Release Notes

RenderDrive Software v2.9, RenderPipe MAX v2.6 and RenderPipe for Maya v1.4

Updated 5th June 2003

These are the release notes accompanying version 2.9 of the RenderDrive software and RenderPipe RIB, version 1.4 of RenderPipe for Maya and version 2.6 of RenderPipe MAX. These release notes:

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

For upgrade instructions from previous releases read:

- 'Installing the RenderDrive Software' on page 7.
- 'Installing RenderPipe for Maya' on page 16.
- 'Installing the RenderPipe MAX Plug-in' on page 31.

The release notes are split into these chapters:

Contacting ART VPS

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

- Send e-mail to ‘support@artvps.com’.
- Phone us on +44 1223 424466 (or from the USA toll-free on +1 866 893 7025).
- 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.

Release Contents

This release contains the following software versions:

- RenderDrive software version 2.9
- RenderPipe for Maya version 1.4
- RenderPipe MAX version 2.6
- RenderPipe MAX Shaders version 2.6
- RenderPipe RIB version 2.9

PURE, RenderDrive and RenderPipe

ART VPS has two rendering products, PURE and RenderDrive.

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

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

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

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

Installation

There are three stages to installation.

1. Install the RenderDrive.
   The User Manual contains instructions for this.
2. Install or upgrade the RenderDrive software..
   Installation of the RenderDrive software is explained in ‘Installing the RenderDrive Software’ on page 7 of these release notes.
3. Install or upgrade the RenderPipe plug-in being used.
   See ‘Installing RenderPipe for Maya’ on page 16 of these release notes or ‘Installing the RenderPipe MAX Plug-in’ on page 31.

RenderPipe Compatibility

RenderPipe RIB and RenderDrive Software Development Kit (SDK)

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

RenderPipe MAX

RenderPipe MAX is compatible with releases R3.*, R4.* and R5.* of 3d studio max, and with releases R3, R3i and R4 of Autodesk VIZ.

RenderPipe for Maya

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

CD Contents

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

- `Acrobat_install`
- `Documents`
- `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 `rp505enu.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-506.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 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:

```
renderdrive_release_notes.pdf
```

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

```
getting_started_RD2000.doc
getting_started_RD3000_and_RD5000.doc
```

This is the RenderDrive user manual in PDF format.

```
RenderDrive_user_manual_v2.9.pdf
```

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

```
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
```

RenderCoat

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

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

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

RenderPipe_for_Maya

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

RenderPipe_MAX

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

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

RenderPipe_RIB

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

RD2000_Software, RD3000_Software and RD5000_Software

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

RenderDrive

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

Installing the RenderDrive Software

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

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

The five new files to be installed are:

- *rd5000-2.9-3* – the rendering software.
- *rd5000-slc-2.9-3* – the shading language compiler.
- *rpmax-shaders-2.6-0* – the shaders used by the RenderPipe MAX plug-in.
- *rd5000-asm-2.9-1* – the assembler required to use shaders
- *rd5000-ui-2.9-1* – the web interface server

The first part of the filename indicates the RenderDrive model and what the file does. The first number, e.g. 2.9, is the software version number. The final number, e.g. 1, is the build number.

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

To install the files:

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

- List the files already installed using the `ls` command:
  `ls`
- Delete the files that are to be replaced using the `del` command. e.g.:
  ```
  del rd5000-2.8-1
  del rd5000-asm-2.8-1
  del rd5000-slc-2.8-1
  del rd5000-ui-2.8-1
  del rpmax-shaders-2.5-1
  ```
- There should not be a file called '`reboot`' in the listing. If there is, delete it:
  `del reboot`
- **Set the transfer mode to binary, using the `bin` command:**
  `bin`
- ftp the new files in their place using the `put` command. Be sure to install the correct version of each files, taking into account the RenderDrive's model number. E.g.:
  ```
  put rd5000-2.9-3
  put rd5000-slc-2.9-3
  put rd5000-asm-2.9-1
  put rd5000-ui-2.9-1
  put rpmax-shaders-2.6-0
  ```
- Enter the command below. It is very important that the RenderDrive does not reboot while this command is running, and that the commands are entered in the correct order.
  `quote site exec upgrade`
- Enter the command:
  `quote site exec reboot`
- Leave ftp by entering the command:
  `quit`
- RD3000, RD3500 and RD5000 RenderDrives will start to reboot immediately. RD2000 RenderDrives will start to reboot within a minute and will be ready to use a few minutes later. The reboot takes a few minutes.
- To see when the RenderDrive is ready to use, run a continuous ping on it, e.g.:
  `ping -t 192.0.1.200`
  To stop the pinging, press `Ctrl-C`.

