RTT
challenging reality

RTT DeltaPix 1.0

User Manual

License conditions and copyright

Introduction

Overview

What is RTT DeltaPix?

Imagine: High quality, interactive, photorealistic renderings of your designs. Instantly. In real-time. No more waiting. No more complicated software packages and costly experts. With the power of RTT DeltaPix, rendering becomes a simple and important part of your creative process and work flow – from concept to marketing.

RTT DeltaPix's cutting edge technology brings renderings alive, allowing you to compose and manipulate high-resolution 3D digital images in real-time. Designs are rendered on the fly, with stunning realism and full photorealistic detail using materials, lighting, shadows and reflections that look so real, you can say goodbye to physical prototypes. What used to take a specialist hours can now be done by anyone in minutes.

How RTT DeltaPix Works

RTT DeltaPix is a fully raytraced rendering environment, by default. (You can pause or disable raytracing to speed up editing on lower power hardware, and then enable raytracing as a final step.) The software is constantly updating the scene using raytracing by taking full advantages of all available CPUs and CUDA GPUs.

Unlike traditional 3D applications, you do not need to guess and check before generating final results. In RTT DeltaPix, you interact with the final result at all times, even while animating.

A RTT DeltaPix project consists of an environment sphere that includes a transparent ground plane for accurate shadowing, and an HDR environment image that maps to the spherical environment. No further lighting setup is required, although additional sources of light are available.

Key Features

- Intuitive out of the box
- State-of-the art user interface using the latest UI development libraries:
- Toolbar with extended capabilities
- Central Asset Library makes all materials, textures, and environments accessible in one palette, with drag-and-drop functionality throughout
- Interactive WYSIWYG rendering of fully raytraced environments
- Model tree of objects and their parts supports direct interactions
- Improved camera control and view management
- Enhanced realtime interactions
- Fast import of many file formats, including the latest native CAD formats
- Enhanced creation, tuning, and assignment of scientifically accurate materials
- Always correct lighting, shadows, and reflections from HDRI environments and raytracing
- Multi-threaded architecture takes full advantage of multi-core CPUs, as well as CUDA GPUs
- Accurate simulation of camera optics
- HD rendering with alpha channels
- Ability to share projects, cameras, and materials.

System Requirements

RTT DeltaPix has the following minimum recommended system requirements:

Configurations and Hardware Requirements	RTT DeltaPix & RTT Boost
Realtime Resolution	up to 4096 x 2048 with a 4K display
Rendering Resolution	unlimited
Operating System	Windows 7 - x64
CPU Minimum	Dual Core CPU
CPU Recommended	Quad-Core CPU or Higher
Memory Minimum	4GB of RAM
Memory Recommended	4GB of RAM, 64bit OS
Disk Space	1 GB or more for application + assets
Tested Graphics Cards 120+ CUDA cores, 1+ GB Graphics Memory*	NVIDIA GeForce GTX 590 3.0 GB, 1024 CUDA cores
	NVIDIA GeForce GTX 580 3.0 GB, 512 CUDA cores
	NVIDIA GeForce GTX 580 1.5 GB, 512 CUDA cores
	NVIDIA GeForce GTX 480 1.5 GB, 480 CUDA cores
	NVIDIA GeForce GTX 480M 2.0 GB, 352 CUDA cores
Dual graphic card configuration highly recommended for professional level performance	NVIDIA GeForce GTX 470 1.28 GB, 448 CUDA cores

	NVIDIA GeForce GTX 465 1.0 GB, 352 CUDA cores
	NVIDIA GeForce GTX 460 1.0 GB, 336 CUDA cores
Quad 3.0 GB graphic card system suggested for production work.	NVIDIA GeForce GTX 295 1.8 GB, 480 CUDA cores
	NVIDIA GeForce GTX 285 1.0 GB, 240 CUDA cores
	NVIDIA GeForce GTX 280 1.0 GB, 240 CUDA cores
Certified Graphics Cards Multiple cards, 120+ CUDA cores, 1+ GB vRAM	NVIDIA Quadro 6000 6.0 GB, 448 CUDA cores
	NVIDIA Quadro 5000 2.5 GB, 352 CUDA cores
	NVIDIA Quadro 4000 2.0 GB, 256 CUDA cores
	NVIDIA Tesla C2050 3 GB, 448 CUDA cores
	NVIDIA Tesla C2070 6 GB, 448 CUDA cores
Dual or quad graphic card configuration highly recommended for professional level performance	NVIDIA Quadro FX 5800 4.0 GB, 240 CUDA cores
	NVIDIA Quadro FX 4800 1.5 GB, 192 CUDA cores
	NVIDIA Quadro FX 3800 1.0 GB, 192 CUDA cores
Graphics Driver Certified	275.xx Win7 - x64
Monitor	1280 x 1024 or higher
Licensing	Node Locked or Floating License
Internet	Required for download and licensing
RTT Boost	Identical OS and GPU's on each system running DeltaPix in Network

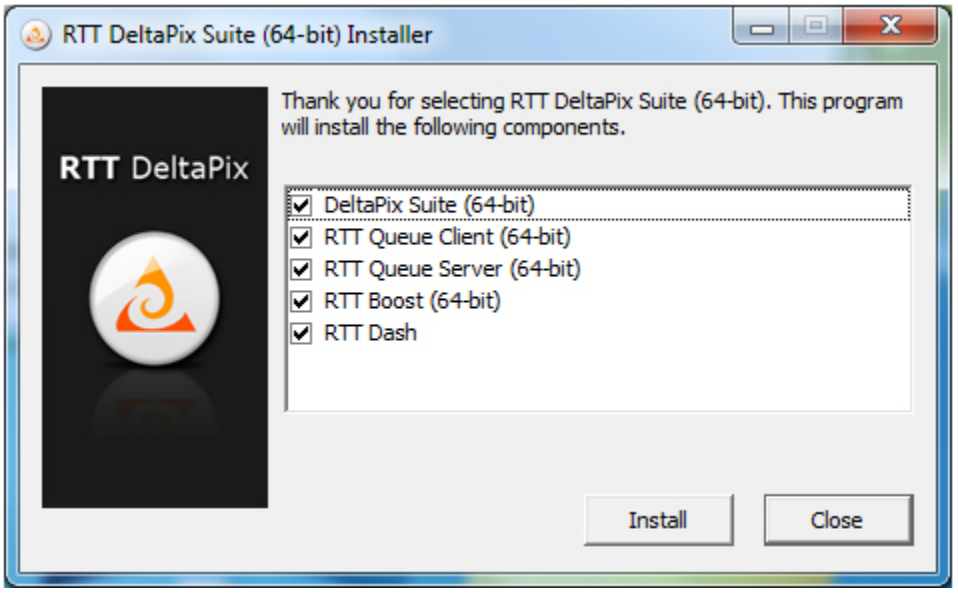
- 1 - Mandatory - All machines must have the same OS including the bitrate. We recommend all Windows 7 64bit
- 2 - Mandatory - If the machines are Windows 7, UAC User Account Control must be turned off or to the lowest setting
- 3 - Mandatory - Boost Service needs to be granted a firewall exception on port number 46001, or the firewall needs to be turned off
- 4 - Minimum specs for each machine in the network are the same minimum specs to run Shot
- 5 - In order to leverage GPU Boosting, the GPUs on all involved machines must be identical running identical drivers
- 6 - If Hybrid mode is chosen for a Boosted rendering, it will best determine whether most machines in the network will be of more use by supplying their CPU Power OR GPU power, not a mix of the two

The amount of GPU memory determines the size of the model that you can load while in GPU mode. About 5 Million Polys can be loaded into 1 GB of memory.

Installation and Licensing

Installation

1. Download the RTT DeltaPix file from RTT's website under :
   www.realtime-technology.com > SOFTWARE > RTT DeltaPix
2. On your local computer, unzip the RTT DeltaPix file and run `setup.exe`.
   Follow the instructions on the screen to complete installation.



You can choose which programs you want to install:

DeltaPix Suite 64-bit

Install the complete DeltaPix Suite

RTT Queue Client 64-bit

RTT QueueClient provides controls and information for you to manage jobs in the queue to be processed later.

RTT Queue Server 64-bit

The QueueServer provides server-side support for processing your jobs. The QueueServer has no user interface, and does not require interaction.

RTT Boost 64-bit

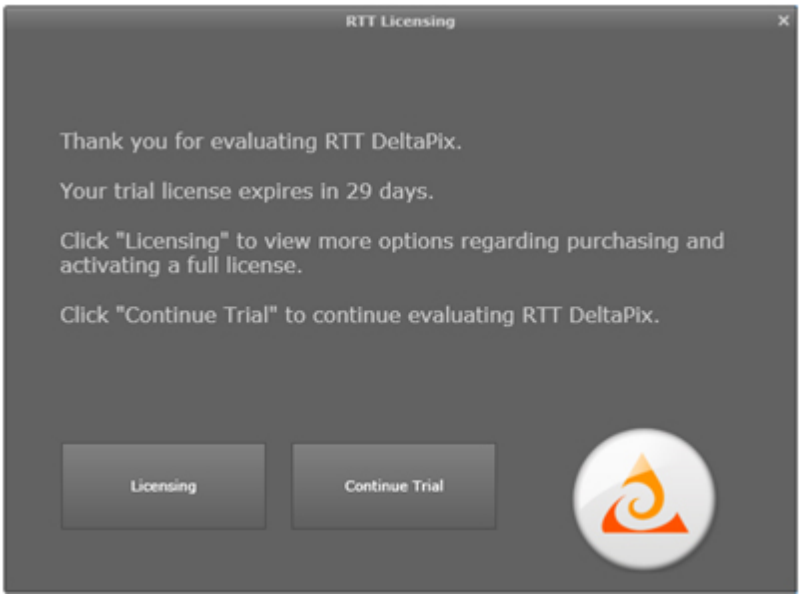
Boost works in conjunction with RTT DeltaPix to speed up rendering times. The increased speed is achieved by using the resources of multiple computers to share the burden of processing.

RTT Dash

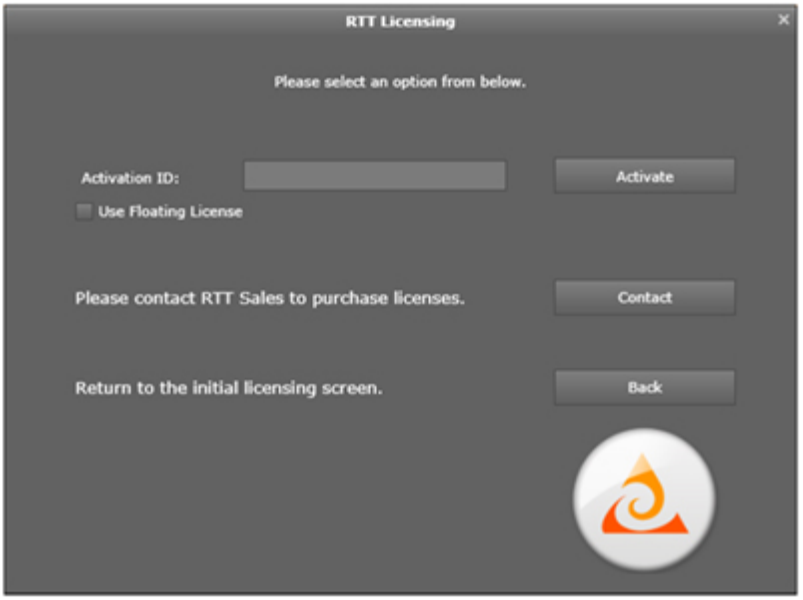
Install RTT Dash if you want to manage your licenses with this. With Dash you can also start and stop RTT Boost and RTT Queue. → RTT Dash, Page 120

Licensing

1. Download the RTT DeltaPix installer from RTT's web site.
2. On your local computer, unzip the file and run it. Follow the instructions on the screen to complete the installation.
3. When you run RTT DeltaPix for the first time, you will probably see the following screen first. In this RTT License dialog window, you can click on **Licensing** to go on the next screen, or you can click on **Continue Trial** to use the trial version. Please note, to activate a trial version you need an internet connection.



4. In the RTT License dialog window, select one of the following options:



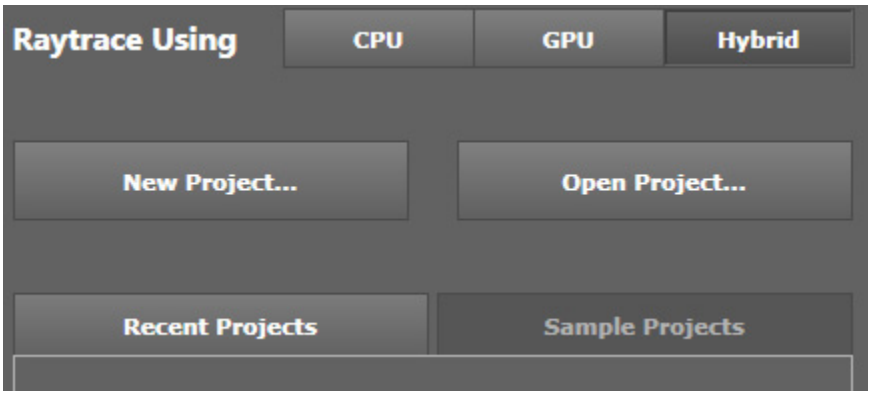
- **Activate:** Enter the **Activation ID** you received from RTT. If you have a floating license, please enable the check box **Use Floating License** and enter the address of the license server on your network.
- **Contact:** Select this option to send a email to RTT AG, where you can buy a license and receive an **Activation ID**. If you don't have an **Activation ID**, select this option to send an email to RTT AG, where you can buy a license and receive an **Activation ID**.
- **Back:** Return to the previous RTT License screen.

5. After handling the licensing, the next step in the first run is to select the location of the folder under which RTT DeltaPix stores all your project assets, when prompted, see → RTT Content Folder, Page 10

RTT DeltaPix

Overview

Rendering Mode



You can select between different rendering methods for Raytrace:

- **GPU Only**: Select this option if you have a much better graphics card than your CPU.
- **CPU Only**: Select this option if you have anything other than a nVidia CUDA-enabled GPU with 512 MB VRAM or better.
- **Hybrid**: Select this option if you have an appropriate nVidia card as well as a good CPU.

Project to Open

New Project: Creates a new project that's empty except for the default HDRI environment image to provide lighting.

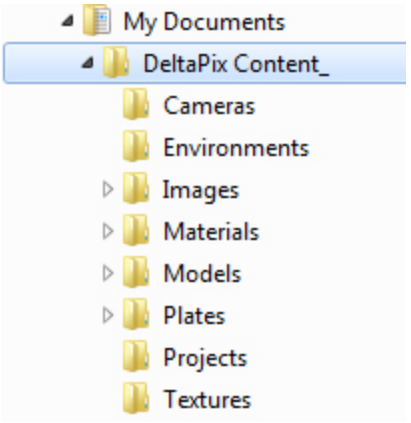
Open Project: Displays a file loader so you can locate and open a native RTT DeltaPix file (BIF format) in an arbitrary location.

Sample Projects: Opens the sample project you select from the list.

Recent Projects: Lets you open a project from a list of recently opened projects. On first run, this list will be empty, of course.

