image Plane is supported, Background Color is not supported. (With RenderPipe, the imagePlane geometry is sized such that the entirety of the image always fits on it, and may extend outside the bounds of the visible region. Maya clips the geometry at the viewing frustrum. This means that when using fit modes other than 'To Size', the image on the plane will look the same as in Maya, but RenderPipe's render will show parts of the image in regions that Maya won't).
- Special Effects – Shutter Angle supported.
- Orthographic Views – supported.
- Display Options / Object Display / Node Behavior / Extra Attributes – do not apply to rendering.

#### Camera Motion Blur

Camera motion blur is supported, but the control for it is somewhat hidden in the Maya interface. There are three options:

1. Go to the Attribute Spread Sheet and swap to the Render tab
2. To make the switch to control motion blur visible in the Attribute Editor, you must edit `AECameraTemplate.mel` in `maya\scripts\AETemplates` and add the line:

```
editorTemplate -addControl "motionBlur";
```

just after the line for adding the shutterAngle control (towards the bottom of the file), and remove the line:

```
editorTemplate -suppress "motionBlur";
```

which is the eighth from the bottom. If you don't want to edit the central copy of this file, then make a local copy in the same place as all the other RenderPipe MEL scripts and edit that one. This local version will then act as an override.

3. You can also enable camera motion blur on a per-camera basis using a MEL command. E.g. for a camera called 'myCamera':

```
setAttr myCamera.motionBlur 1
```

*Note:* Motion blur must also be enabled in Render Globals.

### Motion Blur

When calculating motion blur, RenderPipe takes account of 3 steps. This affects rapidly moving objects on non-straight paths. (In RenderPipe MAX you can configure up to 16 steps, though the default is 2.)

The position of the object is evaluated at 3 times:  $t - \frac{n}{2}$ ,  $t$  and  $t + \frac{n}{2}$ . The value of n is determined by the formulae below.

In Maya 5.0 and later, and in earlier versions of Maya where motion blur is set to 3D, the proportion of motion used between the current frame and the next frame is given by:

$$\frac{\text{Camera Shutter Angle} \times \text{Blur By Frame}}{360}$$

If the value of the equation is greater than 2, RenderPipe correctly takes account of the motion beyond the previous and next frames.

In Maya 4.5 and earlier, it is possible to set motion blur to be 2D and in that case the proportion of motion used between the current frame and the next frame is given by:

$$\frac{\text{Camera Shutter Angle} \times \text{Blur By Frame} \times \text{Blur Length}}{360}$$

The 2D Blur Length control is not available in Maya 5.0 and later.

## Lights

### Summary

All types of built-in lights are supported, except for Volume Light which was added in Maya 4.5. These are:

- AmbientLight
- AreaLight
- DirectionalLight
- PointLight
- SpotLight

### Details

All types of light are supported, except for Volume Light which was added in Maya 4.5.

As in Maya, Volumetric shaders may be applied to spotlights and point lights (for spotlights the geometry is a cone and for point lights the geometry is a sphere).

Light Glow (in Light Effects) is not supported

It is possible to plug both the intensity and color inputs of point lights and spot lights (to give a projection effect).

Light linking is supported.

'Emit Specular' and 'Emit Diffuse' are not supported.

### Ambient Lights

RenderPipe does not render ambient lights in the same way as Maya. If the light's Ambient Shade value is 0, then Maya and RenderPipe match. For values of Ambient Shade greater than 0, RenderPipe gives specular highlights, whereas Maya does not.

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## Area Lights

Export of area light sphere geometry is always done in world space. This ensures that local rotations of the light do not cause any changes in illumination / shadowing.

The Area Light type in Maya's internal renderer is inconsistent with the size of its area light when it comes to illumination / shadow casting. Maya renders illumination from a 2 x 2 square, yet casts shadows from a 1 x 2 square. RenderPipe illuminates and shadow casts from a 2 x 2 square.

Note that the Area light has a built-in inverse-square decay so use of decay rates results in anything up to quintic decay, and is discouraged.

## Shadows

Ray-traced shadows are generated for any light with either Use Depth Map Shadows or Use Ray Trace shadows enabled.

Shadow Color is not supported.

The Depth Map shadow controls do not apply to RenderPipe because PURE / RenderDrive ray traces all shadows.

## Geometry

### Summary

Most types of geometry are supported.

Motion blur is supported.

Sub-division surfaces are not supported

Particles are partially supported

### Details

Most types of geometry are supported, as detailed below. For the supported geometry, all aspects of visibility, transformations, motion blur and deformation blur are supported. Displacement shading is supported for NURBS. It is possible to use displacement shading on Polygons, but it is not recommended.

Motion blur is supported and is three step – see 'Motion Blur' on page 42 for more information.

### NURBS

Fully supported, including trim curves. Most of the Maya tessellation attributes are ignored, see page 17-14 of the PURE user manual or page 22-14 of the RenderDrive user manual for details of the RenderPipe specific tessellation controls.

### Polygons

Polygon meshes are fully supported, including holes.

Multiple shaders per polygon mesh are supported.

Motion blur of polygon meshes is supported. Meshes with concave or holed faces may not render correctly.

Multiple uv sets are supported.

### Sub-Division Surfaces

Not supported – use a subdivToPoly node to convert the mesh.

### Particles

RenderPipe has limited support for particles. RenderPipe does render some types of particle, detailed below, but their appearance will differ to their appearance when rendered by Maya.

RenderPipe renders the particles it supports in the same pass as the rest of the geometry, so they will appear in reflections etc. It is still possible to use the hardware renderer to render particles and composite the results, as you would using Maya.

Multi Point, Multi Streak, Numeric, Blobby Surface, Cloud, Tubes – not rendered

Points – are rendered as triangles. Their size is given by Radius, not by Point Size. To set Radius, temporarily set the type to Sphere, change Radius, then set the type back to Point.

Spheres – are rendered.

Sprites – are rendered. Size is taken from Sprite Scale X and Sprite Scale Y. Sprite Twist is also honored.

Streak – are rendered. As for Points RenderPipe uses radius in place of Line Width. Tail Size is supported, Tail Fade is not.

Radius is used instead of ‘Point Size’ to control the size of particles of type Point and the width of Streak. To set radius, you need to set the particle type to Sphere, click on the Add Attributes For Current Render Type button in the Attributes editor, set the radius, then set the type back to Point.

RenderPipe may render particles a different color to Maya’s hardware renderer because Maya ignores certain attributes (such as Incandescence).

### Reference Scenes

Fully supported.

### Texture Reference Objects

Supported. Currently the Brownian and Leather procedural textures benefit from Texture Reference Objects.

### Render Globals

In Maya 4.5 and earlier, the Render Globals were shared by renderers. Some of Maya’s controls are not relevant to RenderPipe, but there was no way to hide them. In Maya 5.0 and later, Render Globals are specific to each renderer, so only relevant controls are displayed.

#### Maya 4.5 and earlier Render Globals

The following sections of Render Globals are fully supported:

- Image File Output
- Resolution
- Field Options
- Modify Extension
- Motion blur (see above for more information about motion blur)
- Renumber Frames

Only the relevant fields from the following sections of Render Globals are supported:

- Anti-aliasing Quality (Multipixel Filtering – Box and Gaussian filters are supported, Gaussian is used if B-Spline, Triangle or Plug-in selected. The Enable switch is interpreted regardless of other anti-aliasing settings.)
- Render Options (Pre/Post Render MEL, Environment Fog, Ignore Film Gate & Gamma Correction)

The following sections of Render Globals are not supported:

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- Raytracing Quality (not applicable)
  - Memory and Performance Options (not applicable)
  - IPR Options (not applicable)
  - Paints Effects Rendering Options (not applicable)
  - Render Layer / Pass Control – Render Layers are supported (the ability to put objects into Render Layers and control whether each layer renders or not). Render Layer Passes (ie beauty, color, shadow and diffuse) are not supported.

RenderPipe does not support Render Globals Presets in Maya 4.5 and earlier, but does support them in Maya 5.0.

## Image Formats

Most image format options are supported. AVI, GIF, EPS and RLA are not supported, all other image formats are supported.

## Interlaced Fields

When rendering an animation with interlaced fields, all of the odd fields are returned first, followed by all of the even fields. Additional disk space is required to store the odd fields until the renderer starts to render the even fields. If you abort the render, or run out of disk space, you will either lose frames or just have the odd field in frames. For this reason, we recommend that you do not use the interlaced fields option when rendering long animations.

## Render Stat Controls

The 'Render Stat' controls are used to control how an object is rendered.

- Cast Shadows – Supported
- Receive Shadows - Not supported
- Motion Blur – Supported
- Primary visibility – Supported
- Smooth Shading – Not supported
- Visible in Reflections / Visible in Refractions – Both supported. As PURE / RenderDrive does not distinguish between reflections and refractions, if either switch is off the object will not appear in reflections and refractions.
- Double Sided – Supported
- Opposite Side – Supported

## Shading nodes

### Summary

|                                 | Supported   |   | Supported but with significant limitations | Not Supported  |
|---------------------------------|---|---|--|--|
| <b>Materials</b>                | Anisotropic<br>Blinn<br>Lambert<br>RenderPipe Glass<br>RenderPipe Mirror<br>RenderPipe Shiny            | PhongE<br>Phong<br>Surface Shader<br>useBackground  | LayeredShader                              | Fluid Shape<br>Ocean Shader<br>Ramp Shader<br>shadingMap |
| <b>2D Textures</b>              | Bulge<br>Checker<br>Cloth<br>File   | Fractal<br>Grid<br>Mountain<br>Ramp<br>Water  | Noise                                      | Fluid texture 2D<br>Movie<br>Ocean                       |
| <b>3D Textures</b>              | Brownian<br>Cloud<br>Crater<br>Granite<br>Leather<br>Marble   | Rock<br>Snow<br>Solid Fractal<br>Stucco<br>Wood   | Volume Noise                               | Fluid texture 3D   |
| <b>Layered</b>                  | Layered texture   |   |  |  |
| <b>Environment</b>              |   |   |  | envBall<br>envChrome<br>envCube<br>envSky<br>envSphere   |
| <b>Utilities – Color</b>        | blendColors<br>clamp<br>contrast<br>gammaCorrect  | hsvToRgb<br>luminance<br>rgbToHsv   |  | surfaceLuminance   |
| <b>Utilities – general</b>      | bump2d<br>bump3d<br>condition<br>multiplyDivide<br>place2dTexture<br>place3dTexture<br>plusMinusAverage | projection<br>reverse<br>samplerInfo<br>setRange<br>stencil<br>uvChooser<br>vectorProduct |  | arrayMapper<br>clear coat<br>height<br>lightInfo         |
| <b>Utilities – particles</b>    | particleSamplerInfo   |   |  |  |
| <b>Utilities – Post-process</b> | RenderPipe lensFX   |   |  | opticalFX  |
| <b>Utilities – Switch</b>       | Single switch<br>Double Switch  | Triple Switch<br>Quad Switch  |  |  |
| <b>Volumetrics</b>              |   |   | envFog<br>lightFog                         | particleCloud<br>volumeShader<br>volumeFog               |

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## Materials

Anisotropic, blinn, lambert, layered shader, phong, phongE and surface shader are all supported and most are a good match to Maya.

Anisotropic does not match Maya but produces a good result.

RenderPipe does not support the Fluid Shape, Ocean Shader, Ramp Shader or Shading Map materials.

Reflected color is ignored.

RenderPipe adds four new materials, RPLGlass, RPMirror, RPShiny and RP SSI. They are documented in chapter 19 of the PURE User Manual and chapter 24 of the RenderDrive User Manual (see the PDF version if your printed version is not up to date). When rendered by the Maya renderer they display whatever is connected into their dummy color attribute.

The outColor of material nodes cannot be used in a general way, they should always plug into the surface shader attribute of a shading group or into a layered shader.

## Layered Shader

Textures cannot be plugged directly into the layered shader, only material outputs may be inputs for the layered shader. To layer textures, use the layered texture.

Layered shader nodes may not be connected to other layered shader nodes.

Reflection and transparency within the layered shader do not behave in the same way as they do in Maya.

## Textures – General Notes

filterOffset attributes in texture are currently unsupported. All texture filtering is performed using the information provided by the renderer. In some cases (such as when using a gammaCorrect node with high gain) this may lead to visible differences in renders between RenderPipe and Maya.

When a texture does not contain an alpha channel, Maya returns the luminance of the RGB, whereas RenderPipe returns 1 (fully opaque). The workaround in cases where it is known that a bitmap has no alpha channel, is to set the 'alphaIsLuminance' attribute in the file node to get the same outAlpha as Maya.

In Maya 4.5 and 5.0 connections from a file or movie node to a material's transparency connection default to use the outTransparency of the file / movie node. In previous release of Maya outColor was used by default. OutTransparency depends on a bitmap's alpha channel, in the cases where there is no alpha channel Maya uses the RGB luminance to drive the outTransparency. RenderPipe does not make this educated guess and needs alphaIsLuminance to be switched on when a bitmap has no relevant alpha channel and RGB is to be used to drive the transparency of a material.

The outMatteOpacity attribute is not yet supported. The value calculated for outGlowColor is just a rough approximation, and does not extend outside the bounds of the geometry, as it does in Maya. hideSource is unsupported.

Textures which use noise, such as brownian, fractal and wood produce a different result compared to Maya due to differences in the noise function used. However, the 'feel' of the texture will usually be the same. For example, in the case of wood the grain will not be identical but will have the same general appearance, just as if you bought two pieces of real wood.

## 2D Textures

Bulge, checker, cloth, file, fractal, grid, mountain, ramp and water are all fully implemented. Noise is partially supported. Fluid Texture 2D, Movie and Ocean are not supported.

## File Texture

The file types supported are the types supported by PURE / RenderDrive's MakeTexture function (TIFF, JPEG, TGA, RLA and PNG), plus those supported by Maya's image library (IFF, SGI, etc.).

All textures are sampled with a box filter applied in the shader only. Pre-filtering is not supported.

There may be noticeable transitions across the boundaries of repeating File textures which use a high level of filtering. To eliminate this, reduce the filter value.

### 3D Textures

Brownian, cloud, crater, granite, leather, marble, rock, snow, solid fractal, stucco and water are supported.

Volume noise is partially supported. Fluid Texture 3D is not supported.

Snow: In Maya Snow is represented by the snow color on all surfaces where the surface normal is almost parallel with the 'Y' axis and in the positive direction. This is because Maya does not care which way the normals are and completes the calculation. RenderPipe honours the surfaces normal direction and hence on some occasions it will render the snow color on the opposite surface rather than the expected surface. This can be rectified by simply flipping the normals. Select the objects that require the normals being flipped. For NURBS go to the Modelling menu, go to Edit NURBS > Reverse Surface Direction and choose the Option Window by clicking on Reverse Surface Direction's square. De-select the Keep Original check box and click Reverse. For a Poly go to the Modelling menu and select Edit Polygons > Normals > Reverse.

### Textures – other

Layered texture is supported.

### Textures – environment

The environment textures are not supported (envBall, envChrome, envCube, envSky & envSphere).

### Utilities – Color

All are supported (blendColors, clamp, contrast, gammaCorrect, hsvToRgb, luminance and rgbToHsv), with the exception of surfaceLuminance.

### Utilities – General

Nearly all of the general utility nodes are supported: bump2d, bump3d, condition, multiplyDivide, place2dTexture, place3dTexture, plusMinusAverage, projection, reverse, samplerInfo, setRange, stencil, uvChooser and vectorProduct.

RenderPipe does not support arrayMapper, clear coat, height field or lightInfo.

There are some restrictions, detailed below.

### SamplerInfo

Values of tangentUCamera and tangentVCamera may be incorrect.

### Projection

The projection node should work in cases such as place2d -> texture -> projection -> material.

The projection node will usually give problems if a switch node exists somewhere behind, or directly in front of the projection node.

The projection node may not work if a non-shading node (i.e. nurbsSphere) is directly connected to / from the projection node.

Textures upstream from projection nodes will always be evaluated using their projected texture coordinates. If a non-projected instance of the texture is required elsewhere in the shading network, the texture must be duplicated. Similarly if you want to have one texture projected by more than one place2d node, the texture must be duplicated for each place2d node.

### Utilities – Post Process

The opticalFX node is not supported. We recommend you use RenderPipe's lensFX node instead (described in chapter 20 of the PURE User Manual or chapter 22 of the RenderDrive User Manual).

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### Other restrictions

When using the distanceBetween node, it is necessary to plug the input attributes in all cases. (This is because in Maya they are not flagged as 'readable', which prevents the export from getting to their values.)

Some nodes with matrix attributes may export incorrectly, since there is no way for RenderPipe to find out from Maya what type these attributes are.

### Shader export mechanism

In Maya you can build arbitrarily complex shading networks. RenderPipe for Maya supports these networks by stitching together 'shader fragments', creating complete shaders. The complete shaders are then sent to PURE / RenderDrive and used for rendering. The shader fragments are located in the 'shaders' directory of the 'rpmaya' directory.

If you use a node that RenderPipe does not support, it will give you a warning. It gives the option to create an empty shader fragment, which will be stored in the current project. The empty shader fragment will have no effect, for example if it is for a texture it will render black.

The general directory search path order for shader fragments is Project, User (%MAYA\_APP\_DIR%/shaders), Central (/shaders). Therefore a local copy of a shader fragment in the project directory will always override the copies present in the user directory, and the central installation of Maya.

RenderPipe does not give a warning when it uses a local copy of a shader fragment located in the project directory. This can cause problems when RenderPipe has auto-generated one and you subsequently put an implementation for the shader in the central repository – the new implementation will appear to have no effect. However, RenderPipe does issue a warning before creating an empty fragment.

RenderPipe tries its best to avoid rewriting shader wrappers to disk each and every render (which would invalidate the shader cache on PURE / RenderDrive and lead to recompilation - a waste of time).

If you encounter any problems with shader generation, please provide us with a detailed report.

### Materials – Volumetrics

RenderPipe supports the envFog and lightFog nodes, but does not support the particleCloud, volumeFog and volumeShader nodes.

#### envFog

envFog is partly supported – only the 'simple' section is supported.

#### lightFog

Maya only allows application of volume effects to point and spot lights. The light 'gizmo' used for the lights is spherical for point lights and conical for spotlights.

Motion-blurred gizmos should work, even though Maya appears to not allow this.

There is no special handling of intersecting gizmos.

Plugging attributes that exist on the light rather than the Light Fog itself (e.g. fogIntensity) will not yet work.

Light Fog is not a close match to Maya.

### Limitations

In this release there is a limit on the complexity of each shader network. The exact limit depends on the nodes involved, but as an *approximate* guideline the limit is around fifty.

By shader network we mean the nodes connected together for a single surface, light, etc. For example, if you are using the Layered Shader, the shader network is all the nodes which are connected and feed into the Layered Shader node.

If you exceed the limit, you will get render time warnings about shader compile fails.

## *Known Problems*

### **Error message: Renderer caught endless loop**

Rarely a complex scene will give an error message 'Renderer caught endless loop'. Sometimes the render will still complete, but generally it will fail or you will see a visible artifact.

To eliminate the problem, try one or more of these:

- On the Render Globals panel, switch on Manual Ray Depth and use a lower ray depth. Try a value less than 15. This option reduces the number of steps through which PURE / RenderDrive trace light rays. The default value used by PURE / RenderDrive is much higher than that used by Maya.
- Reduce the size of any area lights in the scene
- Reduce the number of area lights in the scene
- Reduce the number of reflective or refractive surfaces. Pay particular attention to overly complex transparent objects, be careful to avoid surfaces which intersect each other.

### **Error message: Shader source ... not declared in this class**

This error can occur if two sessions of Maya are using the same project. It will occur if the two Maya sessions use a different path to reach the project. For example, the disk may be mounted on one machine as G: and on another machine as H:.

Avoid using the same project from more than one copy of Maya if both copies will be rendering. If you cannot, ensure that all copies of Maya use the same path to reach the data. (This is not possible if one is running Windows and the other is running Irix.)

### **Escape Key**

Use of the Escape key terminates the render, even if Maya is not the current application. This is due to a problem in Maya's API.

### **Fog**

The various types of fog give compile failures in some cases, so are best avoided.

### **Mental Ray and Maya 4.5**

If you install and load the Mental Ray plug-in in Maya 4.5, the RenderPipe options no longer appear in the Render menu, because Mental Ray changes the structure of the menu. To avoid this problem, do not load the Mental Ray plug-in when using RenderPipe. Alternatively use the RenderPipe MEL command to render (or create buttons that call the RenderPipe MEL command).

This problem has been eliminated in Maya 5.0 – Maya now properly supports third-party renderers.

### **Transparency connections from File and Move nodes**

In Maya 4.5 and 5.0 connections from a file or movie node to a material's transparency connection default to use the outTransparency of the file / movie node. In previous releases of Maya outColor was used by default. OutTransparency depends on a bitmap's alpha channel and in the cases where there is no alpha channel Maya uses the RGB luminance to drive the outTransparency. RenderPipe does not make this educated guess and needs alphaLuminance to be switched on when a bitmap has no relevant alpha channel and RGB is to be used to drive the transparency of a material.