  On Linux & Irix, the `-t` is not required, e.g.: `ping 192.0.1.200`
  On Irix you may need to use the full path for ping, e.g.: `/usr/etc/ping 192.0.1.200`

Important Notes

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

Changes in the RenderDrive Software

These are the changes in version 2.9 of the RenderDrive software compared to version 2.8:

Frame Splitting – Rendering a Single Frame using Multiple Devices

It is now possible render single frames using more than one rendering device. This is documented in detail in the RenderPipe MAX and RenderPipe for Maya sections of these notes.

Performance Enhancements

The memory requirements for some types of geometry have been reduced. This results in increased polygon capacity and faster rendering. The types of geometry that benefit depend on the exact structure of the geometry. Typically NURBS that have been mirrored or have negative scale will benefit, as will polygonal objects in general.

Shading Language Compiler

The shading language compiler has been further improved. It compiles shaders faster, using less memory. For most shaders it produces smaller compiled shaders that run faster.

The mechanism for handling long parameter lists has been improved. This has two advantages. It allows the use of shaders with longer parameter lists than was possible before and shaders with long parameter lists are handled more efficiently.

The functions `max`, `min` and `clamp` are now available for colors and points, as well as floats.

Compound assignments such as `+=` and `*=` may now be used with array elements.

The function `cellnoise` is now supported. (This function was introduced in version 3.2 of the RenderMan specification.)

RenderMan 3.2 or C++ style variable declaration is now supported. It is no longer necessary to declare variables at the start of a function or shader, they can be declared elsewhere. They must be declared before they are first used and within scope of where they are used.

The `raylevel` function, introduced by BMRT, is now supported. It returns the depth of the currently shaded ray in the recursive raytracing tree. For eye rays this is 0.

Small changes and bug fixes

- Rarely a render would stop with a warning ‘Couldn't open mipmap file’. This has been fixed. If a problem with a bitmap prevents it being processed a new message ‘Regeneration of mipmap file failed’ may appear. If this message is seen then see appendix B of the new user manual for advice.
- Progress now advances more smoothly. Progress is reported by the progress bar in RenderPipe MAX and the percentage figure in RenderPipe for Maya and RenderPipe RIB.
- A rarely encountered problem in version 1.3 was that particularly complex NURBS could be omitted from a render without warning. This problem has been fixed. RenderDrive takes at most 450 samples in each of the u and v directions of a NURBS surface, unless there are sharp creases in the parameterization, in which case it inserts additional points either side of the crease.
- The maximum number of nested attribute states that is supported is now 1024, previously it was 64. When the maximum depth is exceeded a fatal error message ‘No space in attribute stack’ will be given. If you encounter this message when using RenderPipe for Maya then simplify the parenting hierarchy. This message will not be seen in RenderPipe MAX.
- Lens effects are now applied when region rendering. However, they do not take account of flares produced by bright pixels outside the region being rendered, so cannot be relied on as an indication of the lens effect in the render of the whole image.

RenderPipe for Maya

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

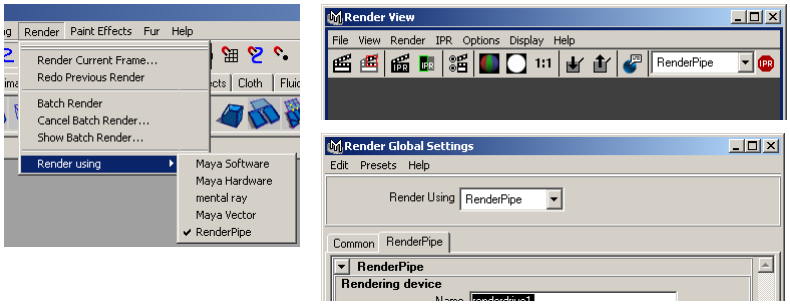
Changes in Version 1.4 of RenderPipe for Maya

Maya 5.0

Maya 5.0 is supported. Alias | Wavefront have updated Maya's interface to support third-party renderers, so the interface for RenderPipe is far more integrated.

In Maya 5.0 there are three locations from which you can tell Maya to use RenderPipe.

- One method is in the Render menu, using the 'Render using' sub-menu – choose the RenderPipe option.
- The second method is using the drop-down list at the top of the Render Globals panel
- The third method is using the drop-down list at the top of the Render View.



Once you have chosen RenderPipe as your renderer, you can use the 'Render Current Frame' and 'Redo Previous Render' options in the Render menu, both of which will use RenderPipe.

Similarly, the render buttons and menu options on the Render View will also use RenderPipe. The IPR Render controls are disabled when RenderPipe is the current renderer.

To render sequences of images, either use:

- the batch renderer. If you use Batch Render menu item in Maya 5 it is not necessary to switch on the 'Override Batch Renderer' and 'Save in Scene' switches on the RenderPipe section of Render Globals.
- the Mel 'RenderPipe' command.

Frame Splitting

RenderPipe for Maya can now render a single frame using more than one rendering device.

If you are rendering a single frame, and have selected more than one rendering device in Render Globals, then RenderPipe will split the frame into pieces and distribute it between the selected devices. For example, if you have selected 5 devices, the frame will be split into 5 parts and each selected device will render one part.