RTT Content Folder

When you install RTT DeltaPix, it asks you for a location to create a Content folder. The Content folder contains the following sub-folders to store assets for your RTT DeltaPix projects:



- `Cameras\` Stores default cameras, as well as cameras that you have saved.
- `Environments\` Stores high dynamic range images (HDR and EXR format) for use in environments.
- `Images\` Stores renderings and snapshots.
- `Materials\` Stores the materials in your Material Library. The contents update when you add a material to the Library.
- `Models\` Stores model files. By default, RTT DeltaPix will look in this folder first when you import a model.
- `Plates\` Stores standard 2D images for use in backplates.
- `Projects\` Stores native project files (BIF format.
- `Textures\` Stores 2D textures for use in materials.

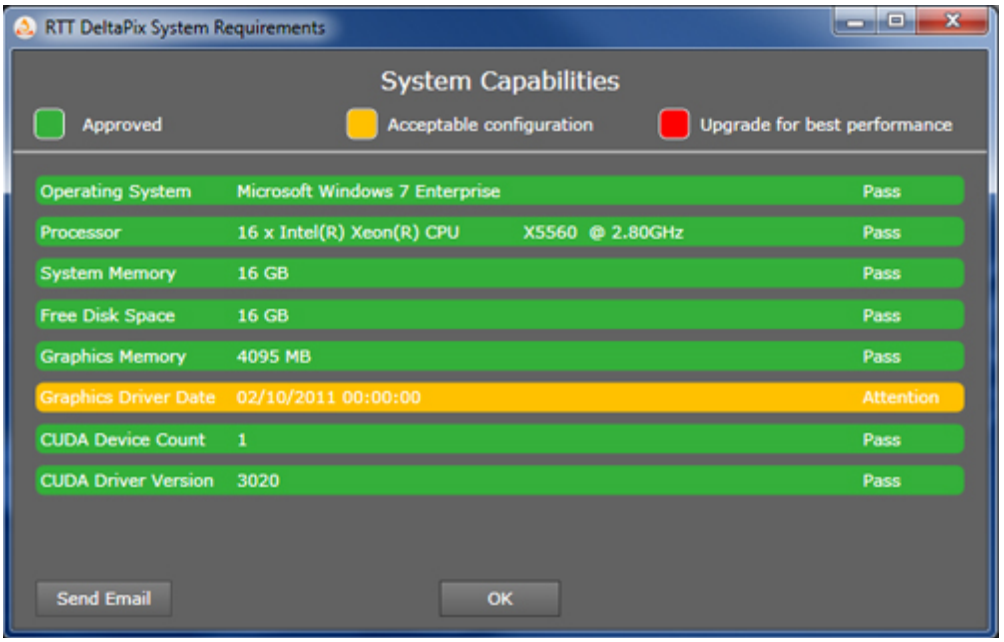
Help Resources

The following instructional resources are available for RTT DeltaPix:

- **Contents**:

- **Quick Start Tutorial**: Learn the essentials of RTT DeltaPix in less than one hour by doing the RTT DeltaPix Tutorial, Page 12 of this User Guide.
- **User Guide**: Quickly look up any RTT DeltaPix subject in the RTT DeltaPix User Guide you are reading now.

- **About**: Provides the version number and similar information for your copy of RTT DeltaPix.
- **System Info**: Summarizes how well DeltaPix will probably perform using your OS and hardware. Advises you of things that could be upgraded to improve performance. Please note: the field Graphics Driver Date is always yellow, because the graphic drivers are constantly changing. If you see a red field in this screen, please check the RTT DeltaPix system requirements. → System Requirements, Page 3



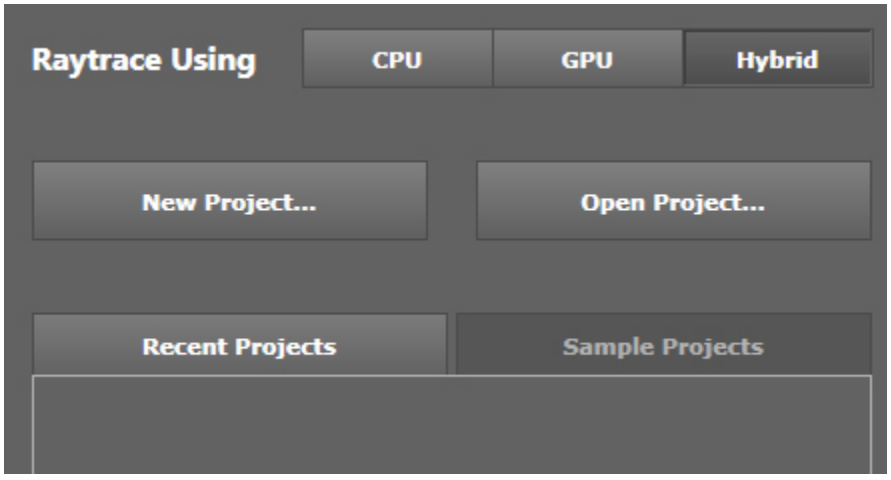
RTT DeltaPix Tutorial

The tutorials in this Quick Start Guide teach you the basics of RTT DeltaPix. Prepare to be rendered speechless (literally) in just 30 minutes! You can create typical RTT DeltaPix projects in the following phases:

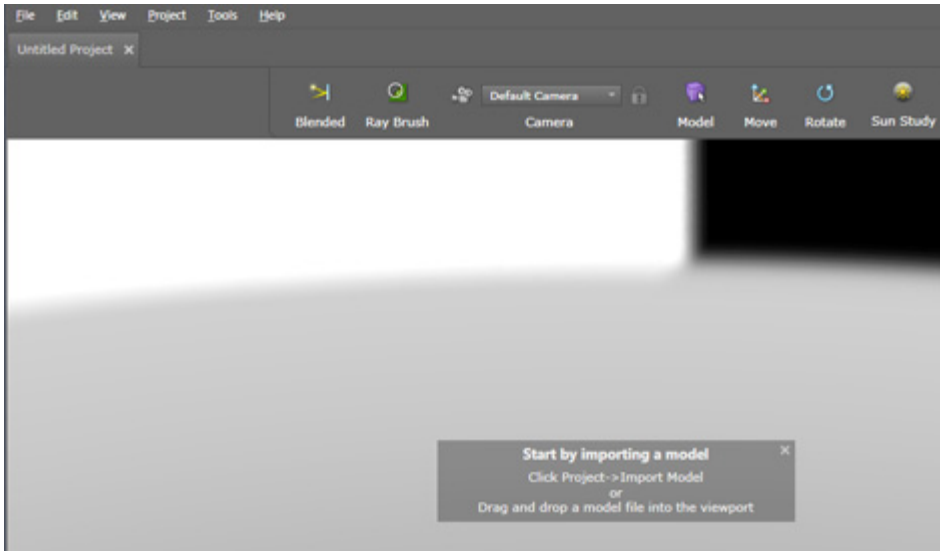
- Launch RTT DeltaPix.
- Import a 3D model (a.k.a. object or mesh) to serve as a 3D subject in your RTT DeltaPix project.
- Assign and edit materials for your models.
- Import an HDRI environment image to provide lighting for your models.
- Import a backplate image to provide a high quality background.
- Output the project at various quality levels.

Launch RTT DeltaPix

1. To run RTT DeltaPix, double click the RTT DeltaPix icon on your desktop, or select RTT DeltaPix in the Start Menu. The welcome window appears – unless this is the first time you have run this installation of DeltaPix, in which case refer to → Installation and Licensing, Page 6.



2. In the Welcome Window, select **New Project** to load an empty scene with the default environment image.



Import a 3D Model

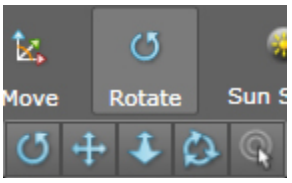
Import a model into your new project: Select **Project > Import** Model from the Main Menu to display and load a model. Folder: `DeltaPix Content \ Models\.`

- Depending on the size of the file and your computer's hardware, it may take a few seconds for the model to fully load.
- Once the model loads, RTT DeltaPix will immediately begin rendering your project in real-time.

For details on models, see → Working with 3D Models, Page 62.

Use the Camera

You can move the current camera relative to the look-at point. You can of course change the look-at point too. The look-at point is the point in 3D space where the camera focuses, rotates around, and zooms towards.



To move the camera, hold the alt key and use the mouse as follows:

- **Rotate:** left click hold inside the Viewport and drag the mouse to orbit the camera around the focal point.
- **Pan:** middle click hold inside the Viewport and drag the mouse to move the camera and focal point together.
- **Zoom:** left click hold inside the Viewport and drag the mouse to zoom the camera in / out, relative to the focal point.
- **Perspective:** rotate the mouse WHEEL to dolly and change the focal length of the virtual lens.
- **Look-At:** Or hold both the control and alt keys, and right click on a new look-at point in the 3D Viewport.

For details on cameras, see → The Camera, Page 58.

Assign and Edit Materials

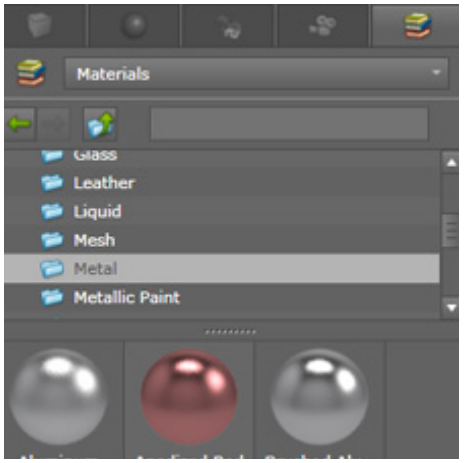
In RTT DeltaPix, a material is a scientifically accurate simulation of a substance such as polished aluminum, glossy paint, glass, emerald, wood, rubber, etc. By mapping materials on models, the models assume an uncanny realism.

Each type of material in RTT DeltaPix is defined by a unique set of parameters, including up to four textures color, specular, alpha and bump. Different materials of the same type have the same parameters with different values. RTT DeltaPix comes with a variety of materials. You can create new materials by modifying the parameters of existing materials, and by importing materials created by others. For details on materials, see → Working with Materials, Page 78.

Here's how you map a material onto a part in a model:

1. In the Palette, select the **Library Tab** to activate Library Mode.
2. To display the Material Library, select **Materials** in the drop-down menu of the Library Tab. The Materials Library contains all the materials in the `DeltaPix Content \ Materials` folder, by default.

The BMF format can be shared and emailed.



3. Double click any material from the Materials Library to the target part in the 3D Viewport. This action accomplishes two things:

   _ The material is mapped to the target part.

   _ The material is added to the current project, and will be packaged and saved with the current project – making the material independent of your Material Library.

Do not confuse the Materials Library in the Library Tab with the Materials Tab:

The Materials Library is accessible via the Library Tab of the Palette. The Materials Library contains all the material files in the `DeltaPix Content \ Materials` folder, by default – regardless of whether or not these materials are used in the open project.

_ The materials in the Material Library are independent of specific projects, making the entire Material Library available to all projects.

_ You cannot directly edit a material in the Material Library. But you can bring a material from the Material Library into the open project, and then edit the material with the parameters in the Material Tab, and save the modified material as a new material in the Material Library.

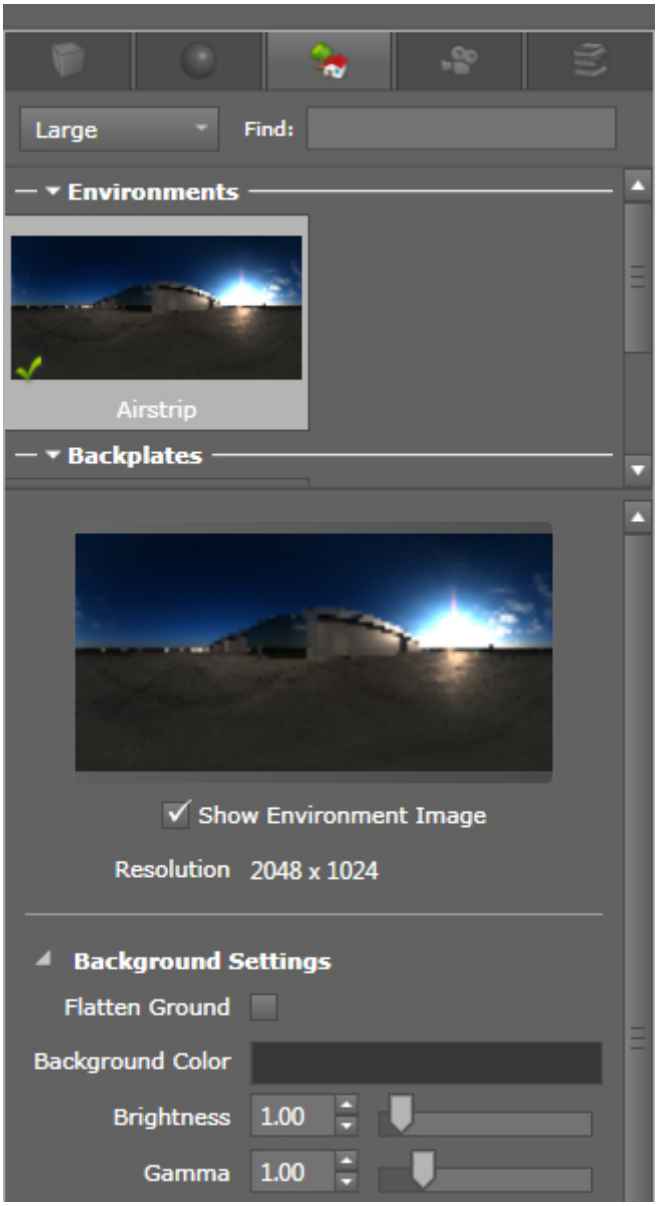
_ DeltaPix saves materials in BMF format in the `DeltaPix Content \ Materials` folder, by default. You can copy, share, and even email BMF files to other DeltaPix users. For details, see → Share Your Materials, Page 84.

_ The Materials Tab of the Palette contains only materials that have been added to the open project.

> In the Materials Tab, left-click any material to display its parameters. You can optionally edit these parameters to modify the material. Your edits will effect instances of the material on parts in the open project, but will not affect the Material Library.

Import an HDR Environment Image

High dynamic range images (HDR) can contain a far greater contrast range and color depth than regular 2D images. HDR images accomplish this by using special formats, such as HDR and EXR, that describe RGB colors with 32-bits per channel of data. That's a lot more color and luminance information than standard 2D images using 8-bits per channel.



RTT DeltaPix lets you load an HDRI image onto an environmental sphere that contains your entire scene. The HDRI image will then radiate light into your scene from all directions, according to the RGB values of individual pixels in the HDRI image.

1. To display the Environments Library, left clickthe **Library Tab** in the Palette, and then select **Environments** in the drop-down menu therein. The Environments Library contains all the HDRI images in the `DeltaPix Content \ Environments` folder, by default.
2. From the Environments Library, Drag-&-Drop any **HDR image** into the 3D Viewport. This action applies the image to the environment sphere containing your project, so the image provides the light for your scene.

Alternative: Double click the environment icon in the Environment Library to load it into the environment of your scene.

3. You can tune an environment image in Environment Mode, as follows:

   _ To activate Environment Mode, left click the **Environment Tab** tab in the Palette. All environments that have been loaded into the open project are listed in the Environments Tab of the Palette.

   _ In the Environment Tab, left click the target environment image in the Environment Tree near the top, and adjust the **Brightness** parameter to change the total amount of light the environment image radiates into your scene.

   _ Adjust the **Gamma** parameter to indirectly change the contrast of the environment image.

   _ Experiment with changing other parameters in the Environment Tab.

Apply a different environment image to the open scene, as follows:

_ Activate the Environment Tab in the Palette.

_ In the Environment Tab, double click the icon of the environment you wish to load into the open scene.

For details of environments, see → Working with Scenes, Page 87.

Import a Backplate Image

A backplate is a standard 2D image that provides a background for your scene, without affecting the lighting in the scene. By design, backplates do not emit light into the scene, and do not receive shadows. Also, backplates always remain in the center of the 3D Viewport, orthogonal to the camera, regardless of where you move the camera.

You can use a variety of 2D image formats backplate images:

_ JPG

_ PNG

_ TIFF

1. To display the Plates Library, left clickthe **Library Tab** in the Palette, and select **Plates** in the drop-down menu. The Plates Library contains the backplate images in the `DeltaPix Content \ Plates` folder, by default.

2. From the Plates Library, double click any **backplate image** into the 3D Viewport to place the image in the background of your project. After loading a backplate image into the open project, the image will be listed in the Plates Tab of the Palette.

For details on backplates, see → Load a HDR Environment Image, Page 88.

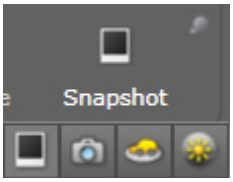
Output the Images

This section introduces you to render images from RTT DeltaPix. For details, see → Outputting Images, Page 99.

Quick Screenshot

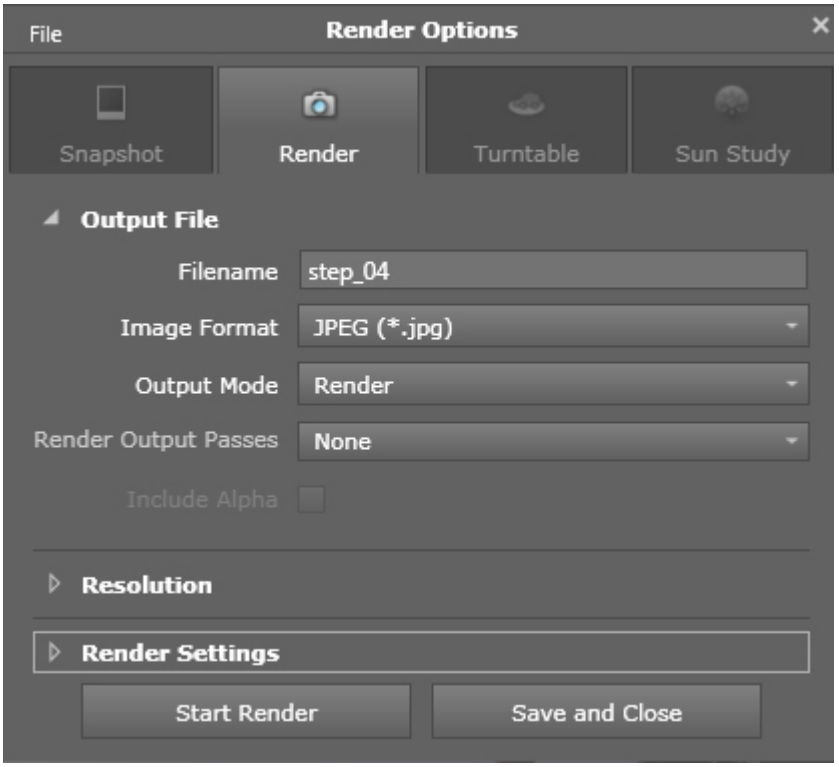
To output a quick snapshot of the scene on your screen, do the following:

1. Adjust your camera to position it and the model in the 3D Viewport so as to frame them exactly as you want the output image of the scene.
2. In the Toolbar, left click the **Render button**, and select Snapshot from the **Render Type** drop-down list.



RTT DeltaPix saves the screenshot in the Images Library, the `DeltaPix Content \ Images` folder by default.

High Quality Rendering



To output a high quality rendering of your scene, do the following:

In the Toolbar, left click the **Render button**, and select the type of render from the **Render Type** drop-down list:

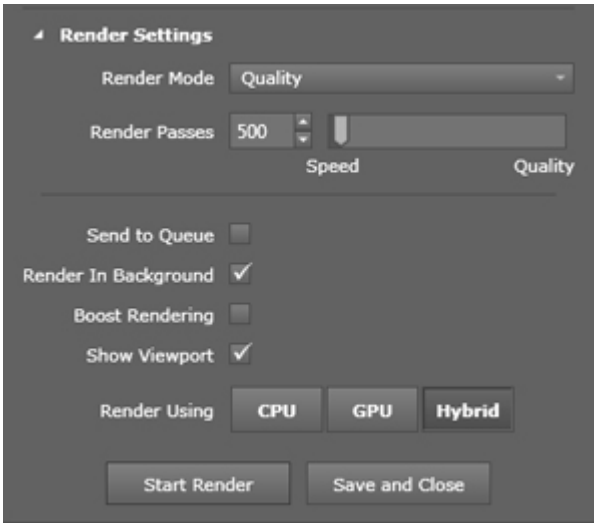
_ Basic Render

_ Turntable Animation

_ Sun Study Animation

_ Render All Cameras

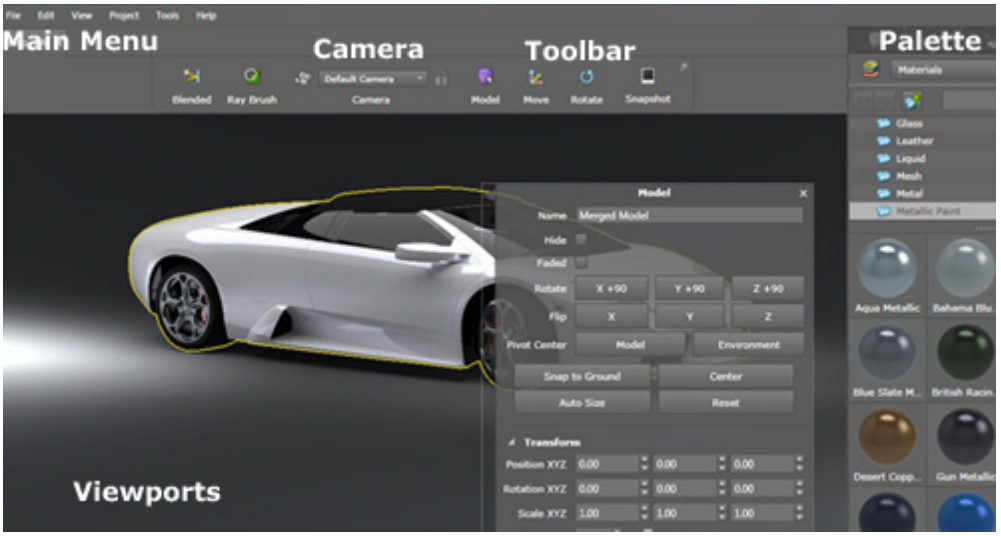
The rendering may take a few minutes, depending on your hardware. RTT DeltaPix saves the rendering in the Images Library the `RTT Content \ Images` folder by default. The following considerations, which you have some control of via the Render Options dialog, affect the rendering:



For all the render types above, you can choose to render based on time or quality:

- Time guarantees a finished result in a given processing time, but does not guarantee a given quality.
- Quality guarantees a quantifiable quality for images / frames, but without any hard limit on processing time.

Overview of User Interface



The RTT DeltaPix User Interface contains the following major elements:

_ Main Menu

_ Viewports

_ Toolbar

_ Palette

_ Context Sensitive Menu

_ Camera

When DeltaPix initially opens, you can choose between rendering modes. Your options include CPU Only, GPU Only, and Hybrid.

After selecting the rendering mode that best utilizes your particular hardware, you can then select **New Project** to start a blank DeltaPix project, or **Open Project** to continue work on an existing DeltaPix project.

When your project has finished loading, you can modify the UI of DeltaPix as follows:

_ To change the width of the Palette, drag its border with the mouse.

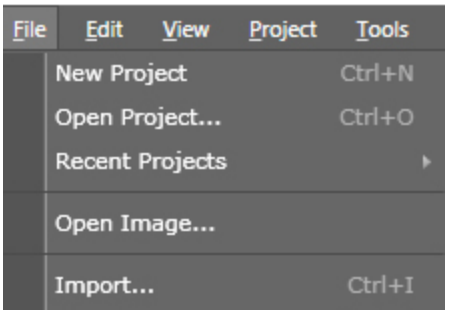
- To break the entire Palette away from its dock, Click-Hold-Drag any tab in the Palette. In Free Floating Mode, you can drag the Palette anywhere on your screen.
- To dock a free-floating Palette, drag it near the left or right edge of the DeltaPix UI. Anchor arrows will appear on the left and right sides. Then drag and release the Palette on top the arrow on the desired side.
- To hide the Toolbar or HUD when it's not in use, Click the pin at the upper right edge. To reveal a hidden Toolbar or HUD, just mouse-over the area it normally resides. Click the pin again to keep it visible.

Main Menu

The Main Menu in RTT DeltaPix includes the following pull-down menus:

- File Menu
- Edit Menu
- View Menu
- Project Menu
- Image Menu
- Tools Menu
- Help Menu
- Progress Bar

File Menu



The **File** Menu provides the following options:

New Project: Creates a new RTT DeltaPix project. New projects are empty except for the default HDRI environment image to provide lighting.

Open Project: Lets you load an existing project from your hard drive or network.

Recent Projects: Lets you select and open a project from a list of recently opened projects.

Open Image: Lets you locate and open a 2D image in the Image Viewport.

Import: Lets you import a 3D model into the open RTT DeltaPix project. For details, see → Importing Models, Page 62.

Export: Lets you export the open project to any of the following formats: Autodesk FBX and OBJ

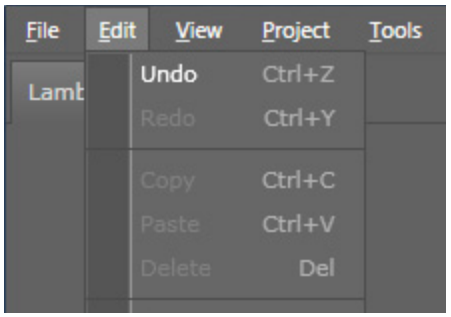
Save Project: Saves your current RTT DeltaPix project in native BIF format, overwriting the same location and filename as the original. For details on BIF, see Saving, Page 99.

Save Project As: saves your current RTT DeltaPix project file in BIF format, using the arbitrary file name and location that you specify.

Close: Closes the current project and leaves RTT DeltaPix running.

Exit: Exits RTT DeltaPix.

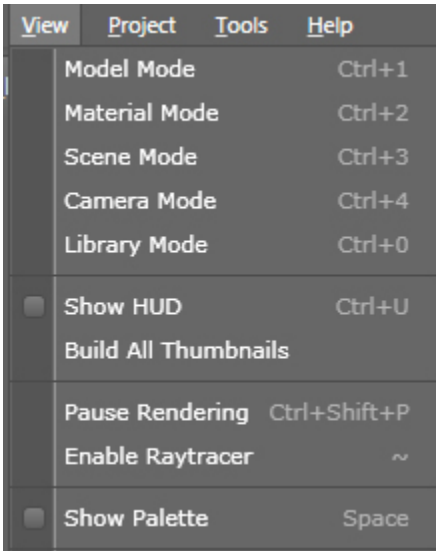
Edit Menu



The **Edit** Menu provides the following standard options:

- Undo
- Redo
- Cut
- Copy
- Paste
- Delete
- Select All
- Deselect All
- Find

View Menu



The **View** Menu provides the following options:

Model Mode: Activates Model Tab and displays the Model Tab in the Palette.

Material Mode: Activates Material Tab and displays the Material Tab in the Palette.

Scene Mode: Activates Environment Tab and displays the Environment Tab in the Palette.

Camera Mode: Activates Camera Tab and displays the Camera Tab in the Palette.

Library Mode: Activates Library Tab and displays the Library Tab in the Palette.

Show HUD: Toggles visibility of the heads-up display, which shows the following data depending on the current mode:

Passes: this number grows until you stop the session.

FPS: shows the current rendering status, e.g. rendering Paused, or Frames per Second being rendered.

Time / Frames: tells you the average framerate passes, which are iterations on the final image that progressively gets more refined and less noisy.

Resolution: the resolution, i.e. in pixels, width by height, of the 3D Viewport as well as output Snapshots.

Polygon Count: number of actively used polygons in the project.

Focal Length: the focal length (in millimeters) of the virtual lens for the camera used for the rendering.

GPU Only, CPU Only, or Hybrid indicates the current rendering mode.

Build All Thumbnails: Generates thumbnail images of materials, models, and similar elements in the Palette.

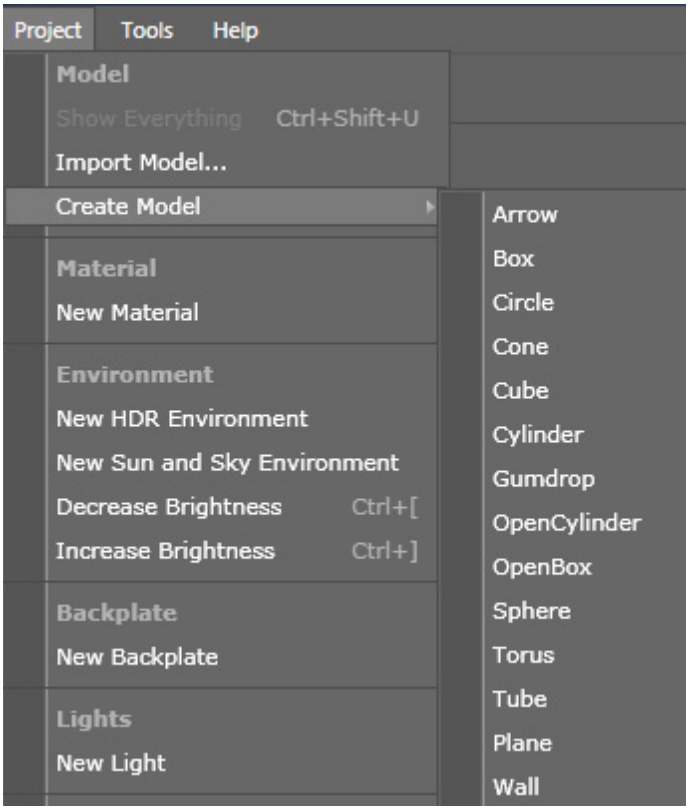
Pause Rendering: Stops a rendering in progress.

Enable Raytracer: Toggles real-time raytracing in the 3D Viewport.

Show Palette: Toggles visibility of the Palette.

Enter Full Screen: Select to maximize the RTT DeltaPix window and hide the Main Menu. Press F11 to return to the windowed mode.

Project Menu



The **Project** Menu provides the following options:

Model

Show Everything: Reveals all models and parts that may have been hidden.

Import Model: Lets you locate and open a 3D model to import into the open RTT DeltaPix project. For details, see → Importing Models, Page 62.

Create Model: Creates the standard geometric shape, e.g. sphere, cube, cylinder, etc., that you choose from a list.

Material

New Material: Creates a new material in the open project, and opens the Material Tab in the Palette so you can customize the new material.

Environment

New HDR Environment: Lets you locate and open a high dynamic range image to provide environmental lighting in your scene. For details, see → Working with Scenes, Page 87.

New Sun and Sky Environment: Creates a new Sky Study Environment, which simulates sunlight at a specific place and time. For details, see → Create a New Sun and Sky Environment, Page 93 .

Decrease Brightness: Decreases the brightness of the loaded HDRI environment image.

Increase Brightness: Increases the brightness of the loaded HDRI environment image.

Backplate

New Backplate: Lets you locate and open a standard 2D image for the background of your scene. For details, see → Load a HDR Environment Image, Page 88.

Lights

New Light: Create, move and edit a new light in the open scene. → Create, move, and edit custom lights, Page 92

Camera

New Camera: Creates a new camera at the default position, and switches the 3D Viewport to show the view from the new camera.

Next: Switches the view in the 3D Viewport to the next camera in the list of existing cameras.

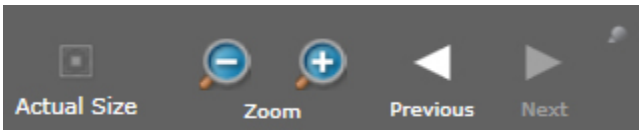
Previous: Switches the view in the 3D Viewport to the previous camera in the list of existing cameras.

Reset: Repositions the current camera to the world origin.

Lock: Prevents the current camera from being moved.

Save to File: Saves the current camera to a file, so the camera can be shared with other projects and users.

Image Menu



The **Image** Menu appears only when an Image is loaded into the Image Viewport. It provides the following options for viewing and managing images such as existing screen shots and renderings. For details, see → Saving and Outputting, Page 99.

Previous Image: Displays the previous image in the Images Library.

Next Image: Displays the next image in the Images Library.

Zoom In: Zooms into the currently displayed image.

Zoom Out: Zooms out from the currently displayed image.

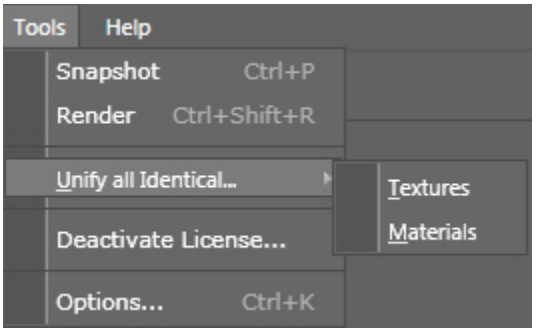
Actual Size: Shows the currently displayed image at 100% zoom.

Fit to Window: Fits the currently displayed image in the Image Viewport.

Close: Closes the currently displayed image.

The above-listed functionality is also available via the Image Tools that appears when you mouse-over an image loaded in the Image Viewport.

Tools Menu



The **Tools** Menu provides the following options:

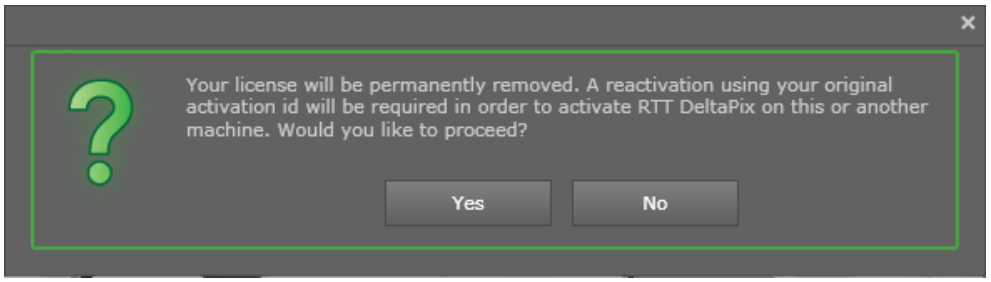
Snapshot: Takes a quick snapshot of your current RTT DeltaPix scene, exactly as it appears in the 3D Viewport, and saves the screenshot in the Images Library.

Render: Starts rendering your scene at the resolution specified in the Options Dialog. When completed, the rendering will be saved in the Images Library.

Unify all Identical

- **Textures:** Eliminates duplicate textures in your project.
- **Materials:** Eliminates duplicate materials in your project.

Deactivate license: If you wish to switch licenses, e.g. from a node-locked license to a floating license, or transfer a license from one machine to another, use this option to deactivate your old license first. Then exit and restart RTT DeltaPix.

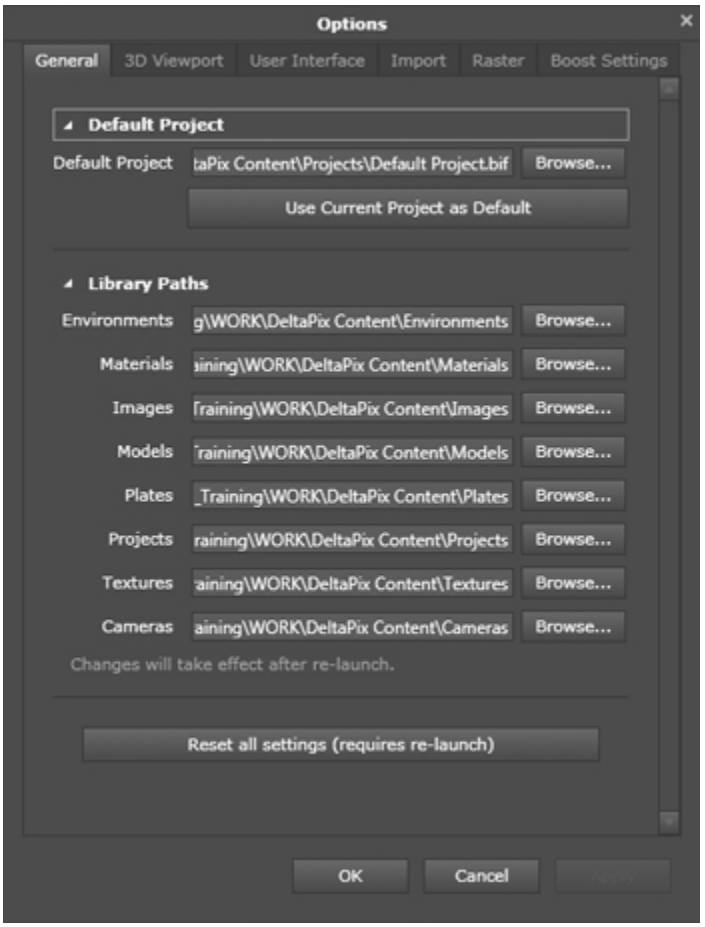


Options: Displays the "Options Dialog" described in detail below.

Options Dialog

The Options Dialog can be displayed by selecting **Options** from the Tools Menu, or pressing Ctrl-K. The Options Dialog includes the General, 3D Viewport, and User Interface Tabs. For details, see the sub-sections below.

General Tab



Default Project: Determines the path to the project file that RTT DeltaPix opens by default when you fire it up. The provided `Default Project.bif` is empty except for a basic HDR image in the environment to provide lighting.

To change the default project to the open project, left click the **Use Current Project as Default** button.

Library Paths: To change the folders containing any library, left click the **Browse** button to the right of the target library, and navigate to the new folder for that library.

Environments: Path to the folder containing the HDRI images in the Environments Library.

Materials: Path to the folder containing the materials in the Materials Library.

Images: Path to the folder containing saved screenshots and renderings.

Models: Path to the folder containing the models in the Model Library.

Plates: Path to the folder containing the images in the Plates Library.

Projects: Path to the folder containing the RTT DeltaPix projects in the Projects Library.

Textures: Path to the folder containing the images in the Textures Library.

Cameras: Path to the folder containing the cameras in the Cameras Library.

Reset all Settings: Restores all options to their factory defaults.

3D Viewport Tab

Realtime Options

Auto Pause: If enabled, DeltaPix pauses realtime raytracing when the application loses focus. When it regains focus, the raytrace picks up from where it left off.

Default to Raytrace: If enabled, DeltaPix starts with raytracing on.

> Turning on raytracing during real-time editing might result in slower responses.

Image Filtering: Image filtering is a new technique that reduces the noise of pixels in the rendering. It turns on a noise reduction technique for the first 50 passes of calculation, and then turns it off. At 100 passes an actual image filter is then applied to completely remove noise. Enabling this option slows down the calculation rate of each pass, but still speeds up the appearance of a complete image!

Maximum Resolution: The resolution for example in pixels, width by height of the 3D Viewport as well as output Snapshots.

Display Options:

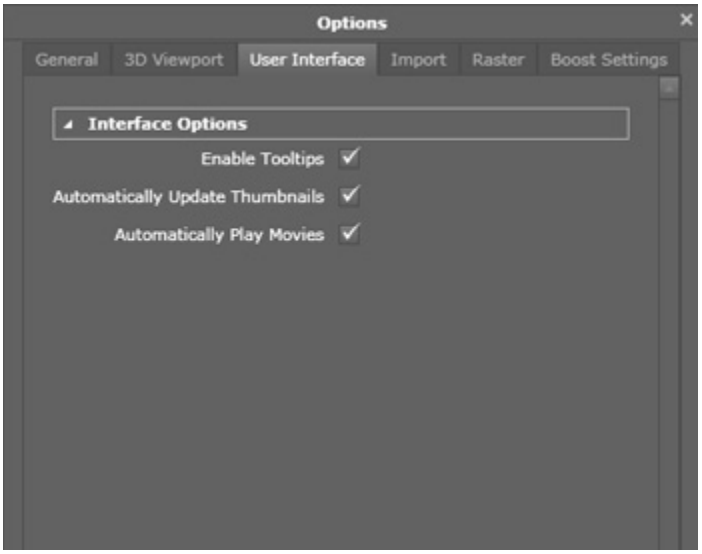
World Axis: Toggles visibility of the world XYZ-axes. This option is available only when raytracing is turned off.

Model Bounding Boxes: Toggles visibility of bounding boxes around models. Available only when raytracing is turned off.

Parts Bounding Boxes: Toggles visibility of bounding boxes around parts in models. Available only when raytracing is turned off.

Show Selection Outline: Toggles visibility of the highlight that appears around active selections. The highlight is useful for showing visually what is currently selected.

User Interface Tab



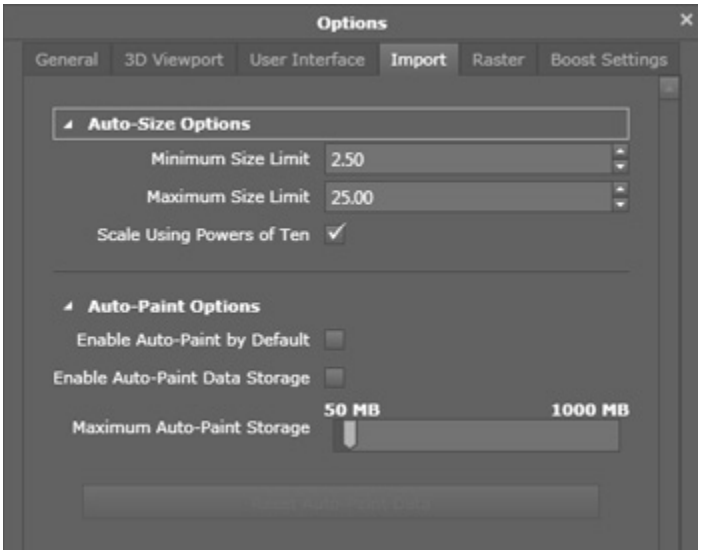
Interface Options:

Enable Tooltips: Toggles visibility of short instructions that appear when you mouse over a button or control.

Automatically Update Thumbnails: If enabled, DeltaPix updates all the thumbnails that appear everywhere in the Palette.

Automatically Play Movies: If enabled, this option automatically plays movies if the "create movie" check box is checked when you render an animation. It opens and plays the animation in whichever media player is associated with the extension on which you play the movie.

Import Tab



Import Options:

Auto-Size Options: Lets you set the rules for the size to which objects are scaled if they are "auto-sized" upon import.

Minimum-Size Limit: Sets the smallest size for a part if it initially imports far too large.

Maximum-Size Limit: Sets the largest size for a part if it initially imports far too small.

Scale Using Powers of Ten: Applies a power-of-ten multiplier to either increase or decrease the size of the original model when it is auto-sized.

Auto-Paint Options: When enabled, auto-paint builds an association between the names you give parts/materials/layers in your CAD package and the names of DeltaPix materials you assign to those parts after import. Based on your paint/ naming pattern, DeltaPix learns how to auto-paint a model upon import. For example: Suppose in CAD you always name a tire layer "Tires," and in DeltaPix you always paint the part called "Tires" with the Black Rubber material. As a result, every time you import a model that has a part called "Tires," Delta Pix will automatically assign the Black Rubber material to that part. This feature essentially lets you pre-paint your model in the CAD package, so you don't have to assign materials once that file is imported.

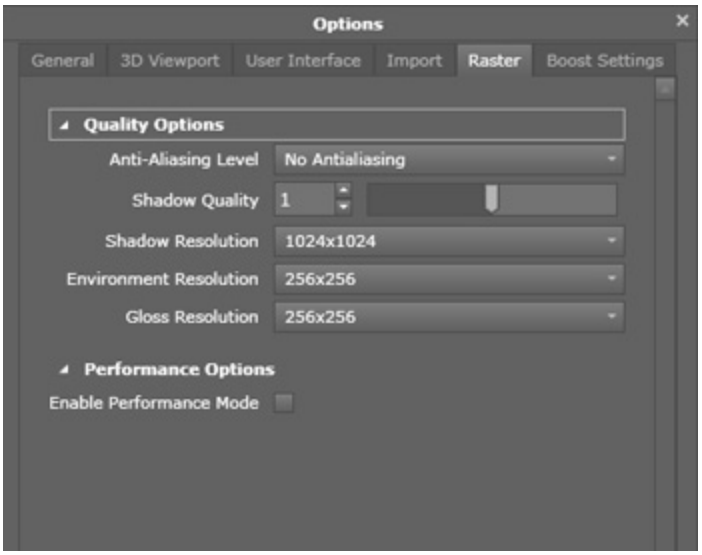
Enable Auto-Paint by Default: Activates the auto-paint feature each time the program is run.

Enable Auto-Paint Data Storage: Activates a persistent list of the associations you make during usage.

Maximum Auto-Paint Storage: Defines how big the Data Storage list can get.

Reset Auto-Paint Data: Clears your Data Storage list and lets you start again.

Raster Tab



Quality Options:

Anti-Aliasing Level controls the process of softening the unnaturally precise or stepped edges, sometimes known as the jaggies, that are created when a computer-generated object is placed against a contrasting background. This softening process is accomplished by using pixels of intermediate shades as a buffer between the object and its background. The higher the value of Anti-Aliasing Level, the better the step removal, but the greater the impact on performance. The available settings will vary based on your video card.

Shadow Quality determines the smoothness of the ground shadow and self-shadows.

Shadow Resolution determines the pixel dimensions for the map created for the shadow projections.

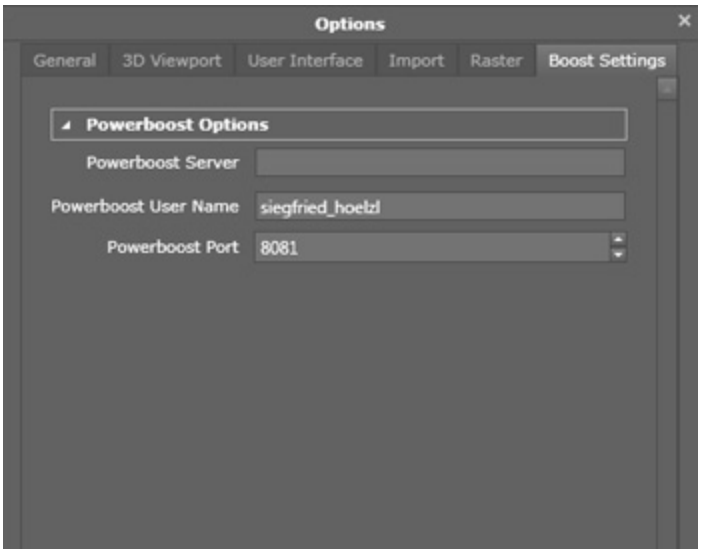
Environment Resolution determines the pixel dimensions used to clamp the HDR environment image.

Gloss Resolution: determines the pixel dimensions that the reflection map is calculated at, so as to determine the material gloss levels.

Performance Options:

Enable Performance Mode: Activates a drawing mode in which all shaders are simplified significantly so as to dramatically increase the speed of realtime editing. It is useful for models that are very large or have lots of textures, and for ensuring animation play-back consistently at 30 FPS. Even if this mode is enabled, the final image will still be rendered with the original shaders.

Boost Settings Tab



Powerboost Options:

Use these options to set up your connection to a remote Powerboost server. Pending purchase of Powerboost software. Powerboost enables you to upload/ download scenes to the DeltaPix Cloud for rendering by powerful computers – freeing your local PC to do other work.

Powerboost Server: The name of the cloud server on which a Powerboost Host is running.

Powerboost User Name: Your user name for logging into the Powerboost server to upload or download your DeltaPix scenes. The default is the user name for your Windows login.

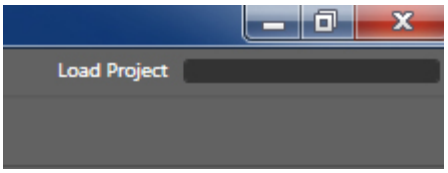
Powerboost Port: Retains the default value of 8081 unless a DeltaPix representative provides you with a different value.

Help Menu

The Help Menu provides the following options:

- **Contents**: Opens the RTT DeltaPix User Guide you are reading.
- **About**: Displays the version number of your copy of DeltaPix.
- **System Info**: Provides an estimate of DeltaPix's performance on your PC hardware, and suggests upgrades when needed.

Progress Bar



The Progress Bar appears on the far right of the Main Menu, above the Palette, whenever DeltaPix is doing tasks that take substantial time to complete.

Viewports

A Viewport dominates most of the area in the RTT DeltaPix window. RTT DeltaPix provides you with a 3D Viewport, plus additional tabs that appear when you open images in the Image Viewport, as explained below.

3D Viewport

The 3D Viewport shows the open project with the currently selected camera. When you move the camera around the scene, or change any content, the 3D Viewport updates in real-time.

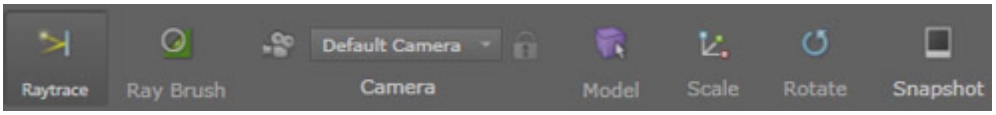
Image Viewport

The Image Viewport displays the images in the Image Library. Since screenshots and renders are saved to the Images Library by default, the Image Viewport is a convenient way to look over your output images.

Rendering Viewport

The Rendering Viewport displays the currently rendering image, when applicable.

Toolbar



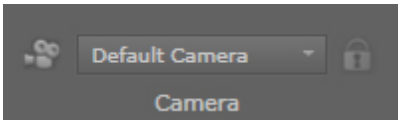
The Toolbar appears near the top of the 3D Viewport, by default. The Toolbar provides you with shortcuts to the following functionality:

Raster / Blended / Raytrace

Lets you choose between three real-time rendering modes: Raster for quick but limited lighting; Raytrace for slower but maximum quality lighting; and Blend for some of both:

Blend is the new default mode. When in Blend mode, the scene automatically switches to Raster mode when any interaction is performed – such as moving the camera, moving the model, playing an animation, dragging a material, etc. As soon as the operation is finished and the mouse stops moving, the raytraced version of the scene gets blended over the raster version.

Camera

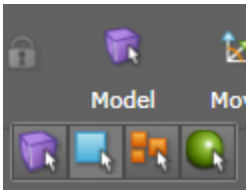


Drop-Down Menu: Select any preset camera from the drop-down menu to display the scene in the 3D Viewport using that camera.

<lock icon> locks / unlocks the current camera

Click the word Camera to open the camera's properties.

Selection Tools



Lets you choose what will be selected when you leftclick a model:

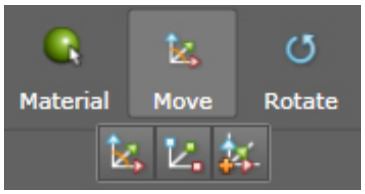
Model: When enabled, left click a model to select it.

Part: When enabled, left click a specific part in a model to select just that part.

Group: When enabled, left click a specific part in a model to select the group containing that part.

Material: When enabled, left click a material on a model to select the material and display its properties in the Material Tab of the Palette.

Transform Tool



Brings up the Transform Manipulator for visually translating, rotating, and scaling the selected model or material, depending on the options you select below.

Move:

_ If the Selector Tool is in **Model** Mode: Activating the **Move** Transform Tool displays the Transform Manipulator for visually transforming models, as well as Model Tab for numerically transforming models.

_ If the Selector Tool is in **Material** Mode: Activating the **Move** Transform Tool displays the Texture Manipulator for visually mapping textures onto parts in models, as well as Material Tab for numerically mapping textures.

Scale: The **Scale** Transform Tool works the same as the **Move** Transform Tool (above), except it scales instead of translating or rotating.

Absolute Mode: If enabled, model transformations are relative to world space. If disabled, model transformations are relative to local model space. **Absolute Mode** is not applicable to materials.

Camera Control

Select the Camera Control Tool to set the camera's behavior from the following options. For usage, see → The Camera, Page 58 .

_ Rotate

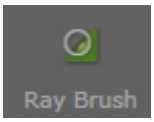
_ Pan

_ Zoom

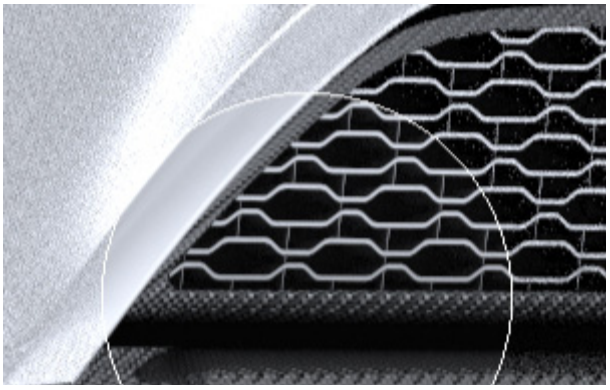
_ Twist

_ Look At

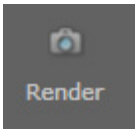
Ray Brush



The Ray Brush lets you to select a circular area within which raytracing happens, and outside of which raytracing does not happen.

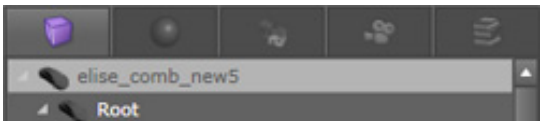


Render Button



Select the Render button. In the Render Type drop-down within the Render Options dialog, select an available option. For details, see → Outputting Images, Page 99. Renderings and snapshots are saved in the Images Library, by default.

Palette



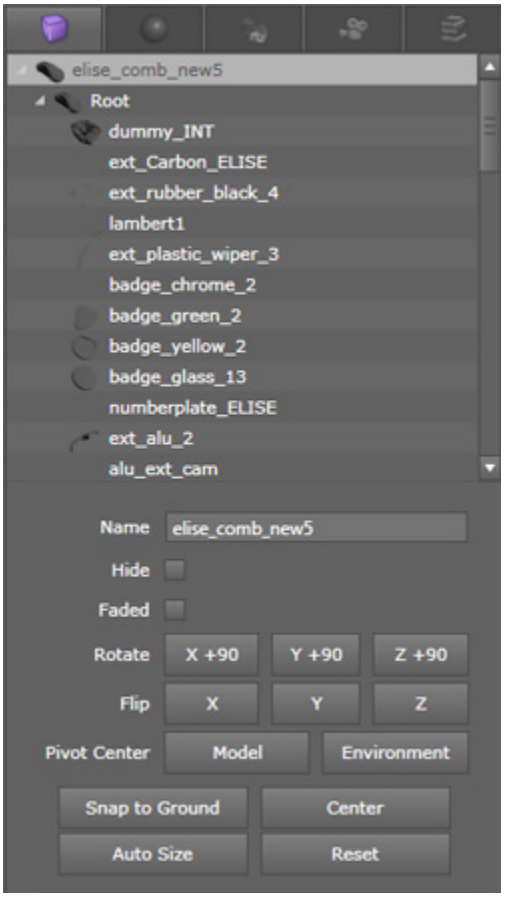
The Palette contains various tabs corresponding to the following modes:

- Model Tab
- Material Tab
- Scenes Tab
- Camera Tab

_ Library Tab

You can undock the Palette and move it around the screen separately from the main DeltaPix Window, and then re-dock it later if desired. To undock the Palette, left click holdthe top bar of the Palette, and drag it away from its dock. To re-dock the Palette, drag-and-drop it the same way onto the arrow on the far right side of the main DeltaPix window, where it is normally docked.

Model Tab



The Model Tab provides you with the following options for selecting and transforming Models and their Parts:

Model Tree

The names of the Models in your scene, and the parts within each Model, appear in the Model Tree near the top of the Model Tab in the Palette.

In the drop-down list near the top of the Model Tab, select the Model Set containing the models you want in your scene.

- A Model Set is a collection of one or more 3D objects.
- Different Model Sets are entirely separate, except when several sets contain the same model.
- A given Model Set can optionally be part of a custom configuration, but not part of the base configuration.

To select a Model and display its parameters in the Model Tab:

- Option 1: Click the target model in the Model Tree of the Model Tab.
- Option 2: Set the Selection Tool in the Toolbar to Model Mode, and click the target model in the scene.

To select a part and display its parameters in the Model Tab.

- Option 1: Click the target Part in the Model Tree of the Model Tab
- Option 2: Set the Selection Tool in the Toolbar to Part Mode, and click the target part in the scene.

When a model is selected, DeltaPix outlines it in yellow.

When a part is selected, DeltaPix outlines it in blue.

Model / Part Parameters

Select a model or part to display and optionally modify its parameters. See figure on previous page. Note that parts have some parameters that whole models do not, and they share some parameters as well. The following lists all available parameters regardless of the user's current selection:

Import Model: Click to import a model into the current scene.

Name: The name of the selected model or part. Type over this name to change it.

Hide: Toggles the visibility of the selected model in the 3D Viewport.

Faded: Hides a model to the camera, but leaves it in the scene otherwise.

Rotate: left click one of these buttons to rotate the selected model by 90-degrees around the selected axis.

Symmetry: Mirrors the selected object across the specified axis. This is useful for a symmetric object because you can import just half the object, halve the number of triangles and instance their symmetric data.

Flip: Reverses the orientation of the model around the selected axis.

Pivot Center:

- **Model**: Moves the pivot point of the selected model to the center of the bounding box of the model.
- **Environment**: Moves the pivot point of the selected model to the center of the environment.

- **Snap to Ground**: Moves the model (or models) so it rests on the ground.
- **Center**: Moves the model to the center of the XZ-plane.
- **Auto Size**: Automatically sizes the model to best fit within the environment, and locates the model at the world origin.
- **Reset**: Moves the model to the location it was first imported into the open project, and returns it to its scale upon initial import.

Transform: Provides parameters for numerically **moving**, **rotating**, and **scaling** of the selected model with the following controls. You cannot transform parts independently of their parent model.

- Position XYZ
- Rotation XYZ
- Scale XYZ
- Scale All

For usage with models, see → Transforming Models, Page 67.

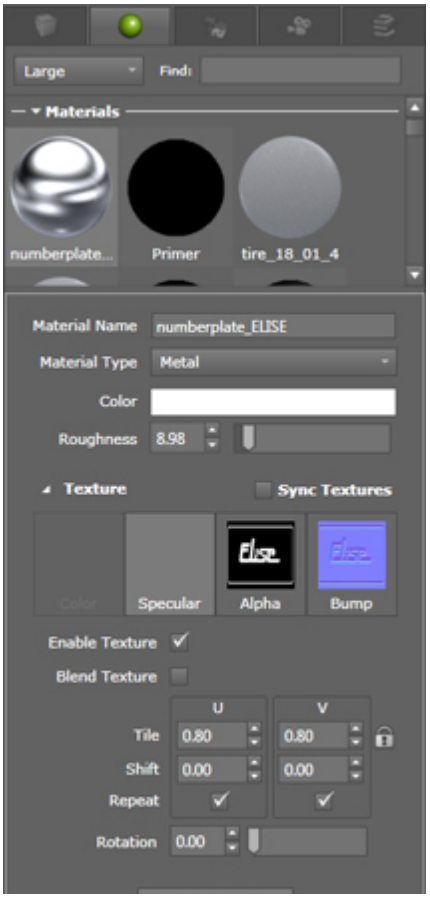
Rasterization Options:

Enable Ground Shadows: Toggles ground shadows on/off in Performance Mode only for example with Raytracing turned off. Has no effect in Raytrace Mode.

Part/Normals Controls: Edits and rebuild the normal vectors on the selected part. For details, see Part/Normals Control on page 61.

- **Texture Mapping:** Controls how textures are mapped onto the selected part. For details, see Texture Mapping on Parts on page 62.

Material Tab



The Material Tab provides you with the options discussed in this section. When you select a material on a model, the material is highlighted in orange.

Material Tree

Each and every material in the open project is listed in the Material Tree near the top of the Material Tab. Display options: tiles, thumbnails, or text lists.

1. To select a material and display its parameters, left click its name or icon in the Material Tree, see image to the left.
2. To apply a material to part in a model in the 3D Viewport, drag and drop the material from the Material Tree to the target part.

Material Parameters

When you select a specific material in the Material Tree, or select a material on a part in a model, the parameters defining the material appear in the Material Tab of the Palette. Exactly which parameters appear and depends on the **type** of the selected material, for example glass, metal, leather, etc. Different parameter

values for the same type of material produce variations within the type, for example silver verses gold. You cannot create new types of materials, but you can edit the values of material parameters to create unique variations within each type.

All materials in RTT DeltaPix share the following parameters:

Material Name: An arbitrary name for the material. You can optionally overwrite the default name.

Material Type: The type, for example category of material – such as glass, metallic paint and plastic. Different types of materials have different parameters. For a list of all types of materials supported by RTT DeltaPix, with details on the parameters for each type, see → Types of Materials in RTT DeltaPix, Page 127.

Texture

Expand to display → Texture Parameters, Page 43.

Texture Mapping

Expand to display parameters for texture mapping, as explained in "Texture Mapping on Parts" on page → Texture Mapping, Page 44.

Save / Reset Material

To Library: Saves the selected material to the Material Library using the RTT Material File format. This action makes the material readily available to other DeltaPix projects on the same PC.

To File: Saves the selected material to an arbitrarily folder using the RTT Material File format. This action makes it easy to share materials with other DeltaPix users.

Reset Material: Resets the material to the state it was in before you started making edits to it.

Texture Parameters

Expanding the **Texture** parameters near the bottom of the Material Tab allow you to add Color, Specular, Alpha, and Bump textures to the selected material. For usage instructions, see → Add and Edit Textures in Materials, Page 83.

After you add a texture, you can tune its parameters. When you apply a material with one or more textures to a part, DeltaPix maps the textures onto the target part. Some of the Texture parameters discussed below pertain to texture mapping:

Sync Textures: Once you fill in the values for one type of mapping, select this option to copy those values to the other types of mapping, assuming the other types have loaded textures.

Color, Specular, Alpha, or Bump: Allows you to load a texture of the selected type: Color, Specular, Alpha, or Bump. This option appears only if you have not already loaded a texture of this type.

Remove Texture: Removes the texture of the selected type, for example if Specular is selected, this button removes the Specular texture.

Enable Texture: Turns on/off the a texture that has already been loaded. This option appears only if a texture of the selected type has already been loaded.

Blend Texture: (Color and Specular textures only) combines the loaded image with the color of the material itself in an additive fashion that allows you to tint textures.

Bump Scale: (applies to Bump textures only) determines the height of the bumps. Negative values give the impression of engraving.

Tile (U, V): The default of (1, 1) causes exactly one copy of the texture to be mapped, from edge to edge, across the target part. Values greater than "1" cause tiles of the texture to repeat across the part. For example, a value of (2, 2) causes the texture to repeat twice along each axis, forming a 2x2 grid of tiles across the surface of the host part.

Shift (U, V): Offsets the center of the texture in horizontal (U) and vertical (V) directions, relative to the normalized texture coordinates on the host part. The default of (0,0) centers the texture on the part.

Repeat (U, V): Toggles between single and multiple copies of the texture. per axis.

Rotation: Rotates the texture in texture space.

Invert Bump: (applies to Bump textures only) when inverted, hills in the bump texture become valleys, and valleys become hills.

Treat as Normal Map: (applies to Bump textures only) when you first add a bump or normal texture, DeltaPix makes an educated guess about which type it is indicated by the half-checked box for this parameter. When using actual normal maps, you can manually select Normal Maps by fully checking this box. Otherwise, use **Treat as Normal Map** to toggle between Bump Mapping and Normal Mapping, and select whichever produces the best results.

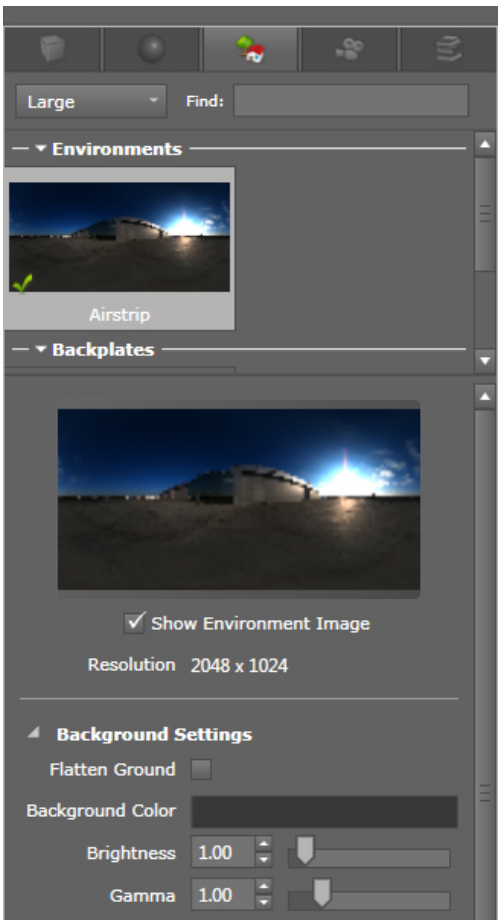
Treat Bumps as Displacement: Converts the highlights and shadows in the greyscale bump texture to actual 3D displacement. This adds realism by adding actual physical depth to the bump texture!

> Technical Note: When making the conversion from 2D to 3D, DeltaPix re-tessellates the underlying geometry to add 2 triangles to every pixel on the texture mapped to that geometry. For high detail textures, you will need a lot of RAM or vRAM.

Texture Mapping

In addition to editing the Texture Parameters discussed above, additional Texture Mapping parameters are available for controlling this texture will be projected onto selected parts in 3D models. For details on texture mapping for parts, see → Texture Mapping on Parts, Page 74.

Scene Tab



The Scene Tab provides you with options for importing, configuring, managing, and applying environmental lighting.

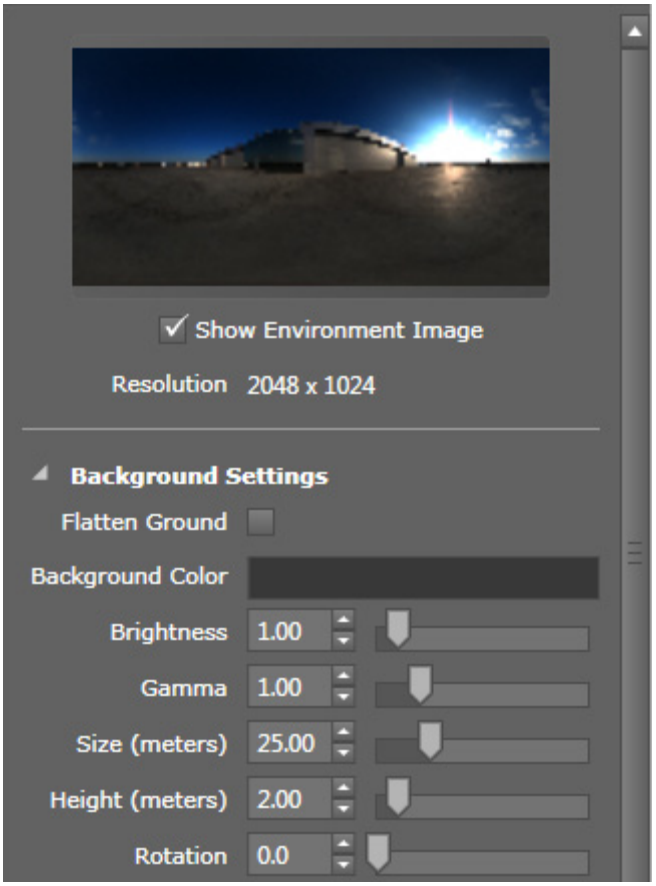
Scene Tree

Every HDRI environment image loaded into the open project is listed near the top of the Scene Tab. The tree of images can take the form of tiles, thumbnails, or text lists.

1. To select an environment image and display its parameters, left click it's icon or name in the Environment Tree.
2. To switch to different environment image in the open project, -double left click its name or icon in the Environment Tree.

Alternative: drag and drop the environment's icon from the Palette into the Viewport.

HDR Environment Parameters



When you select an HDR image in the Environment Tree, DeltaPix displays the following parameters in the Environment Tab. You can edit these parameters to tune the selected environment image.

> When you create a new sun and sky environment, it will use different parameters, as explained in the Environments chapter.

Show Environment Image: Toggles visibility of the environment image loaded in the 3D Viewport. Even when invisible, the loaded environment image still emits light into the scene.

Flatten Ground: When enabled, the environment becomes a half-sphere. When disabled, the environment becomes a full sphere.

Background Color: Determines the background color of the 3D Viewport outside the environment sphere. left click the color to display a standard color picker.

Brightness: Adjusts the overall brightness of the selected environment image.

Gamma: Indirectly adjusts the contrast of the selected environment image.

Size: Determines the radius, in meters, of the environment sphere.

Height: Shifts the loaded environment image vertically, up and down, on the environment sphere.

Rotation: Rotates the loaded environment image on the environment sphere.

Flip Horizontal: Flips the environment image horizontally left / right around a vertical axis in the center of the image.

Ground Reflection: Adjust the visibility of the ground reflection where 0 is off and 1 is full reflection.

Ground Glossiness: Adjusts the roughness of the ground reflection where 0 is perfectly crisp and 1 is fully rough.

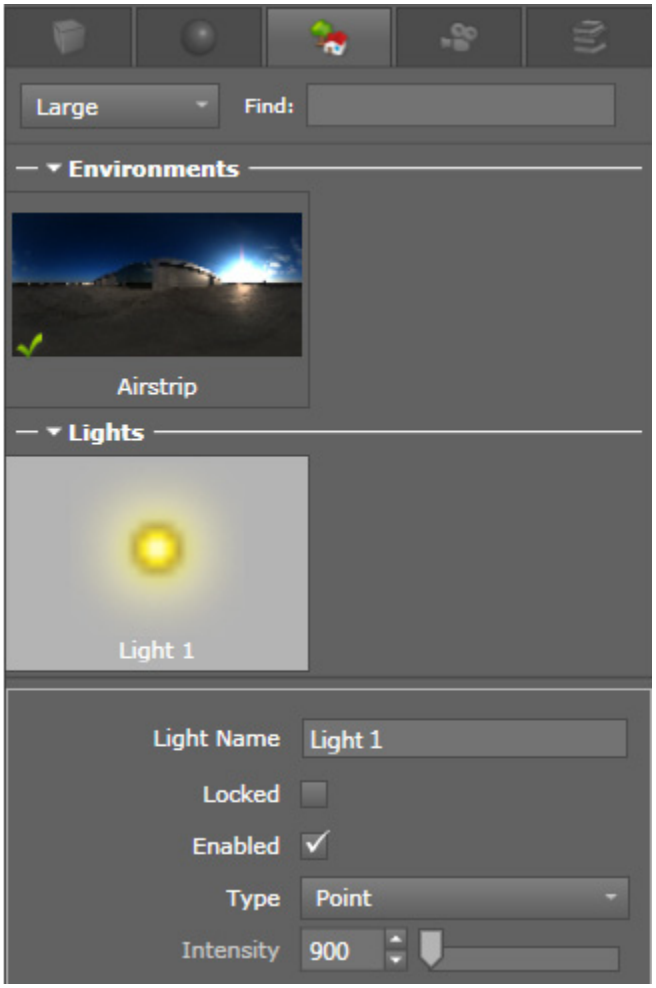
Ground Shadow: Toggles the projection of shadows on the ground in both Performance and Raytrace Modes.

Show Grid: Toggles visibility of a grid in the XZ-plane.

New Sun and Sky Environment: As explained in Create a New Sun and Sky Environment, this special type of environment uses different parameters than those which appear above.

Create New Backplate: Lets you import a new 2D backplate image, which can be in any supported file format. Backplate Parameters are listed below.

Light Parameters



The following parameters appear when you select the icon of an existing light from the Scenes Tab, or you select the light icon in the scene itself.

Light Name: An arbitrary name for the light.

Locked: If enabled, the light cannot be moved.

Enabled: If enabled, the light affects the scene's overall lighting.

Type: Lets you choose between various common types of lights such as point lights.

Intensity: Determines the intensity brightness of the light.

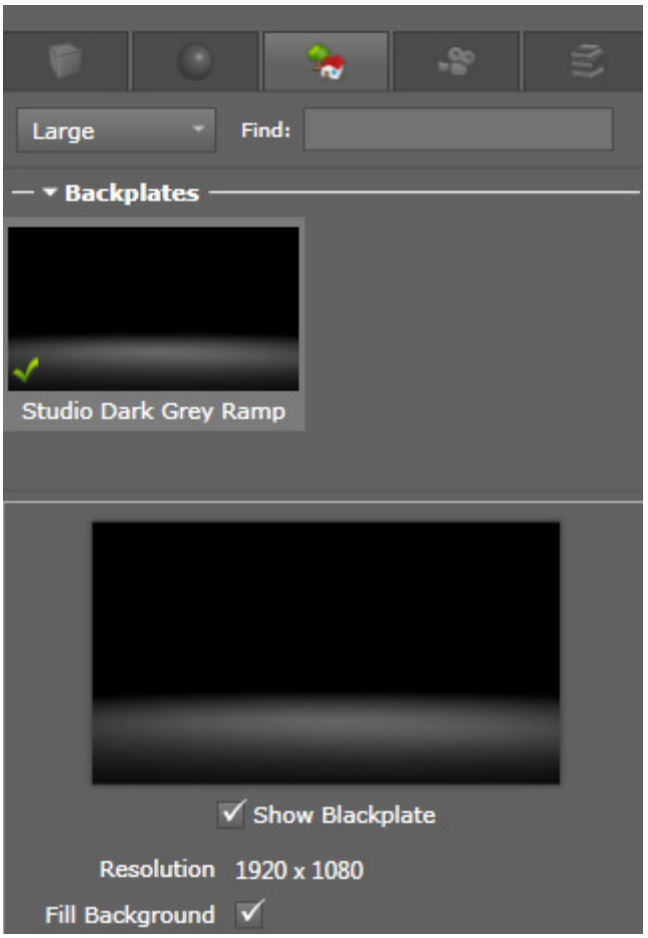
Color: Lets you set the color of the light with the Color Picker.

Color Temperature: Lets you select the light's color in degrees Kelvin.

Area Light Size: Lets you set the radiant area of planar lights.

Transform: Lets you transform the position of the light numerically. Note: You can also transform lights with the Transform Manipulator.

Backplate Tab



If you select a previously loaded backplate image in the Scene Tree, the following parameters appear.

Backplate Parameters

Visible: Toggles the visibility of the loaded plate image.

Resolution: The width and height (in pixels) of the backplate image.

Fill Background: Stretches the backplate to fit within the aspect ratio set on the camera.

Fit Camera to Aspect Ratio: Adjusts the camera to match the dimensions of the backplate.

New HDR Environment: Lets you import a new HDR environment image.

New Sun and Sky Environment: Lets you create a new sun and sky environment.

Context-Sensitive Scene Menu:

Right click in the upper area of the Scene Tab to display a context-sensitive menu that includes the following options for creating new scene elements:

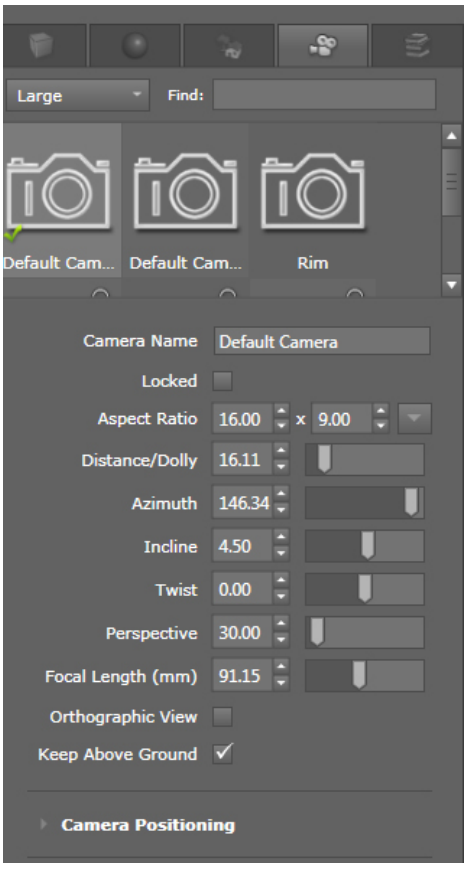
_ New HDR Environment

_ New Sun and Sky Environment

_ New Backplate

_ New Light

Camera Tab



The Camera Tab provides you with options for creating, configuring, managing, and using various cameras to view and record your scene.

Camera Tree

Each camera in the open project is listed near the top of the Camera Tab. The Camera Tree can take the form of tiles, thumbnails, or text lists.

1. To select a camera for editing, left click its name or icon in the Camera Tree.

2. To switch to different camera in the open project, double left click its name or icon in the Camera Tree. drag and drop works to.

Camera Parameters

Camera Name: An arbitrary name you can give a camera.

Locked: Prevents movement of the selected camera.

Aspect Ratio: Sets the aspect ratio of the rendered area within the 3D Viewport. Type over these values to change them.

Distance / Dolly: Determines the distance between the selected camera and the look-at point. You can also dolly / zoom the camera in several other ways, as explained in → Zoom the Camera, Page 59.

Azimuth: Rotates the selected camera around the look-at point. You can also rotate the camera in several other ways, as explained in Rotate the Camera, Page 58.

Incline: Moves the selected camera vertically.

Twist: Tilts the selected camera left/right without moving its 3D position. You can also twist the camera in several other ways, as explained in → Twist the Camera, Page 59.

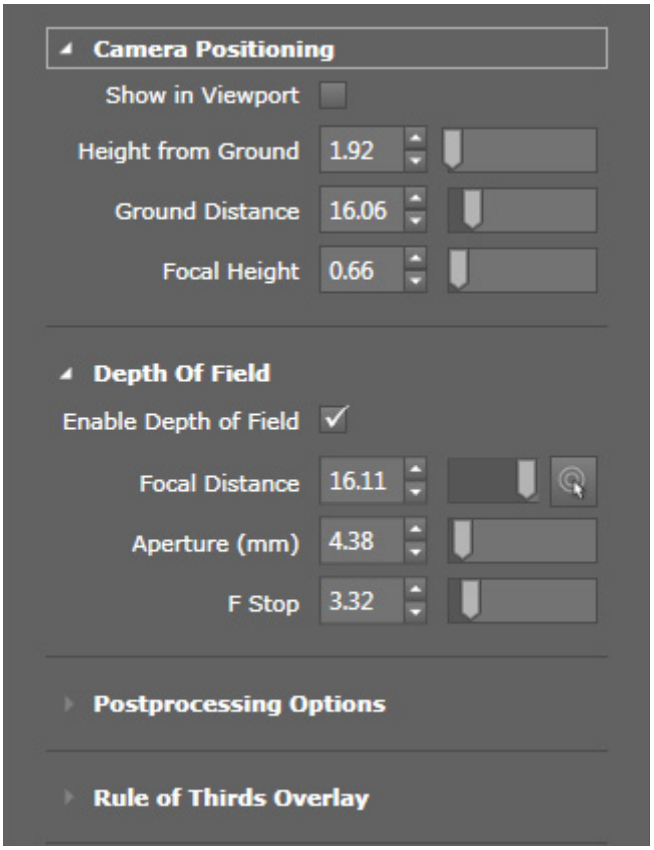
Perspective: Controls the amount of perspective distortion in the selected camera by changing the focal length of its virtual lens. Smaller perspective values reduce perspective distortion, and increases the focal length of the lens. Larger values do the opposite.

Focal Length (mm): Controls the amount of perspective distortion in the selected camera according to an accurate simulation of optical physics in camera lenses. Although the 3D position of the camera remains unchanged, smaller values provide a wider angle of view and therefore seem to move the camera further away. Larger values do the opposite.

Orthographic View: Toggles between perspective and orthographic cameras. When enabled, all perspective distortion is eliminated, regardless of the values of **Perspective** and **Focal Length**.

Keep Above Ground: When enabled, you cannot move the camera below the ground in the open project. When disabled, you can move the camera anywhere.

Camera Positioning



These parameters let you view an overlay showing the distance between the World Origin and the cameras you select in the Cameras Tab of the Palette. The distances will be accurate provided the model scale in your scene is accurate. To use this feature, you must be viewing the scene from another camera entirely.

Show in Viewport: If enabled, the distance of this camera to the World Origin will be shown in the Viewport.

Height from Ground: Allows you to move the camera's height above the ground in your scene.

Ground Distance: Allows you to move the camera horizontally closer to, or further from, the World Origin of your scene.

Focal Height: Allows you to set the height of the camera's focal plane, relative to the ground in your scene.

Depth of Field

Depth of Field is the rate that blur increases for objects further from the focal plane. Controls:

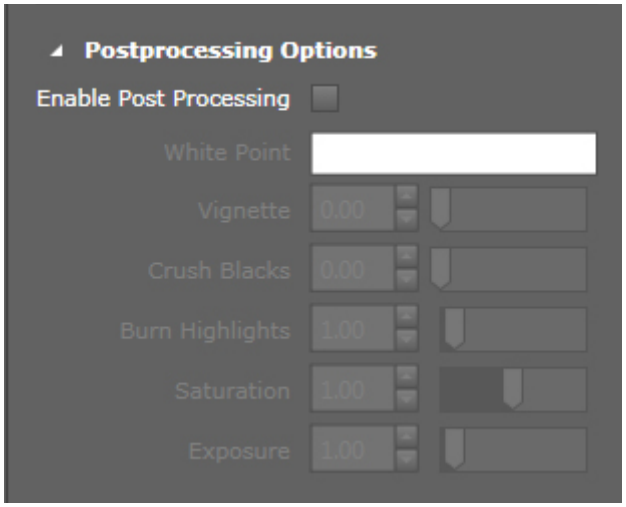
Enable: Toggles the calculation of depth of field.

Focal Distance: The distance between the camera and the point of optimal focus.

Aperture (mm): Uses millimeter to set the diameter of the opening in virtual lens of the selected camera.

F-Stop: Uses F/stop to set the diameter of the opening in virtual lens of the selected camera.

Post-Processing Options



The following Post-Processing options add various photographic effects to the scene, when viewed through this camera. All imagery produced from this camera – including the real-time view in the DeltaPix Viewport, as well as snapshots and all types of rendering and animations – uses these settings:

Enable Post-Processing: Activates post-processing of this camera view and all imagery that comes from it.

White Point: Sets the white point of all imagery coming from this camera.

Vignette: Creates a soft shadow near the edges of the camera's field of view.

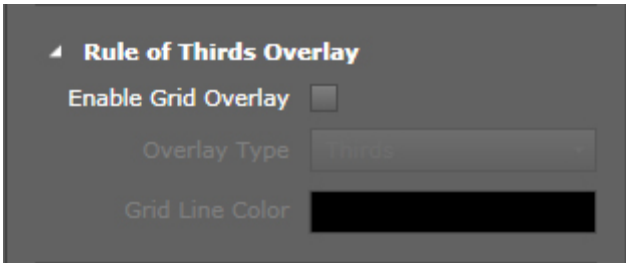
Crush Blacks: Makes affected areas brighter, so as to add detail to shadows.

Burn Highlights: Makes affected areas darker, so as to recover blown out highs.

Saturation: Increases / decreases the color saturation of the image.

Exposure: Increases / decreases the density (brightness) of the scene.

Rule of Thirds Overlay



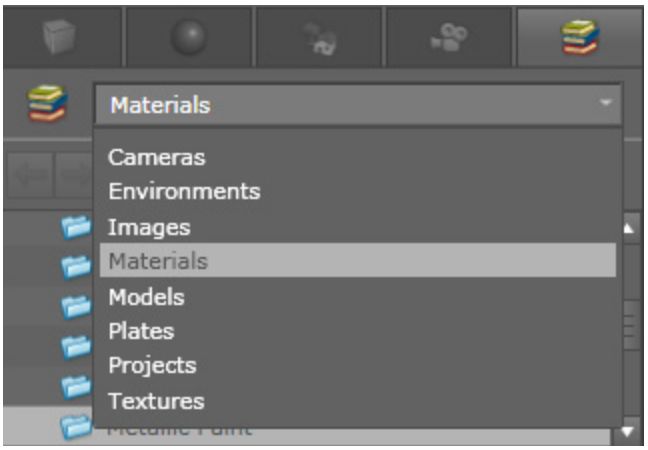
This feature toggles an overlay of a **Thirds Ruler** or **Quarters Ruler** to aid with composition when using this camera. You can configure the **Grid Line Color** to your preference.

Miscellaneous

Reset Camera: Resets the camera to the factory defaults.

Save Camera File: Saves the selected camera to the Cameras Library, using the RTT Camera File format. You thereby have the option to load this camera in a separate project, and share the camera with other DeltaPix users.

Library Tab



The Library Tab provides you with the means to import and manage files in specific libraries (see list below).

A drop-down list at the top lets you store files in the following libraries:

_ Project Library

_ Material Library

_ Model Library

_ Environment Library

_ Plates Library

_ Texture Library

_ Image Library

_ Camera Library

In the Palette, near the top of the Library Tab is a search option and a triangle. If you left click the triangle, something like Windows Explorer will appear so you can create sub-folders and organize your items in them (see figure). These sub-folders will be created under the location of the current library. For example, you can create new sub-folders in the Material Library, so you can organize your materials however works best for you.

A list of the items in a library occupies the entire lower space of the Library Tab.

You can change the default folders for the Libraries in two ways:

_ Either edit the paths in the General Tab of the Options Dialog,

_ or drag new folder from Windows Explorer into the target libraries in the Library Tab of the Palette (one library at a time)

Project Library

The Project Library contains the project files in the `RTT DeltaPix Content \ Projects` folder, by default.

To load a project in RTT DeltaPix, drag and drop a project file from the Project Library to the **3D Viewport**.

Material Library

The Materials Library contains the material files in the `RTT DeltaPix Content \ Materials` folder, by default.

To apply the material to a part on a model, drag and drop the material from the Materials Library to the target **part** in the 3D Viewport. Once applied, the material will be saved with the project. For example added to the list of materials in the Material Tab of the Palette, and become independent of the Materials Library.

Model Library

The Models Library contains the model files in the `RTT DeltaPix Content \ Models` folder, by default.

To add the model to the open scene, drag and drop the target model file from the Models Library into the **3D Viewport**. Once added, the model will be saved with the project. For example added to the list of models in the Model Tab of the Palette, and become independent of the Model Library.

Environment Library

The Environments Library contains high dynamic range images in the `RTT DeltaPix Content \ Environments` folder, by default.

To apply the image to the environment of the open scene, drag and drop an HDRI image file from the Environments Library to the 3D Viewport. Once applied, the HDRI image will be saved with the project, i.e. added to the list of HDRI images in the Environments Tab of the Palette, and become independent of the Environments Library.

Plates Library

The Plates Library contains the backplate images in the `RTT DeltaPix Content \ Plates` folder, by default.

- To apply an image to the backplate of the open project, drag and drop the target image from the Plates Library into the 3D Viewport. Once applied, the image will be saved with the project. For example added to the list of images in the Plates Tab of the Palette, and become independent of the Plates Library.

Texture Library

The Textures Library contains the images in the `RTT DeltaPix Content \ Textures` folder, by default. These images are intended for use as textures in materials. For usage, see → Add and Edit Textures in Materials, Page 83.

Image Library

The Images Library contains images in the `DeltaPix Content \ Images` folder, by default. The Images Library is where DeltaPix saves screenshots and renderings.

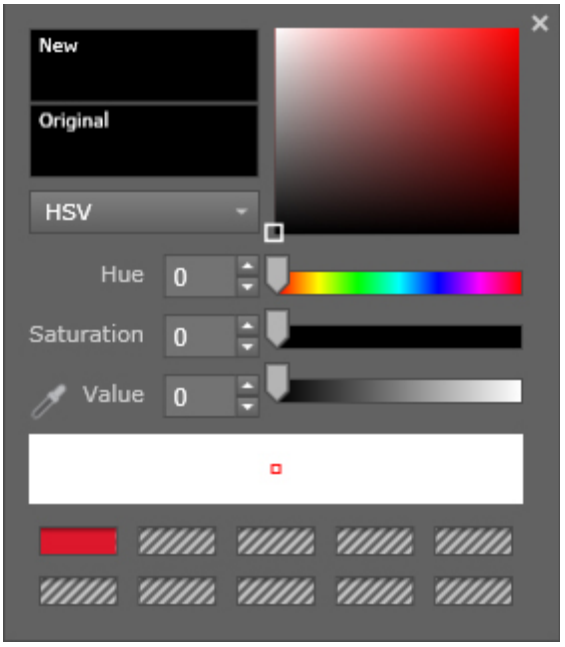
Double click an image in the Image Library to display a larger view of the image in the Image Viewport.

Camera Library

The Camera Library contains images in the `RTT DeltaPix Content \ Cameras` folder, by default.

To load a library camera into the open project, drag and drop it from the Camera Library into the 3D Viewport. Once loaded, the camera will be saved with the project. For example added to the list of cameras in the Cameras Tab of the Palette, and become independent of the Camera Library.

Color Picker



The Color Palette is available on various Tabs and several dialog boxes.

You can select the Color Palette from wherever a color parameter appears. For example, when you select a material in the Material Tab, its color parameters appear as strips of color. Clicking any of these color parameters displays the Color Palette for editing that color.

The Color Picker has all the standard controls, plus an eyedropper that lets you sample colors anywhere on your screen – even outside the DeltaPix window! Usage:

1. Click and hold down the left mouse button over the target color.

   > The rectangular window with the little red box is a deep zoom of what is under the color dropper.

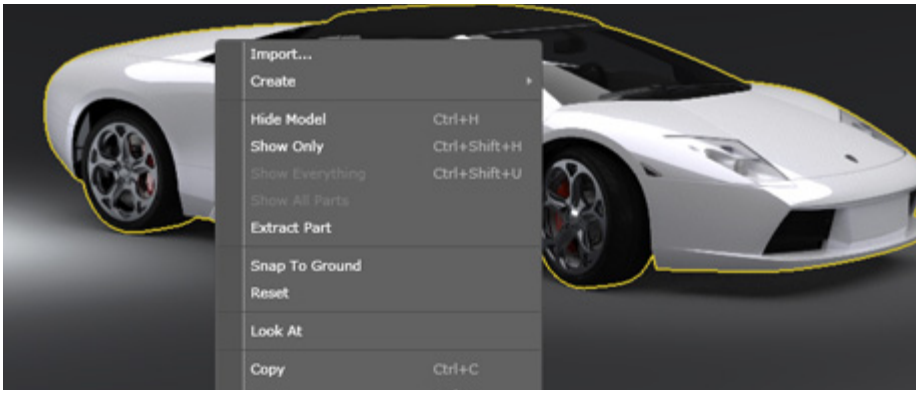
2. Release the left mouse button to select the color you are hovering over.

Context Sensitive Menu

For convenience, RTT DeltaPix provides a context sensitive drop-down menu that appears when you right click various things in the user interface. The options in the Context Sensitive Menu change according to what you select and the circumstances.

The Context Sensitive Menu provides quick access to commonly tools that can be invoked in other ways, as explained elsewhere in this Guide. In short, the Context

Sensitive Menu does not provide you with any unique options; it just makes some common options more accessible.



The Camera

This section describes how to use the camera in RTT DeltaPix.

Basic Camera Movements

You can rotate the camera, pan the camera, and zoom the camera the camera relative to its look-at point. For example the point in the scene that the camera is focused on. You can also change the look at point, and save a camera to a file, among other things.

By default, the camera is restricted to moving above ground. To let the camera move below the ground, de-select **Keep Above Ground** in the Camera Tab of the Palette.

Rotate the Camera

This option rotates the camera around the selected look-at point:

To rotate the camera around the look-at point, hold both the alt key and mouse left mouse button, and then drag the mouse .

- Alternative: left click the Camera Control in the Toolbar, and select the **Rotate** icon. Then left click hold and drag the mouse without holding the Alt-Key.

Pan the Camera

Panning the camera moves it left/right and up/down in the current viewing plane. The camera keeps pointing in the same direction, and the look-at point moves with the camera.

To pan the camera, hold both the Alt-Key and MIDDLE mouse button, and drag the mouse .

_ Alternative: left click the Camera Control in the Toolbar, and select the **Pan** option. Then left click hold and drag the mouse without holding the Alt-Key.

Zoom the Camera

Zooming the camera moves the camera closer to or further away from the object, while pointing in the same direction. Technically this is a dolly camera, but the term "zoom" is more widely understood.

To zoom the camera, hold both the Alt-Key and right mouse button, and drag the mouse .

_ Alternative 1: left click the Camera Control in the Toolbar, and select the **Zoom** option. Then left click hold and drag the mouse without holding the Alt-Key.

_ Alternative 2: Change the **Distance/Dolly** parameter in the Camera Tab of the Palette.

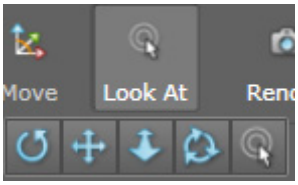
Twist the Camera

Twisting the camera rotates it clockwise / counterclockwise in the 2D plane of the screen:

To do a 2D twist around the center of the 3D Viewport, select the **Twist** option from the drop-down Camera Control in the Toolbar, and drag THE mouse without holding down the Alt-Key.

_ Alternative: Change the **Twist** parameter in the Camera Tab of the Palette.

Change the Look At Point



The Look-at point acts like a pivot point for the Rotate and Zoom methods of moving the camera.

To set a new look-at point, left click the Camera Control in the Camera Bar, and select the **Look-At** option. Then left click the desired location of the new look-at point in the 3D Viewport. The camera will move to center the new look-at point.

> Panning the camera moves the look-at point with the camera.

Additional Camera Controls

Reset the Camera

Resetting a camera restores its position and the look-at point to the World Origin, and sets the focal length and other camera parameters to their default values.

To reset the active camera, press the **Reset Camera** button in the Camera Tab of the Palette.

Lock / Unlock

To prevent the current camera from moving, select the **Locked** button in the Camera Tab of the Palette.

_ Alternative: Toggle the lock icon next to the Camera drop-down menu in the Toolbar.

Use Camera Presets

Making a camera preset allows you to return later to the exact position and settings of the current camera.

1. To preset the current camera, left click the **plus +** next to the Camera drop-down menu in the Toolbar.
2. To return to any recorded Preset, select the **desired Preset** from the Camera drop-down menu in the Toolbar.

Save a Camera to a File

The current settings and position of the active camera can be saved to a file, which makes it easy to share cameras with other RTT DeltaPix projects and other users.

To save the active camera to a file, left click the **Save Camera File** button in the Camera Tab of the Palette. DeltaPix saves the camera to the Camera Library, by default.

Working with 3D Models

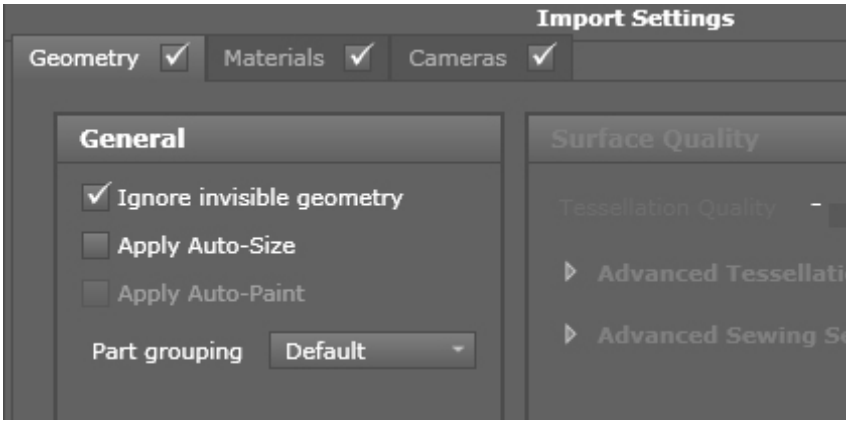
You can load multiple 3D models into your RTT DeltaPix project. In this document, models, objects, and meshes are all the same thing: 3D geometry that's defined in a computer file. Coordinates within a model are in model space, for example relative the model's origin, and coordinates in a RTT DeltaPix project are in project space, for example relative to origin in the center of the scene. The separation of model space and project space helps RTT DeltaPix preserve the correct relative sizes of multiple models in the same RTT DeltaPix project.

Importing Models

RTT DeltaPix can import 3D models in many common file formats. Most 3D modeling software today can export to at least one of the formats that RTT DeltaPix can import. For a complete list of supported import formats, see → Import Formats for 3D Models, Page 125.

Importing a model is easy:

1. To import a model, select **File > Import** from the Main Menu. The Load/ Import Model dialog appears, so you can locate and load a model.
   - Alternative: Select **Project > Import Model** from the Main Menu.
   - Alternative: In the Model Tab of the Palette, right click in the Model Tree, and select **Import** from the Context Sensitive menu.
2. Depending on the file format being imported, a dialog may appear with import options. If the dialog appears, select the import options you prefer and left click **OK** to import the model:



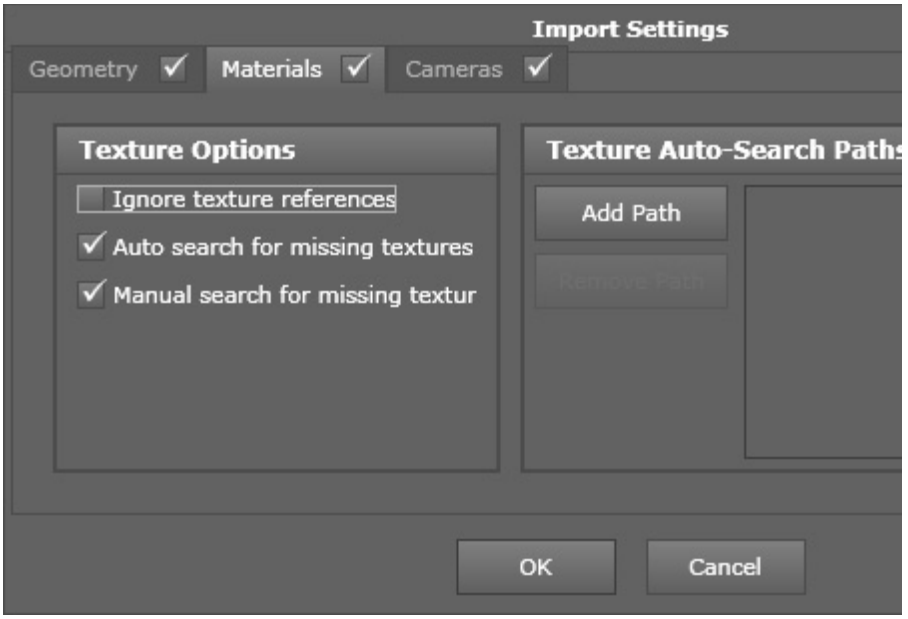
Geometry:

- **Ignore Invisible Geometry**: If geometry in the source model is set as invisible, then DeltaPix ignores that geometry upon import.
- **Apply Auto-Size**: Automatically sizes the model upon import to best fit within the environment of the open project.
- **Auto Paint**: When enabled, auto-paint builds an association between the names you give parts/materials/layers in your CAD package and the names of DeltaPix materials you assign to those parts after import. Based on your paint/naming pattern, DeltaPix learns how to auto-paint a model upon import.
- **Part Grouping**: Divides geometry into parts based on your choice of groups, materials, and/or divisions in the source model. The Default option generally recommended uses all three to produce the most diverse divisions.
- **Tessellation Quality:** determines the relative accuracy of the results when converting a model to polygons. The higher the tessellation quality, the more polygons are used to represent curved surfaces in the model, and the smoother the results. The downside to high quality tessellation is a heavy model with a large file size that's more taxing on your hardware.
- **Advanced Tessellation Settings**: Lets you fine-tune exactly how models get tessellated i.e. converted into polygons. Experts only.
- **Advanced Sewing Settings**: Specifying multiple passes ensures that parts in models are all connected i.e. they all share vertices, so as to eliminate seams between adjacent materials.

Materials:

- **Ignore Texture References**: ignore all textures associated with materials in the source model.
- **Auto Search for Missing Textures**: look in logical places for missing textures referenced by materials in the source model.
- **Texture Auto-Search Paths**: Lets you specify where DeltaPix looks for textures referenced by materials in the source model.

Cameras: When importing CSBs or JTs from RTT DeltaGen, all camera objects will be imported.



Importing CSB Files

You can import all CSB stored files with DeltaGen 8.0 or later with the following features:

Hierarchy and transformations

_ Groups

_ Switches only visible

_ LODs only 1.

_ File Nodes all supported file formats from DeltaPix

Geometry

_ Polygons only

_ Body & Shells are imported as polygon current tessellation

Materials

_ Legacy looks will automatically be converted to non-legacy looks

_ Looks and Override looks

_ Override looks will be applied to underlying shapes

Cameras,

_ All cameras are imported

Lights

- Point, Spot and Directionallights as global lights
- It's possible to deactivate at import

Importing OBJ Files

When exporting the OBJ file from your source software, make sure to choose a tessellation that meets your needs. Close-ups in RTT DeltaPix look best at higher tessellation, for example more triangles for smoother surfaces, than more distant views. You must determine tessellation inside the 3D modeling software you are using to create the model. You can't change the tessellation of a model after it's been imported into RTT DeltaPix.

Fine tessellation increases the size of an OBJ file, so ensure that your computer has enough RAM and other resources to handle your preferred degree of tessellation.

The OBJ file format does not support a full scene graph, but it does maintain all material assignments, including textures. When importing an OBJ file and its material files, make sure that all associated files stay together in the same folder. Upon import of the OBJ file, RTT DeltaPix will automatically copy the model's textures into the Textures Library.

All materials inside the OBJ file are converted to material groupings in RTT DeltaPix. Specifically, all parts in your model sharing the same material will become a single material group in RTT DeltaPix. You cannot alter imported material groups from within RTT DeltaPix. Hence, you must assign materials in your 3D modeling software before exporting to OBJ.

RTT DeltaPix interprets imported material files – as well as any texture maps, bump maps, or decals that are used in the model. After importing the model, RTT DeltaPix allows you to edit the resulting material parameters in the usual way, or by assigning other materials from the Material Library.

Importing SolidWorks Files

RTT DeltaPix allows you to directly import SolidWorks 2010 and prior files, SLDPRT and SLDASM.

RTT DeltaPix uses the tessellated information stored with the SolidWorks part files. In most cases, this tessellation is fine enough for good results in RTT DeltaPix, but close-ups may require finer tessellation. Please refer to your SolidWorks documentation for information about refining the tessellation of your part file and/ or entire assembly. Refining tessellation can significantly increase file size, as can importing larger assemblies. Make sure that your computer has enough RAM and other resources to handle large files. Importing and rendering larger files may affect system performance.

When importing a single part file, RTT DeltaPix uses the materials that were inside SolidWorks in order to determine the material groups. RTT DeltaPix places identical materials into a single material group. Objects with no assigned materials will use a single material group.

When importing an assembly file, RTT DeltaPix assigns an individual material group to every part in the assembly, as well as any material that is contained within the individual parts. Identical parts will be grouped into a single material group.

Upon import, RTT DeltaPix interprets any materials described in the SolidWorks file, including texture and bump maps that have been applied in SolidWorks. RTT DeltaPix stores all necessary information in a BIFfile.

Importing Rhino Files

Before importing Rhino files (3DM format, version 4.0 or earlier), make sure that your individual parts and material groups are on individual layers in Rhino. RTT DeltaPix converts individual layers to different material groups. In addition, you will need to assign material to all objects by layer.

Importing SketchUp Files

When importing SketchUp files (SKP format, version 7.0 or prior), RTT DeltaPix takes the geometry and color information, along with all applied textures, and brings them into RTT DeltaPix. All textures are kept in a separate folder together with the original SketchUp file in the original location.

Importing IGES Files

When importing IGES files, RTT DeltaPix recognizes any layer information inside the IGES file. These layers result from layer information in the original CAD file, or the assembly structure. Each layer is imported as an individual material group. Original materials are not recognized.

Importing STEP Files

RTT DeltaPix recognizes assembly information inside imported STEP files. All parts inside the assembly result in individual material groups. Original materials are not recognized.

Importing WIRE Files

DeltaPix can import WIRE files automatically – provided you have an Autodesk Alias product installed from 2008 - 2011. If no Autodesk Alias product is installed please contact RTT Software Services department.

Importing PLMXML Files

DeltaPix can import the hierarchy and transformations from groups and file references.

Importing JT Files

DeltaPix can import the:

Hierarchy and transformations

_ Groups

_ LODs only 1.

_ File references

Geometry

_ Polygons only

JT Materials

DG Materials

_ Legacy looks will automatically be converted to non-legacy looks

_ Looks and Override looks override looks will be applied to underlying shapes

_ Except restrictions

Cameras

_ All cameras are imported

Transforming Models

There are several ways you can transform (i.e. move, rotate, and/or scale) 3D models in the open RTT DeltaPix project:

_ Numerical Transforms

_ Using the Transform Manipulator

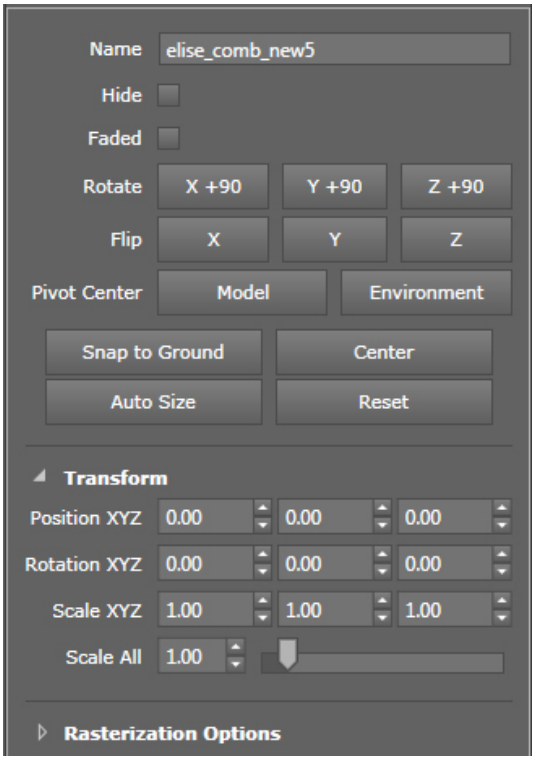
All transforms are relative to pivot point of the model. The pivot point of the model is determined by the external modeling software used to create the model. In the drop-down menu of the Transform Manipulator,

_ if you select **Absolute Mode**, transforms are relative to a copy of the world axis at the pivot point of the model;

_ if you de-select **Absolute Mode**, transforms are relative to the model's local axis and pivot point.

Numerical Transforms

Numerical transforms allow precise translation, rotation, and scaling of a model. You control numerical transforms with the Model Tree and Transform parameters in the Model Tab of the Palette. The Model Tree lists all the models in the open project, and the parts in each model.



1. In the Model Tab of the Palette, left click the **target model's name** in the Model Tree to select the model.

   _ Alternative: Select the Model Selector in the Toolbar, and then double click the target model in the 3D Viewport.

2. To numerically transform the selected model, change its position, rotation, and scale in the Model Tab of the Palette.

   _ **Position XYZ:** changing these values causes the model to move along the selected axis (from left to right: X, