AV4 Release Notes

PURE and RenderDrive Software v3.2, RenderPipe MAX v2.9 and RenderPipe for Maya v1.7

Updated: 6th October 2004

Contents

Contacting ART VPS

If you have any problems with this 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.

Product Overview

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’. There are RenderPipe plugins for 3ds max, Autodesk VIZ, Maya and CATIA. 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.

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 32-bit 5-volt PCI slot, version 2.2 compliant. *

This is a minimum requirement. A faster processor and increased memory will significantly enhance PURE’s performance. Note that the computer will be running a 3d modelling application, such as 3ds max or Maya, as well as the PURE software (unless it is only used to render RIB files).

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

* 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 rail, which was optional under earlier versions of the PCI specification. If your computer provides this 3.3v 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 R4, R5, R6 and R7 of 3ds max, and Autodesk VIZ R4 & 2005.

RenderPipe for Maya

RenderPipe for Maya is compatible with versions 4.5, 5.0 & 6.0 of Maya, running on either Windows or IRIX.

Changes in this release

RenderDrive and PURE Software Changes

Analytical Light Sampling

A new method of rendering lights has been added to the software, called Analytical Light Sampling. In most scenes it gives much less noisy results when rendering area lights. In some scenes Analytical Light Sampling allows you to get less noisy results than are possible at *any* Image Quality without Analytical Light Sampling.

Analytical Light Sampling generally takes longer to render a frame at a given Image Quality setting, but because the image is much less noisy, it is usually possible to use a lower Image Quality setting. So in most cases the overall render time is similar to rendering without Analytical Light Sampling.

Analytical Light Sampling is switched off by default – typically you will switch it on for final renders.

In RIB files Analytical Light Sampling is disabled by default. It can be enabled and set to automatic mode using:
`Attribute "light" "nsamples" 0`
See section04.html of the RenderMan documentation in the RenderPipe_RIB/doc directory for more information.

Ray Buffer Improvements

RenderDrive and PURE's ray buffer is used to hold rays during rendering. It has been improved and made more robust. This further reduces the likelihood of encountering rare problems such as endless loop detected warnings.

Multiple PURE cards in a PC

It is now possible to use more than one PURE card in a PC. Each PURE card has 8 AR350 chips. The cards work as a single array of chips, so if you use 2 PURE cards it is as if you have an array of 16 chips.

Performance will not be doubled by using 2 PURE cards. This is mainly because there are diminishing returns as you add more AR350 chips. A secondary factor is that the two cards are sharing the PCI bus. The performance of the PCI bus is especially important when using multiple PURE cards.

Textureinfo Shading Language Call

The RenderMan shading language `textureinfo()` call is now supported. The datanames "resolution" and "channels" are supported, the other types of dataname are not supported. See the RenderMan 3.2 specification for details of textureinfo().

Large polygon meshes faster to send

It is now much faster to send very large polygon meshes to PURE or RenderDrive.

This affects single meshes containing hundreds of thousands of polygons or more. This change has no noticeable effect on more typical scenes containing smaller meshes, even if the total number of polygons is large.

HDR format images

RenderDrive and PURE now support the HDR image format directly.

HDR format images can be used from RenderPipe MAX (3ds max 6 / 7 and AutoDesk VIZ 2005 only), RenderPipe for Maya (from Maya 6 only) and RenderPipe RIB. Earlier versions of 3ds max, VIZ and maya do not support the HDR format.

In RenderPipe for CATIA, HDR format images can be used from the RenderPipe Shooting tab (but not from within materials because CATIA does not support this format).

(In the previous release, RenderPipe MAX converted HDR format images to the tif format before sending them to PURE or RenderDrive. In the previous release, RenderPipe for Maya did not support the HDR format.)

RenderDrive and PURE support HDR images with top-down left-to-right line order (resolution -Y ... +X ...) that are encoded with format FORMAT=32-bit_rle_rgbe. All other header fields (EXPOSURE etc.) are ignored.

Rendering scenes containing large bitmaps

Sometimes when trying to render a scene that used a large bitmap (larger than 128Mb) the render would fail with a message 'Buffer flush failed: No buffer space available'. This has been fixed. Some issues remain which will be fixed in a subsequent release.

Tip: Use the HDR format rather than the tif format for large floating point bitmaps.

Clear Cache button in the RenderDrive web interface

A 'Clear cache' button has been added to the diagnostics page of RenderDrive's web interface. This button clears RenderDrive's bitmap and shader cache, in the same way as the equivalent button in the PURE Starter interface.

It is not necessary to use this button in normal use, because RenderDrive automatically throws away the least recently used files. The most common reason for using this button is if you are using bitmaps and shaders with inconsistent modification times.

Note: Do not use this button during a render. If you do use the button during a render, the render will fail. In the case of Maya, Maya can hang waiting on the RenderDrive.

Floating Point RLA Images

Floating point RLA images are now supported by RenderDrive and PURE. 32-bit integer RLAs are no longer supported.

Note that 3ds max will gamma-correct floating point data when it is saved into an RLA. RenderDrive and PURE do not gamma-correct floating point data, so float RLAs with a gamma other than 1 will not render as expected. This is not a significant restriction because in real production work floating point images should not be gamma corrected – only use gamma correction on final output images when they are clamped to 8 or 16 bits.

PURE error handling on Windows XP

The handling of PURE errors on windows XP has been made more robust, eliminating the risk of PURE's rendering program (netpci) freezing.

Changes in RenderPipe MAX

RenderPipe MAX benefits from the PURE and RenderDrive changes detailed above, together with the following specific changes:

3ds max 7 is supported

The new release of 3ds max, release 7, is supported.

Mappable refractive index in RenderPipe materials

The Refractive Index in RP Glass, RP Mirror and RP Shiny may now be mapped. The monochrome floating point value of the map is used; so a map value of 255 is a refractive index 1.

Tip: Use an Output map or a map's Output rollout to scale or offset maps into useful ranges.

HDR format images

PURE and RenderDrive now directly support HDR format images. RenderPipe no longer converts HDR format images to TIFs before sending them to PURE or RenderDrive.

The exposure settings in 3ds max's HDR bitmap import settings dialogue are now ignored.

Analytical Light Sampling

A switch to control Analytical Light Sampling has been added to RenderPipe. See ‘Analytical Light Sampling’ on page 3 for a description of this new feature.

Cameras with 2 point perspective correction

Lights now render correctly when the scene is being viewed through a camera with 2 point perspective correction.

Backgrounds in orthographic cameras and views

RenderPipe now supports backgrounds (controlled from the Environment panel) in orthographic cameras and views. Screen environment coordinates can be used.

Target time controls removed

The target time controls have been removed from RenderPipe MAX. They had been found to be confusing and of no practical use.

RenderPipe for Maya Specific Changes

Ramp Shader node

The ramp material shader is now supported.

Volume Light

Volume Light is now supported.

RenderPipe’s implementation of Volume Light has the following restrictions:

- Inward Light Direction is not supported.
- For Light Shape Box, the input value used to index the Color Range ramp is quite different to Maya. It shares the characteristic that it is spherical near the centre of the light, and cuboidal near the edges, but is otherwise different.
- Down Axis Light Direction behaves as a directional light. Shadowing is quite different from Maya, which continues to cast point light shadows in this mode. In particular note that shadows are cast by objects outside the volume (as is the case with the HDR skylight in max and maya, and the direct light in max).

Environment Nodes

RenderPipe now supports the Env Sphere, Env Ball and Env Cube nodes.

Env Chrome and Env Sky are not supported.

Maya6 remap nodes

The 3 remap nodes introduced in Maya 6 are now supported. They are Remap Color, Remap HSV and Remap Value.

File node and ‘alpha is luminance’ switch for images with no alpha

If a file node contains an image with no alpha channel and the node’s alpha output is connected to another node, Maya treats the ‘alpha is luminance’ switch as being on, even if it is off. This is sensible default behaviour, if a little confusing. RenderPipe now matches this behaviour.

Analytical Light Sampling

A switch to control Analytical Light Sampling has been added to RenderPipe. See ‘Analytical Light Sampling’ on page 3 for a description of this new feature.

The control is available as the attribute ‘analyticalLightSampling’ / ‘als’ in renderPipeGlobals. The attribute is on by default in new scenes, off by default in old scenes.

Use Background and shadow mask

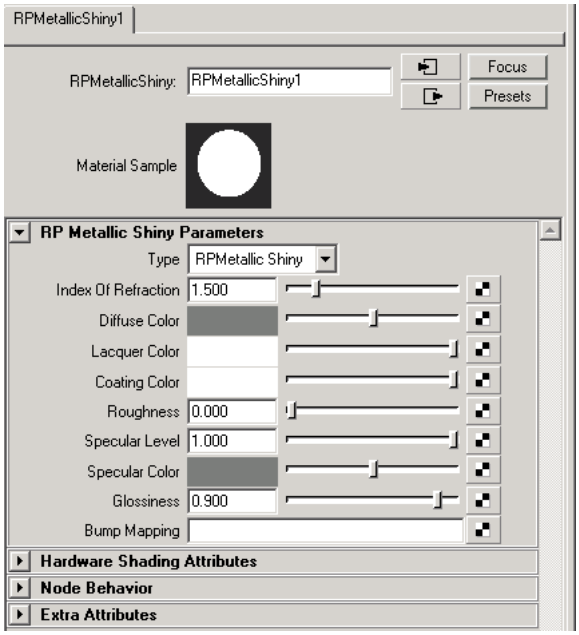
The shadow mask control in Use Background is now supported. This allows Use Background to receive shadows, which is very useful when doing HDRI work.

RP Metallic Shiny material

A new shading node called ‘RP Metallic Shiny’ is available. It is an enhanced form of the RP Shiny material that gives a metallic effect and is particularly useful for modelling car paint. The metallic effect is an additional specular highlight.

RP Metallic Shiny has 3 additional controls compared to RP Shiny:

- Specular Color –controls the color of the specular highlight. Typically set this to the diffuse color or brighter.
- Glossiness – controls the size / spread of the specular highlight. The higher the value the smaller the highlight area becomes. For a metallic effect set Glossiness to a high value, close to 1.
- Specular Level – controls how much specular effect there is. When set to 0 there is no specular effect and the material exactly matches RP Shiny. For a metallic effect set Specular Level to 1.



HDR format images in Maya 6

RenderPipe for Maya now supports HDR format images. Maya 6 supports HDR images, but Maya 5 does not.

Note that the results obtained do not match Maya 6. Maya appears to perform some kind of inconsistent gamma correction or exposure scaling, which RenderPipe does not attempt to match.

Image planes and floating point images

Maya does not support floating point tif images. When using RenderPipe it is possible to use a floating point tif in the File node (just ignore Maya’s warnings). However, it is not possible to use a floating point tif file in the Image Plane, because Maya sizes it incorrectly.

In Maya 6 this is not a problem, because an HDR format image can be used instead.

In Maya 5 (and if you need to use a floating point tif in Maya 6) a mechanism has been added which allows you to specify an alternative image to be used for RenderPipe rendering.

1. Put a dummy image in the Image Plane or File node. This should be a small non-floating point version of the image you really want to use. It is important that it has the same aspect ratio as the full size image.
2. Add a dynamic string attribute ‘RPimageName’ to imagePlane or ‘RPfileTextureName’ to file, for example:

   ```
   addAttr -ln "RPfileTextureName" -dt "string" file1;
   addAttr -ln "RPimageName" -dt "string" imagePlane1;
   ```
3. Use the dynamic string attribute to specify a file which is used at render time in place of the imageName / fileTextureName attribute. For example:

   ```
   setAttr imagePlane1.RPimageName -type "string" "my_file.tif";
   ```

   Note that animated image sequences are not supported, whatever the settings in the file texture node.

Installing the new software

First Time Installation

If you have just bought the PURE card or RenderDrive, there are two or three steps to installation:

1. Install the PURE card or RenderDrive.
   The User Manual contains instructions for this.
2. Install the PURE software.
   Installation of the PURE software is explained in chapter 2 of the PURE User Manual or below.
   The RenderDrive software is pre-installed, so does not need to be changed.
3. Install the appropriate RenderPipe plug-in.
   See 'Installing RenderPipe for Maya' on page 12 of these release notes or 'Installing the RenderPipe MAX Plug-in' on page 10.

Software Update Installation

If you are installing a software update there are two steps:

1. Update the PURE or RenderDrive software update.
   Installation of the PURE software is explained below.
   Installation of the RenderDrive software is explained in 'Updating the RenderDrive Software' on page 8.
2. Update the RenderPipe plug-in being used.
   See 'Installing RenderPipe for Maya' on page 12 of these release notes or 'Installing the RenderPipe MAX Plug-in' on page 10.

Updating the PURE Software

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

To upgrade the software:

- Temporarily disable your anti-virus software and close any other programs that are running.
- Go to the Control Panel, choose Add/Remove Programs, search for PURE and then remove it.
- 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.
- Re-enable your anti-virus software
- The PURE device driver has not changed, so there is no need to update it.

Note: The file 'PURE 3.2-2.PDF' in the PURE install directory is a package definition file, not an Adobe Acrobat file. Do not try to open it.

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.

Updating 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.

If you receive these notes with a new RenderDrive, this software is already installed so ignore this section.

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 rd3000 are for RD3000 and RD3500 RenderDrives and the files prefixed rd5000 are for RD5000 RenderDrives.

The five new files to be installed are:

- *rd5000-3.2-2* – the rendering software.
- *rd5000-slc-3.2-2* – the shading language compiler.
- *rpmax-shaders-2.8-0* – the shaders used by the RenderPipe MAX plug-in.
- *rd5000-asm-3.2-0* – the assembler required to use shaders
- *rd5000-ui-3.2-0* – the web interface server (not present for the RD2000)

The first part of the filename indicates the RenderDrive model and what the file does. The first number, e.g. 3.2, is the software version number. The final number, e.g. 0, 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 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`
- Delete the files currently installed using the m`del` command. e.g.:
  `mdel r*`
  For each of the 5 files it will ask you to confirm deletion, so answer `y` to each prompt (or just press Enter)
- **Set the transfer mode to binary, using the `bin` command:**
  `bin`
- ftp the new files in their place using the m`put` command. Be sure to install the correct version of each files, taking into account the RenderDrive's model number:
  `mput r*`
  For each of the 4 or 5 files it will ask you to confirm the transfer, so answer `y` to each prompt (or just press Enter)

- 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.

Tip: The most common problem is to have missed the ‘bin’ command before doing the ‘put’ commands.

Installing the RenderPipe MAX Plug-in

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

- `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
- `RenderPipe_MAX\max7` – for use with max R7
- `RenderPipe_MAX\viz2005` – for use with Autodesk VIZ 2005

The appropriate `rpmax.dlr` file should be copied to the `Plugins` directory of your 3d studio max / VIZ installation. For 3d studio max R5 this is normally `C:\3dsmax5\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\max4`, `max5`, `viz2005` or `max6` 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.

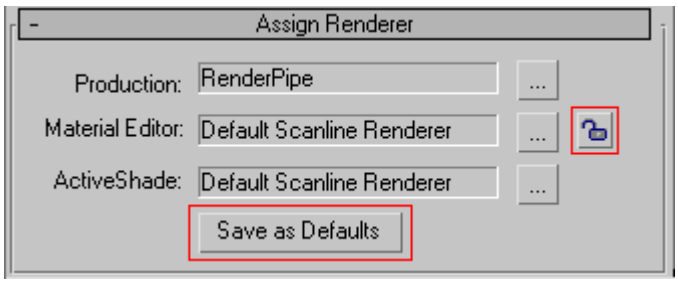
3ds max 6 / 7 and VIZ 2005 Renderer Assignment

We strongly recommend you do the following when you first run 3ds max 6 / 7 or VIZ 2005:

- 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'.

Example_shaders 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:

- `RP_hdr_skylight.sl`, a light shader used for HDR lighting and sky lighting from a hemisphere;

- `qtvrcam.sl`, a camera transform shader used to create QuickTime VR style projected images;
- `RPMetallicShiny.sl`, a surface shader that is like RP Shiny but has an optional metallic effect, making it good for metallic car paint.

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\max4\ui` (or max5 / max6) directory of your release. To install them, drag the `ui` directory from the `RenderPipe_MAX\max4` (or 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. 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.

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 three sub-directories, `rpmaya45` for Maya 4.5, `rpmaya5` for Maya 5.0 and `rpmaya6` for Maya 6.0. 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 recommend installing RenderPipe for Maya using Maya's module mechanism. If you have used RenderPipe for Maya before and installed it *without* using modules, please see 'Removing Old Releases of RenderPipe for Maya' on page 14 for instructions on uninstalling the old version of RenderPipe.

Note: If you use Muster or Smedge, use 'Alternative Method for Installation' on page 14 instead.

First Time Installation of RenderPipe for Maya

Installing a module for the first time 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 '`RenderPipe`*`version`*`.mod`' file, where *`version`* is either `45`, `5` or `6` 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.

Upgrading RenderPipe for Maya

If you have installed RenderPipe for Maya as a module before, then to update to the new version of RenderPipe for Maya:

1. Delete `C:\RPMaya_Windows_Module`
2. 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.

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 recommend installing RenderPipe for Maya using Maya's module mechanism. If you have used RenderPipe for Maya before and installed it *without* using modules, please see 'Removing Old Releases of RenderPipe for Maya' on page 14 for instructions on uninstalling the old version of RenderPipe.

First Time Installation of RenderPipe for Maya

Installing a module for the first time 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 below.

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 6.0 or 4.5.

   You may need to create some or all of the directories in this path.

3. Copy the appropriate '`RenderPipe`*`version`*`.mod`' file, where *`version`* is either `45`, `5` or `6` 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 14 instead.

Upgrading RenderPipe for Maya

If you have installed RenderPipe for Maya as a module before, then to update to the new version of RenderPipe for Maya:

1. Delete `/RPMaya_Irix_Module`
2. 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 below.

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:

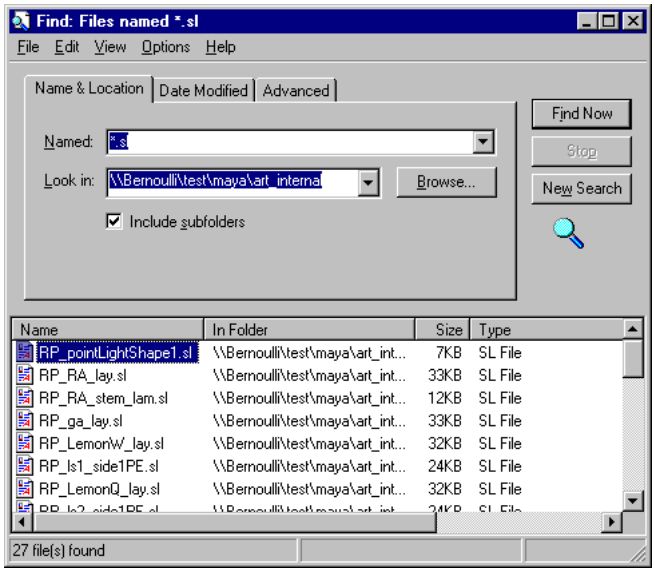
- Go to your Maya install directory. On Windows in Maya 3.0 or 4.0 this defaults to `C:\AW\Maya3.0` or `4.0` and in Maya 4.5 it defaults to `C:\Program Files\AliasWavefront\Maya4.5`. On Irix it defaults to `/usr/aw/Maya4.0`, `4.5` or 5.0.
- If there are any directories called `rpmaya3`, `rpmaya4`, `rpmaya45` or `rpmaya5` 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.



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:

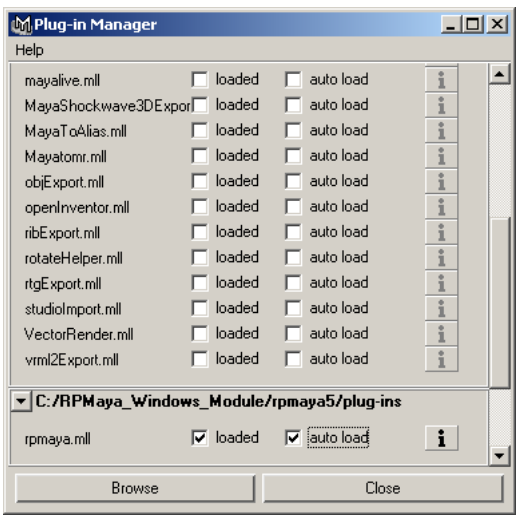
```
find / -name rpmaya -type d -prune -o -name \*.sl -type f -print
```

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...).

Scroll down to find the rpmaya entry in the plug-in manager and switch on the 'loaded' switch.

If you set 'auto load' to be on, the plug-in will be automatically loaded whenever you run Maya.



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.

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_3.2.pdf
```

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

```
installing_PURE.doc
installing_RD2000.doc
installing_RD3000_and_RD5000.doc
```

These are the PURE and RenderDrive user manuals in PDF format.

```
PURE_user_manual_v3.2.pdf
RenderDrive_user_manual_v3.2.pdf
```

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

`LICENCE.html`

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 3.2-2.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 4, 4.5, 5.0 and 6.0.

RenderPipe_MAX

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

There are five versions of the RenderPipe plug-in, `rpmax.dlr`. for the various versions of max and VIZ. The appropriate version should be installed in your `Plugins` directory.

There is also a viz2005 folder containing the plugin for Autodesk VIZ 2005.

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 four 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.

RD2000 Web Interface

It is no longer possible to include the web interface on the RD2000 because there is not sufficient space. The RD3000, RD3500 and RD5000 have far more space available so will not be affected by this problem.

If you have an RD2000 and also have a RD3000, RD3500 or RD5000, then there is a way round this.

You can use a URL of this format:

`http://<IP address of RD3/5000>/<item>?<IP address of RD2000>:5553`

where <item> is one jobs.cgi, diag.cgi, logs.cgi or rdrive.log.

For example, if the IP address of your RD2000 is 192.168.1.20 and the IP address of your RD5000 is 192.168.1.50. Then to see the RD2000's:

- Web queue enter this URL:
  `http://192.168.1.50/jobs.cgi?H=192.168.1.20:5553`
- Diagnostics enter this URL:
  `http://192.168.1.50/diag.cgi?H=192.168.1.20:5553`
- Log settings enter:
  `http://192.168.1.50/logs.cgi?H=192.168.1.20:5553`
- Log file enter:
  `http://192.168.1.50/rdrive.log?H=192.168.1.20:5553`

High Dynamic Range Imaging

This section explains how to use RenderDrive & PURE's high dynamic range rendering, HDRI.

On a computer screen, white is represented as 100% bright or an RGB value of (1.0, 1.0, 1.0). Colors less than 100% bight appear as shades of gray. (Think of this as low dynamic range.)

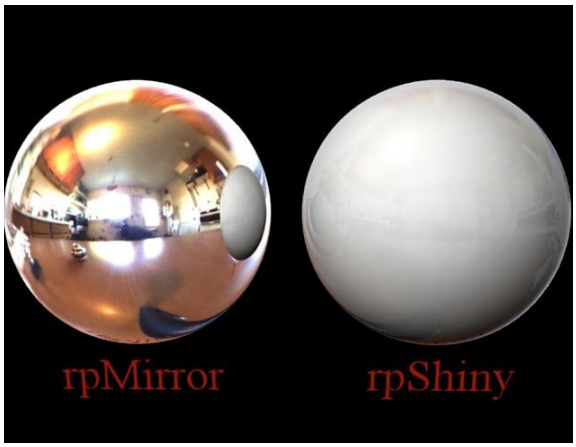
In high dynamic range rendering the rendering calculations are not clamped to 100% brightness, but can use values of virtually unlimited brightness.

For example, if you look at a sheet of paper it appears white. If you look at a fluorescent light tube it also appears white but is much brighter. In the real physical world colors are not restricted to the range of colors a computer screen can display. In computer terms you might say the color of the piece of paper is white with a value of (1.0, 1.0, 1.0) or 100%. The fluorescent light tube might have a brightness of (20, 20, 20) or 2000%.

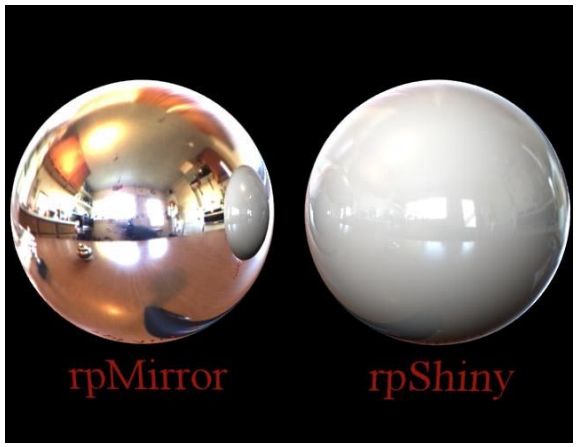
HDRI is especially important in reflections. If you look at a ceramic mug, you will see distinct reflections of the fluorescent tube, but the paper will be less visible. Brighter objects tend to appear more clearly in reflections.

Floating point or HDR images should be used as environment maps, giving more realistic reflections – see the example pictures below.

HDR images can also be used in the RP_hdr_skylight to provide improved illumination.



Low dynamic range, background clamped to 100%



High dynamic range

Light Probe Image courtesy of Paul Debevec (http://www.debevec.org/Probes/), used with permission.

The key HDR features are

- HDR format images can be used in 3ds max 6 / 7, Autodesk VIZ 2005 and Maya 6. (Earlier versions of max, VIZ and Maya do not support the HDR format.)
- Floating point TIF format images can be used in all RenderPipe interfaces (MAX, Maya and RIB)
- The RP_hdr_skylight.sl RenderMan light shader can be used in RenderPipe MAX and RenderPipe RIB. See 'Sky light shader in RenderPipe MAX – RP_HDR_skylight.sl' on page 20 for details of this shader.
- The new RP HDR Skylight can be used in Maya – see'RenderPipe for Maya – RP HDR Skylight' on page 21.

Tip: The HDRI tutorials for 3ds max / VIZ and for Maya can be found on the CD in the 'HDRI Tutorials' directory, or downloaded.

Notes:

- In Maya when you open a floating point TIF, Maya may warn that the format is not supported and will display the image as black. Ignore this warning as RenderPipe can read and use the image.
- In max and VIZ when you open HDR format images there is a panel of 'HDRI Load Settings' to choose how the HDR map is used These settings are ignored by RenderPipe.

Sky light shader in RenderPipe MAX – RP_HDR_skylight.sl

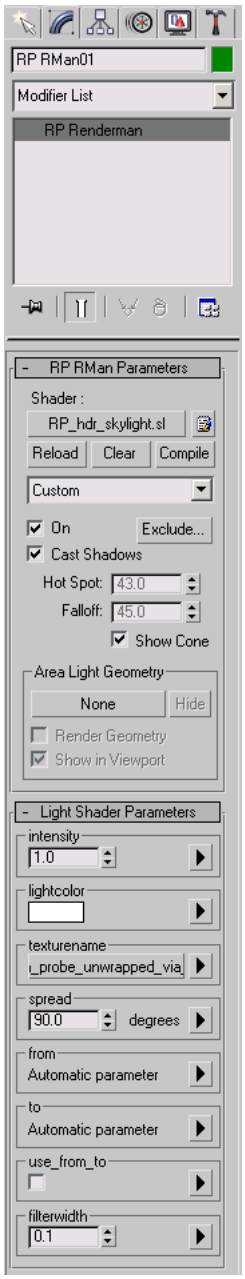
There are several RenderMan shaders in RenderPipe MAX's `example_shaders` sub-directory. This section describes the HDR skylight.

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.

The RP_hdr_skylight.sl 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.

To use the shader create a RenderPipe RenderMan light. Swap to the modifier view, then click on the 'None' button under 'Shader:' and choose RP_hdr_skylight.sl. We recommend that you leave the area light geometry for the skylight shader 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 no 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 '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.

Tip: Use a low resolution version of the HDR image in the RP HDR skylight. This will keep render time down and reduce noise. It is never necessary to use a high resolution bitmap in the RP HDR skylight.

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 spread should be set to 90 degrees (PI / 2 or 1.57). It can be set to 180 degrees (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 use_from_to is on (or non zero) then the shader gets the from and to values from the light position and target in the viewport. If use_from_to is off or set to zero then the shader ignores the from and to, instead pointing 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 filterwidth is set to zero there is no filtering. If the value of filterwidth 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.

RenderPipe for Maya – RP HDR Skylight

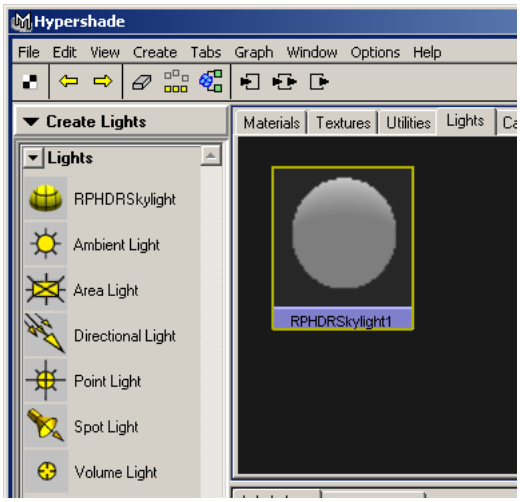
RenderPipe for Maya contains a new type of light, the RP HDR skylight. The light provides half dome lighting, typical of skylights. Light comes from all directions in the half sphere surrounding the illuminated objects.

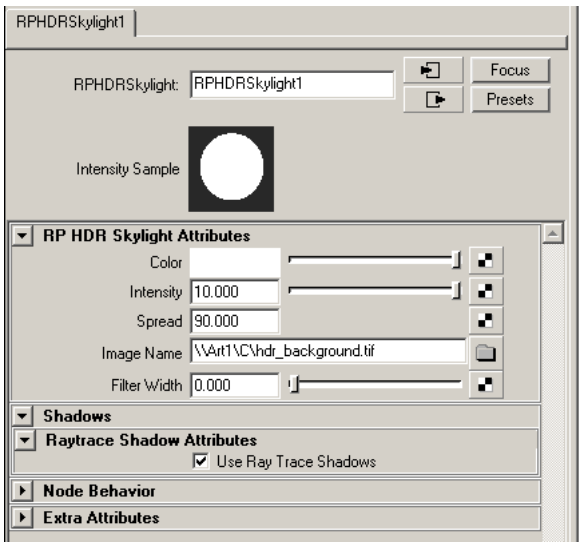
The RP HDR skylight can also be used with floating point tifs or HDR files to provide HDRI illumination. The same bitmap should be used as the background or reflection map.

Creating and Using the Light

The RP HDR skylight is created in Hypershade. There is no menu option to create this light.

The light does not appear in the viewport. The light always shines downwards and its direction cannot be changed.





The attribute editor for the RP HDR skylight gives the following controls:

Color – the light color used if there is no texture. If there is a texture, then the color multiplies the texture. Leave Color set to white to have no effect on the texture.

Intensity – a multiplier, as for any light.

Spread – this is the cone angle used by the light, measured in degrees. The default of 90 degrees give a whole half dome. Spread can be set to 180 degrees 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.

Image Name – if you want the light to be colored by a bitmap, choose the bitmap using the button or type its name in the text field. The bitmap is treated as a spherical projection, using the default positioning if Y is the up axis.

Filter Width – controls the filter size used with the bitmap. If filterwidth is set to zero there is no filtering. If the value of filterwidth 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.

Use Ray Trace Shadows – controls whether the light casts shadows.

Other Notes

Maya contains limited support for plugin lights so there are a few restrictions on the RP HDR Skylight:

- The RP HDR Skylight can be selected in Hypershade, Multilister and Outliner. The light will not appear in the scene DAG, so will not appear in Hypergraph.

- The RP HDR skylight is always part of the Default Light Set. The RP HDR Skylight is not subject to light linking so affects all objects in the scene. If it is connected to other light sets it will be ignored.
- When you create the RP HDR Skylight, you will see an error message in the script editor saying ‘Error: No object matches name:’. This message can be ignored. Alias have acknowledged this is a bug in the script others/renderCreateNode.mel. Changing line 306 from select $node to if(`size ($node)` > 0) select $node; suppresses the error.

Tip: Use a low resolution version of the HDR image in the RP HDR skylight. This will keep render times down and reduce noise. It is never necessary to use a high resolution bitmap in the RP HDR skylight.

Matching the Background or Reflection Map to the Light

If you are using a bitmap in the RP HDR Skylight, you probably need the same bitmap to be used as a background image or reflection map. The light treats the bitmap as a spherical projection.

To use the same bitmap as a background or reflection map and match it to the light:

1. Surround the scene by a large sphere
2. In the sphere’s ‘Render Stats’ rollout, switch off ‘Casts Shadows’. If you want the sphere to only be used as reflection map, also switch off ‘Primary Visibility’.
3. Apply a Surface Shader material to the sphere
4. In the Attribute Editor, click on the button at the right end of the Surface Shaders’s Out Color line to display the Create Render Node panel.
5. On the Create Render Node panel, set the 2D Textures mode to ‘As Projection’, then choose ‘File’. This creates a network consisting of a File node, a Projection node, a Place 2D node and a Place 3D node.
6. In the Projection node, set the ‘Proj Type’ to ‘Spherical’
7. In the File node choose the bitmap
8. If you have chosen the Z axis as your up axis (in Preferences > Settings) then in the Place 3D node set the X rotation value to 90.

RenderPipe MAX Compatibility Guide

This section of the release notes is about RenderPipe MAX, the plug-in for 3d studio max / VIZ. It contains details of compatibility with 3d studio max / VIZ. It also details the most useful RenderMan shaders provided with RenderPipe.

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.

RP HDR Skylight shader

`RP_hdr_skylight.sl` is a skylight 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.

Tip: Use a low resolution version of the HDR image in the RP HDR skylight. This will keep render time down and reduce noise. It is never necessary to use a high resolution bitmap in the RP HDR skylight.

To use the shader create a RenderPipe RenderMan light. Swap to the modifier view, then click on the 'None' button under 'Shader:' and choose the `RP_hdr_skylight.sl` file. 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 (PI / 2 or 1.57). It can be set to 180 degrees (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 2.9 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.

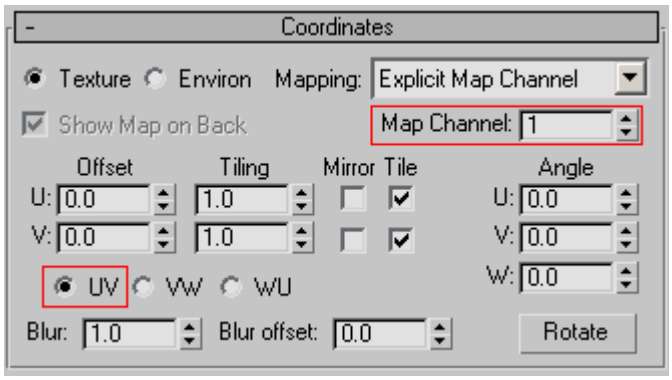
All terminology corresponds to that used by 3dsmax and VIZ. Where max is referred to, the same applies to VIZ.

Geometry Capacity

The number of faces that PURE and RenderDrive can render 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 yield 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 automatically combine very small faces into larger faces, effectively increasing the number of faces that can be rendered.

The capacity of 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 an 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 use 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 many 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

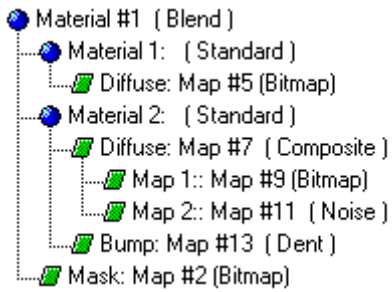
On any one material and its maps only 5 extra UVW or WorldXYZ mapping coordinate channels may be used at once. UVW1 and Vertex Color do not count towards this total.

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.



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.

Rendering

The Radiosity advanced lighting option is supported. The solution is calculated by 3dsmax and 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 is not supported by RenderPipe.

The Super Black render option is not supported.

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 RPDetail 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 30.
- 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.

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.

RenderPipe Lens Effects

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 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.

Advanced Lighting – Radiosity

Radiosity in 3dsmax R5 / VIZ R4 and later 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 drawback 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 RPMax.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-tesselation 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.

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.

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.

The Exposure Control rollout is not supported – use the Exposure Gain control on the RenderPipe rollout on the Render Panel instead.

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

RenderPipe supports Video Post. You can edit the video post specific render options by clicking on the Render Options button in scene events.

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 for 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

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.

RPC (RealPeople, RealTrees)

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.

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.

Region Net Render

In 3ds max 6 and later, Region Net Render is an option built into the Network Job Assignment panel – it is enabled by switching on the ‘Split Scan Lines’ option. In 3dsmax 5 and earlier, Region Net Render is a rendering MAX script.

Region Net Render allows an image to be split into parts, then renders each part using the network renderer / backburner, before finally stitching the resulting parts together.

Normally it is not appropriate to use Region Net Render with PURE and RenderDrive. If you have multiple RenderDrive and PURE cards, it is better to use frame splitting direct from the render panel. However, in the following cases Region Net Render can be useful:

- You have an unreliable network
- You want to benefit from the network renderer’s queuing and scheduling
- You are rendering an extremely high resolution image

Region Net Render has been tested with 3ds max 5 and 6 and RenderPipe. The script has not been tested with other versions of max and VIZ but should work as well.

For more information on Region Net Render see the 3ds max user documentation. For information about using RenderPipe MAX with the network renderer, see page 14-2 of the PURE manual or page 16-2 of the RenderDrive manual.

Note you should not use RenderPipe lens effects with Region Net Render – lens effects only work on complete images.

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.

Known Problems in Version 2.9 of RenderPipe MAX

This section lists problems that you may encounter with version 2.9 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 in 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.
- 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 / 7 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’.

RenderPipe for Maya Compatibility Guide

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

RenderPipe NURBS Tessellation Controls

To control NURBS tessellation in Maya 5 and later there is a RenderPipe specific ‘Set NURBS Tessellation’ panel. To access this panel run this MEL command:

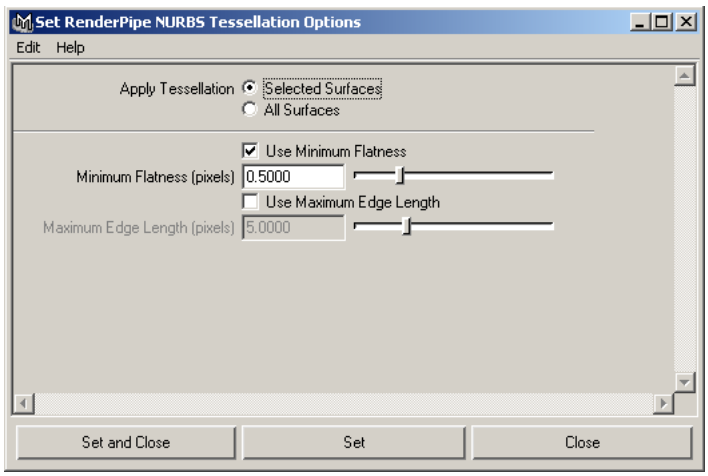
```
performRenderPipeTessellationSetup 1;
```

For convenience you may wish to add a shelf button to execute this command – select the command text including the semi colon and drag it on to the shelf.

(In Maya 5.0 the render menu’s ‘Set NURBS tessellation’ item accessed this panel – unfortunately Alias changed this for Maya 5.0.1 and 6.)

The RenderPipe NURBS Tessellation panel gives graphical control over flatness and edgelength. 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 edgelength slide runs in the range 0.1 to 50, default 5, and is disabled in the factory defaults.

Tip: To apply the previous tesselation settings without showing the panel, make a shelf button for the command: ‘performRenderPipeTessellationSetup 0;’

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

All types of built-in lights are supported. These are:

- AmbientLight
- AreaLight
- DirectionalLight
- PointLight
- SpotLight
- Volume Light

Additionally RenderPipe provides a new type of light, the RP HDR Skylight, see ‘RenderPipe for Maya – RP HDR Skylight’ on page 21.

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.

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

Most types of geometry are supported.

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 37 for more information.

Sub-division surfaces are not supported

Particles are partially supported

Reference Scenes are supported.

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 – some types of particle, detailed below, are rendered 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 practices 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).

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:

- 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 (i.e. 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
Materials	Anisotropic Blinn Lambert Ramp Shader RP Glass RP Metallic Shiny RP Mirror	PhongE Phong Surface Shader useBackground RP Mirror RP SSI	LayeredShader	Fluid Shape Ocean Shader shadingMap
2D Textures	Bulge Checker Cloth File	Fractal Grid Mountain Ramp Water	Noise	Fluid texture 2D Movie Ocean
3D Textures	Brownian Cloud Crater Granite Leather Marble	Rock Snow Solid Fractal Stucco Wood	Volume Noise	Fluid texture 3D
Layered	Layered texture			
Environment	envBall envCube envSphere			envChrome envSky
Utilities – Color	blendColors clamp contrast gammaCorrect hsvToRgb	luminance remapColor remapHsv rgbToHsv remapValue		surfaceLuminance
Utilities – general	bump2d bump3d condition multiplyDivide place2dTexture place3dTexture plusMinusAverage	projection reverse samplerInfo setRange stencil uvChooser vectorProduct		arrayMapper clear coat height lightInfo
Utilities – particles	particleSamplerInfo			
Utilities – Post-process	RenderPipe lensFX			opticalFX
Utilities – Switch	Single switch Double Switch	Triple Switch Quad Switch		
Volumetrics			envFog lightFog	particleCloud volumeShader volumeFog

Materials

Anisotropic, blinn, lambert, layered shader, phong, phongE, ramp, surface and use background shaders 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 or Shading Map materials.

Reflected color is ignored.

RenderPipe adds five new materials, RPGlass, RP Metallic Shiny, 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. Material node outputs 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.

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

Env Ball, Env Cube and Env Sphere are supported. Env Chrome and EnvSky are not supported.

Utilities – Color

All are supported (blendColors, clamp, contrast, gammaCorrect, hsvToRgb, luminance, remapColor, remapHsv, remapValue 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).

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.

Escape Key

Use of the Escape key may terminate 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).

Alias eliminated this problem in Maya 5.0.