If you are rendering more than one frame and select multiple devices, the frames will be distributed to the selected rendering devices as in previous releases.

It is good practice to turn 'Progressive Update' off to cut down on network traffic when rendering to multi-devices (especially if one of your devices is a PURE card).

Note: Field renders, multi-camera renders and scenes containing Use Background nodes will only render on the first device specified.

Note: It is not possible to use RenderPipe Camera lens effects when frame splitting. The lens effect calculation requires a complete image.

Speed Ratio Specifier

When splitting a frame RenderPipe divides the work according to the speed of the selected devices. RenderPipe assumes that each device has a default speed of 1.0, except for PURE which is treated as having a speed of 0.75.

It is possible to tell RenderPipe that the device has a different speed by adding a qualifier to the host name or IP address. This takes the form <hostname|ip_address>%<speed>., for example: `renderdrive%2.0`

Speed can be one of the named presets or a number. The following presets are available:

Preset	Value
P1800	0.75
RD5000	2.0
RD3500	1.0
RD3000	1.0
RD2000	0.4

These are valid examples:

- `renderdrive1%RD5000`
- `192.168.1.25%RD2000`
- `renderdrive%2.6`
- `myhostname%P1800`

'`PURE`' with no qualifier is treated as '`PURE%P1800`'. However, if the PURE card is in a different machine to the one running Maya the P1800 specifier is needed. From a hostname or IP address alone it is not possible to tell the difference between a RenderDrive and a PURE card in a different computer.

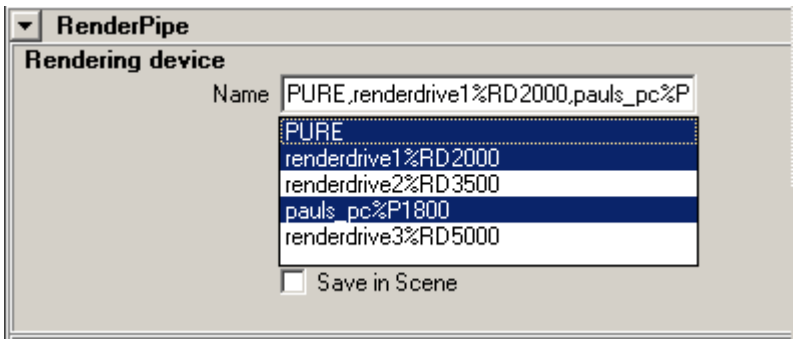
Tip: If you are using a single device or your devices are all identical types and models, then there is no need to use the speed ratio specifier.

Tip: If you have a mix of device types, either different models of RenderDrive or a mix of RenderDrives and PURE cards, use the speed ratio specifier to give a balanced distribution of work.

How is the frame split? For example, you render a frame using two RD5000s and one RD3000. The RD5000s have a speed ratio specifier of 2.0 and the RD3000 has a speed ratio specifier of 1.0. The total of the speed ratio specifiers for the selected devices is 5.0. RenderPipe will split the frame so that each RD5000 renders 40% of the image (2 / 5) and the RD3000 renders the remaining 20% (1 / 5).

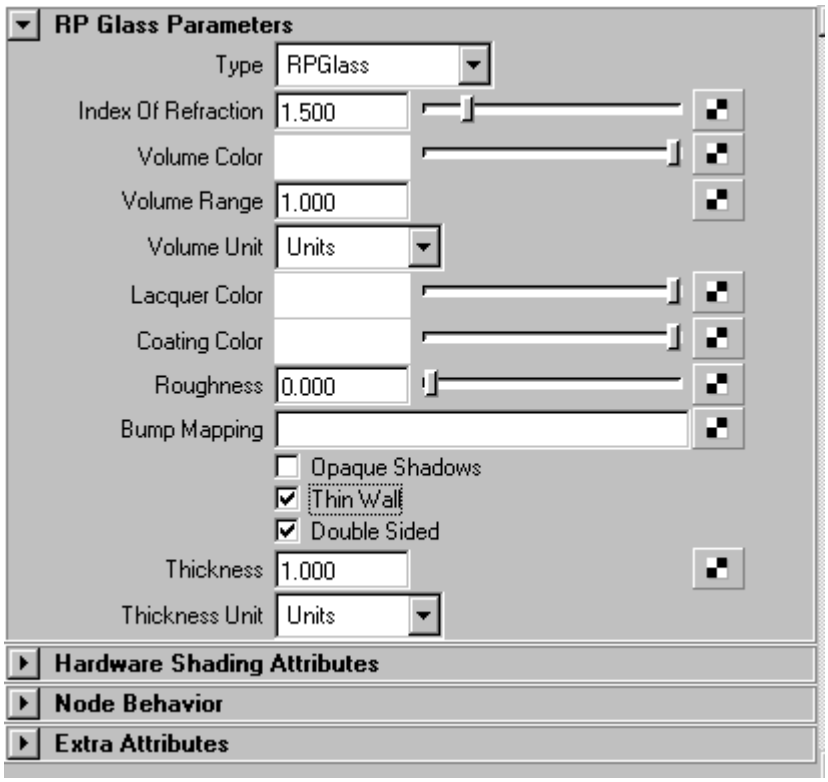
If you specify a speed qualifier that is not valid, RenderPipe will warn 'Invalid speed ratio specifier'.

In the screen grab below, a local PURE card, an RD2000 and a PURE card in a different computer are selected. An RD3500 and an RD5000 are not selected.



RenderPipe Glass – Sheet Controls

RP Glass now has additional controls allowing thin, sheet, or plate glass to be accurately reproduced. The controls are the same as those in RenderPipe MAX.



Thin Wall – when this is switched on, the geometry the glass is applied to is treated as being made of a thin sheet of glass, so is hollow. The material will not be refractive. When Thin Wall is switched off, the object is treated as being solid glass and is refractive.

Double Sided – this switch is only enabled when Thin Wall is switched on. When it is switched on the sheet glass is coated and lacquered on its inside as well as its outside.

Thickness – specifies the thickness of the sheet glass. It is only available when Thin Wall is switched on.

Units – specifies the units that the thickness of the sheet glass is measured in. When set to ‘Units’ the scene’s default units are used.

Speed and Memory Improvements

There have been several performance improvements. The level of benefit is scene and geometry dependent.

Memory usage has been generally reduced, which has the additional benefits of improving speed and increasing capacity.

The shading language compiler is now faster and uses less memory. The compiled shaders it produces are smaller and run faster.

Rendered image read back is now faster in virtually all cases.

Texture Warps

Texture Warp handling has been improved, so it can handle bad texture coordinates at singularities.

Note: Texture Warp slows down geometry export and is inefficient – the Maya documentation advises against using it unnecessarily.

Tessellation Controls

Control of tessellation and de-tessellation has been improved with the extension of the global Detail control and the addition of optional object-level controls.

Overview

There are 3 parameters that control tessellation and de-tessellation.

Pixels – this controls de-tessellation and is set by the Detail control in the RenderPipe section of Render Globals. It is used by RenderDrive to control the removal of small triangles from polygon meshes. If a triangle is smaller in area than this value, then RenderDrive attempt to combine it with other triangles, as long as the result is still smaller in area than this value. If set to 0.0 then no de-tesselation is attempted.

Flatness – this controls tessellation in NURBS (and in the future in other geometric primitives). It specifies the maximum chordal deviation. It is measured in pixels so automatically takes account of resolution and object position. The smaller its value the closer the match between the tessellated mesh and its NURBS, but the more polygons will be required.

EdgeLength – specifies the maximum edge length of a triangle in the tessellated NURBS and is measured in object space. It is not normally the appropriate control to use, but it can be useful if the camera is highly zoomed in.

Detail Control

In previous releases the Detail value in the RenderPipe section of Render Globals set only the Pixels control, which controls de-tessellation.

Detail is now used additionally as a global control of Flatness, thus controlling the smoothness of NURBS tessellation within a scene. For this purpose the minimum value used is 0.1 – if Detail is set to a value less than 0.1, RenderPipe will treat Flatness as 0.1.

The Detail control continues to control the Pixels value for de-tessellation.

Object-level Controls

Each of the three tessellation and de-tessellation controls are now available as attributes for individual objects. The attributes are created and set using the MEL command line, as there is no user interface to them.

The attributes are called rpGeometryPixels, rpGeometryFlatness and rpGeometryEdgeLength.

Both Flatness and EdgeLength are clamped to be greater than 0.1 when rendered, so if you set a value less than 0.1, a value of 0.1 will be used instead.

To use one of these attributes you must first add the attribute to the object, then set its value. The following six lines add all 3 attributes to the object nurbsSphereShape1 then set the value of each:

```
addAttr -ln "rpGeometryPixels" -at "float" nurbsSphereShape1
addAttr -ln "rpGeometryFlatness" -at "float" nurbsSphereShape1
addAttr -ln "rpGeometryEdgeLength" -at "float" nurbsSphereShape1
setAttr nurbsSphereShape1.rpGeometryPixels 0.5
setAttr nurbsSphereShape1.rpGeometryEdgeLength 0.6
setAttr nurbsSphereShape1.rpGeometryFlatness 0.05
```

The attributes can actually be added to any DAG node, so for example you can add the attributes to a group node and affect all the objects contained in that group (except of course those that have had their own attributes added).

Other Changes

The ‘name#.ext’ output image name-format, introduced in Maya 4.0, is now supported

Partial support for the Noise and Volume Noise nodes has been added. Both are rendered as if they were Fractal and Solid Fractal, respectively. Only the ‘Perlin Noise’ type is supported.

The File and Movie node’s outTransparency attribute, introduced in Maya 4.0, is now supported.

The Fractal texture’s Time Ratio, Bias, Frequency Ratio and Inflection parameters are now supported.

Installing RenderPipe for Maya

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

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

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

Installation consists of two simple steps:

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

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

The following sections explain the install procedure in detail.

Installing RenderPipe for Maya on Windows

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

If you have used RenderPipe for Maya before, please see 'Removing Old Releases of RenderPipe for Maya' on page 18 for instructions on uninstalling the old version of RenderPipe.

Installing a module is a simple 3 step process:

1. Copy the '`RPMaya_Windows_Module`' directory from the '`RenderPipe_for_Maya`' directory on the 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 the central Maya modules directory for your version of Maya. For Maya 5.0 it is:
   `C:\AW\Modules\maya\5.0`

   For other versions of Maya replace the 5.0 by 3.0, 4.0 or 4.5.

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

3. Copy the appropriate '`RenderPipe`*`version`*`.mod`' file, where *`version`* is either `3`, `4`, `45` or `5` depending on your version of Maya, from the '`C:\RPMaya_Windows_Module`' directory into the modules directory located in step 2.

   For Maya 5.0 the directory is `C:\AW\Modules\maya\5.0`

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

Note: If you use Muster or Smedge, use 'Alternative Method for Installation' on page 18 instead.

Personal Maya Application Directory

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

On Windows 2000 and XP your personal Maya application directory is usually `C:\Documents and Settings\`*`username`*`\My Documents\maya` (where you replace *`username`* by your user name).

On Windows NT it is usually `C:\Winnt\Profiles\`*`username`*`\maya`.

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

Installing RenderPipe for Maya on Irix

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

If you have used RenderPipe for Maya before, please see 'Removing Old Releases of RenderPipe for Maya' on page 18 for instructions on uninstalling the old version of RenderPipe.

Installing a module is a simple 3 step process:

1. Copy the '`RPMaya_Irix_Module`' directory from the '`RenderPipe_for_Maya`' directory on the RenderDrive CD to the root of your disk (i.e. /).

   If you downloaded RenderPipe from the web site, the directory will be provided as a .tar.gz file – the instructions for unpacking this are in 'Gzipped Release' on page 17.

2. Go to the central Maya modules directory for your version of Maya. For Maya 5.0 it is:
   `/usr/aw/modules/maya/5.0`

   For other versions of Maya replace the 5.0 by 3.0, 4.0 or 4.5.

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

3. Copy the appropriate '`RenderPipe`*`version`*`.mod`' file, where *`version`* is either `3`, `4`, `45` or `5` depending on your version of Maya, from the '`/RPMaya_Irix_Module`' directory into the modules directory located in step 2.

   For Maya 5.0 the directory is `/usr/aw/modules/maya/5.0`

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

Note: If you use Muster or Smedge, use 'Alternative Method for Installation' on page 18 instead.

Gzipped Release

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

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

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

Then follow the instructions above to install.

Personal Maya Application Directory

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

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

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

Alternative Method for Installation

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

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

Removing Old Releases of RenderPipe for Maya

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

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

To clear up both types of install:

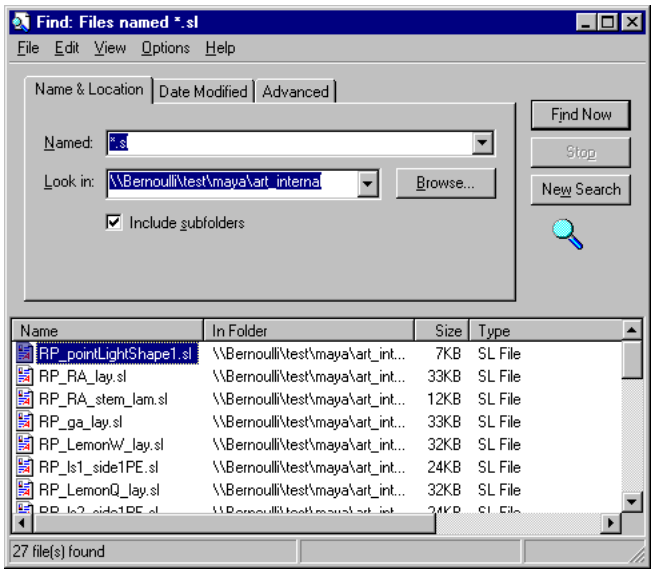
- Go to your Maya install directory. On Windows in Maya 3.0 or 4.0 this defaults to `C:\AW\Maya3.0` or `4.0` and in Maya 4.5 it defaults to `C:\Program Files\AliasWavefront\Maya4.5`. On Irix it defaults to `/usr/aw/Maya3.0`, `4.0` or `4.5`.
- If there are any directories called `rpmaya3`, `rpmaya4`,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

Removing Out of Date .SL Files

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

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

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



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

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

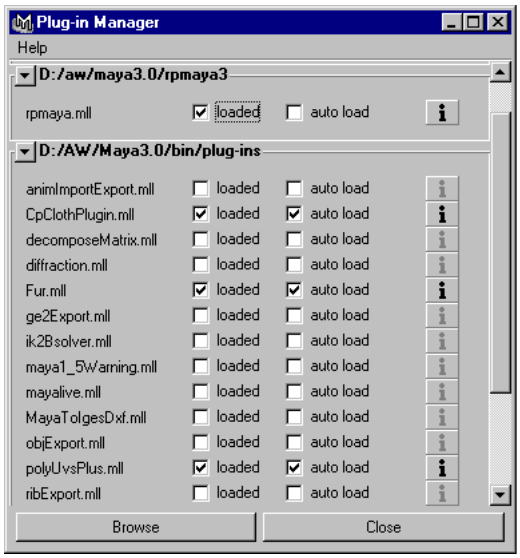
Loading RenderPipe for Maya

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

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

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

Maya’s Plug in Manager



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. 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.

For 2D motion blur, the proportion of motion used between the current frame and the next frame is given by:

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

For 3D motion blur, 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.

Lights

Summary

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

- AmbientLight
- AreaLight
- DirectionalLight
- PointLight
- SpotLight

Details

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

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

Light Glow (in Light Effects) is not supported

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

Light linking is supported.

‘Emit Specular’ and ‘Emit Diffuse’ are not supported.

Ambient Lights

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

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 RenderDrive ray traces all shadows.

Geometry

Summary

Most types of geometry are supported.

Motion blur is supported.

The following geometry related items are not supported:

- Sub-division surfaces
- Particles

Details

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

Motion blur is supported and is three step – see 'Motion Blur' on page 21 for more information.

NURBS

Fully supported, including trim curves. Most of the Maya tessellation attributes are ignored, see 'Tessellation Controls' on page 14 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

Particles are not currently supported.

Some types of particle systems will be output, but will not be rendered correctly. For these, radius is used instead of 'Point Size' to control the size of particles of type Point. (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.) For particles of type Streak, RenderPipe uses radius or radiusPP instead of Line Width.

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

Reference Scenes

Fully supported.

Texture Reference Objects

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

Render Globals

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 (not applicable)

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
- Motion Blur – Supported
- Primary visibility – Supported
- Smooth Shading – Not supported
- Visible in Reflections / Visible in Refractions – Both supported. As 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 RenderPipe Glass RenderPipe Mirror RenderPipe Shiny	PhongE Phong Surface Shader useBackground	LayeredShader	Fluid Shape Ocean Shader Ramp 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 envChrome envCube envSky envSphere
Utilities – Color	blendColors clamp contrast gammaCorrect	hsvToRgb luminance rgbToHsv		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 and surface shader are all supported and most are a good match to Maya.

Anisotropic does not match Maya but produces a good result.

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

Reflected color is ignored.

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

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

Layered Shader

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

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

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

Textures – General Notes

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

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

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

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

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

2D Textures

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

File Texture

The file types supported are the types supported by 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. Prefiltering is not supported.

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

3D Textures

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

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

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

Textures – other

Layered texture is supported.

Textures – environment

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

Utilities – Color

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

Utilities – General

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

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

There are some restrictions, detailed below.

SamplerInfo

Values of tangentUCamera and tangentVCamera may be incorrect.

Projection

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

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

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

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

Utilities – Post Process

The opticalFX node is not supported. We recommend you use RenderPipe's lensFX node instead (described 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 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 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 RenderDrive trace light rays. The default value used by RenderDrive is much higher than that used by Maya.
- Reduce the size of any area lights in the scene
- Reduce the number of area lights in the scene
- Reduce the number of reflective or refractive surfaces. Pay particular attention to overly complex transparent objects, be careful to avoid surfaces which intersect each other.

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

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

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

Escape Key

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

Fog

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

Mental Ray and Maya 4.5

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

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

Transparency connections from File and Move nodes

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

RenderPipe MAX

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

Installing the RenderPipe MAX Plug-in

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

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

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

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

Plug-in search paths

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

Requirements

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

Examples directory

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

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

Scripts directory

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

iesconv.ms

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

rplighter.ms

This script can be used to convert all the 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.

index_of_refraction.ms

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

Customizing the User Interface

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

Installation

The optional user interface files are located in the `RenderPipe_MAX\max3\ui` (or max4 or max5) directory of your release. To install them, drag the `ui` directory from the `RenderPipe_MAX\max3` (or max4 or max5) 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.

(The macro_lightlist.mcr file is only provided with max4 and max5. 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 for instructions on adding buttons to the interface.

Changes in RenderPipe MAX version 2.6

These are the changes that are specific to RenderPipe MAX version 2.6, compared to the previous release, version 2.5:

Advanced lighting – Radiosity

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

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 now 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 artefacts eliminated

The triangular artefacts sometimes seen on bump mapped surfaces have been eliminated.

For surfaces with bump mapped materials, RenderPipe now 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.

It is possible that this change can cause a degradation in some old scenes; the uv components of UVW channel 1 may be worse for interpolation than no co-ordinates at all. The change can be globally disabled for all scenes by adding the line 'betterBumps=0' in the '[RenderDrive]' section of the rpmax.ini file.

Frame Splitting

RenderPipe MAX can now render a single frame using more than one rendering device.

If you are rendering a single frame and have selected more than one rendering device on the Render Panel then RenderPipe will split the frame into pieces and distribute it between the selected devices. For example, if you have selected 5 devices, the frame will be split into 5 parts and each part will be rendered on one of the selected devices.

Video post, network rendering and other renders which have not previously allowed multi-device rendering now will also split the frame and render it using more than one device.

It is good practice to turn 'Progressive Update' off to cut down on network traffic when rendering to multi-devices (especially if one of your devices is a PURE card).

Performing a render which does already support multi-device use but which doesn't have enough work for all the devices will still behave as before. For example a single-frame field render with three devices specified will use only two of them.

Note: It is not possible to use RenderPipe Camera lens effects when frame splitting. The lens effect calculation requires a complete image.

Speed Ratio Specifier

When splitting a frame RenderPipe divides the work according to the speed of the selected devices. RenderPipe assumes that each device has a default speed of 1.0, except for PURE which is treated as having a speed of 0.75.

It is possible to tell RenderPipe the device has a different speed by adding a qualifier to the host name or IP address. This takes the form <hostname|ip_address>%<speed>., for example: `renderdrive%2.0`

Speed can be one of the named presets or a number. The following presets are available:

Preset	Value
P1800	0.75
RD5000	2.0
RD3500	1.0
RD3000	1.0
RD2000	0.4

These are valid examples:

- `renderdrive1%RD5000`
- `192.100.100.25%RD2000`
- `renderdrive%2.6`
- `myhostname%P1800`

'`PURE`' with no qualifier is treated as '`PURE%P1800`'. However, if the PURE card is in a different machine to the one running 3dsmax the P1800 specifier is needed. From a hostname or IP address alone it is not possible to tell the difference between a RenderDrive and a PURE card in a different computer.

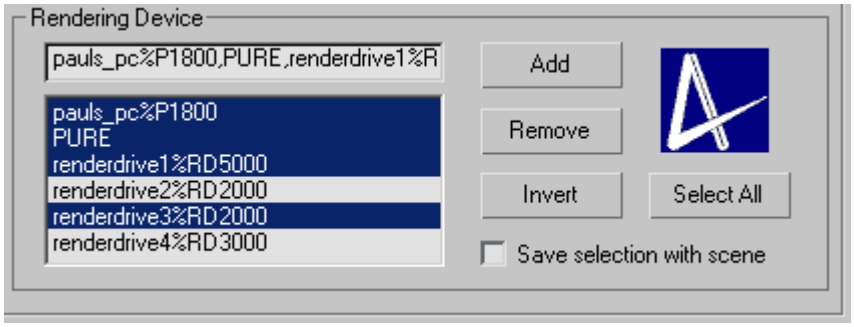
Tip: If you are using a single device, or your devices are identical types and models, then there is no need to use the speed ratio specifier.

Tip: If you have a mix of device types, either different models of RenderDrive or a mix of RenderDrives and PURE cards, use the speed ratio specifier to give a balanced distribution of work. If your devices are all the same type, there is no need to use the qualifier.

How is the frame split? For example, you render a frame using two RD5000s and one RD3000. The RD5000s have a speed ratio specifier of 2.0 and the RD3000 has a speed ratio specifier of 1.0. The total of the speed ratio specifiers for your selected devices is 5.0. RenderPipe will split the frame so that each RD5000 renders 40% of the image (2 / 5) and the RD3000 renders the remaining 20% (1 / 5).

If you specify a speed ratio specifier that is not valid, RenderPipe will warn 'Invalid speed ratio specifier'.

The picture below shows the render panel set to use a PURE card in a different computer, a local PURE card, an RD5000 and an RD2000. A second RD2000 and an RD3000 are not selected.



Scanline renders of RenderPipe Materials

The default scanline render of the RenderPipe Glass, Mirror, and Shiny materials is now a closer match to the RenderDrive render. The roughness controls and shadows from RenderPipe Glass are not supported. This only applies to 3dsmax R5 and VIZ R4.

The 3dsmax R3 / R4 and VIZ R3 scanline renders of RenderPipe materials have not changed and are not a close match to the RenderDrive render.

Skip existing frames switch and multiple device renders

If the 'Skip existing frames' switch is on and you are rendering using multiple rendering devices, then each frame will be split across the selected devices.

If the 'Skip existing frames' switch is off, then each frame will be allocated to a single selected device and not split.

Draft and Production renderers

The selections of rendering devices in the Production and Draft renderers are now independent. For example, you could choose to use PURE from the Draft renderer and a RenderDrive from the Production renderer.

Devices added to one list are added to the other list without changing the selection. Devices removed from one list are removed from the other list.

Other changes

The Blur Effect no longer causes RenderPipe renders to stop without warning.

The plug-in 'cebas.dlu' no longer causes RenderPipe renders to stop without warning. This affected Standard materials set to use the Anisotropic, Multi-Layer, Oren-Nayar-Blinn and Strauss shading models.

In RenderPipe RenderMan shaders, the string parameter's environment mode now works.

RenderPipe will no longer warn about missing bitmaps which are not part of the active scene, for example those used by objects that have been hidden or switched off.

RenderPipe's behavior if missing maps are encountered when network rendering now matches 3dsmax's behavior. A warning is printed in the network rendering log and the network render stops, the missing map panel does not appear.

Swirl texture's 'random seed' parameter is now supported. Existing scenes may look different with this release; if backwards compatibility is required, set the 'random seed' parameter to 0.

The Shell material introduced in 3dsmax R5 is now supported.

Known Problems in Version 2.6 of RenderPipe MAX

This section lists problems that you may encounter with version 2.6 of RenderPipe MAX.

- Rarely, a render will fail with a warning like "Caught fatal mesh error" within a few seconds of starting. If this happens, deselect the selected objects and re-render.
- 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.
- Some problems in 3dsmax 4 where specific geometry causes the render to fail without warning or even cause max to exit can be solved by upgrading to 3dsmax 4.2.
- Using the Camera Options button on the RenderPipe rollout of the render panel can cause max to crash, so use the RenderPipe Camera interface instead.

RPC (RealPeople, RealTrees) – Important Notes

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

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

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

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

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

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

Geometry

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

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 typical polygon capacities for various models of RenderDrive and for PURE.

	No UVW Coordinates	**1 Set of UVW Coordinates**
PURE, 1Gb PC RAM, 1Gb PC virtual memory	5.2 million	3.3 million
RD16 / RD2000	3 million +	1.1 million
RD3000 / RD3500	12 million	5.2 million
RD5000	12 million	5.2 million

Typically scenes fall somewhere between these two limits, but if multiple sets of UVW coordinates are used the number of faces that can be rendered will be lower.

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

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

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

Materials

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

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

Standard Material

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

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

The Bump channel in the Standard material may not give quite the same effect as max, but the results are similar. If there is a difference, try adjusting the Bump amount – it can vary between -999 and +999. Bump maps which

make use of noise can be harder to match, because RenderDrive uses a noise function different from that used by max.

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

The Reflection Dimming parameters are ignored.

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

The SuperSampling rollout is ignored.

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

Matte / Shadow Material

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

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

Composite Material

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

Morpher Material

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

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

Shellac material

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

Advanced Lighting Override and Lightscape materials

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

Texture Maps

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

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.

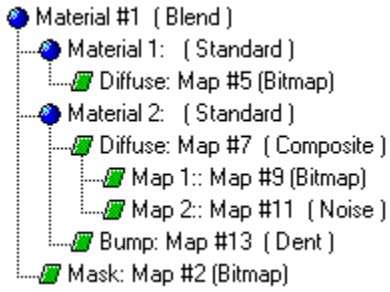
Mapping Coordinates

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.

Cameras and Rendering

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

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

The Super Black render option is not supported.

The maximum size of image to which lens effects may be applied is approximately 7 million pixels (e.g. 2500 x 2500). 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 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).

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 artefacts eliminated’ on page 33.
- To see the tessellation, add a Tessellate modifier to the object. The best solution is to remodel the object in such a way that the tessellation behaves better. The MeshSmooth modifier may also be helpful.

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

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

Render Elements are not supported.

Depth of Field / Motion Blur – 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.

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 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 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 are not supported.

Effects Panel

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

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

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

Environment Panel

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

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

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

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

Image Channels

The image channels that are supported are as follows:

- RGB
- Z / Depth
- Alpha
- Material Effects

- Object
- Unclamped Color
- Normals
- UV Coordinates

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

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

Video Post

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

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

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

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

Third-Party Plug-ins

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

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

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

- Materials

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

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

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

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

Particle Systems

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

MAXScript

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

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

The RenderPipe classes include:

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

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

Miscellaneous

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

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

RenderPipe RIB

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

Changes in this Release

Frame Splitting – Rendering a Single Frame using Multiple Devices

Frame splitting is not supported in the initial version of RenderPipe RIB. See the support area of the ART VPS web site for an update on this.

Other Changes

The filter function is now correctly written to disk by Windows netrib.

Use of CropWindow in a RIB file rendered by the Windows version of RenderPipe RIB no longer results in an image that Photoshop won't load.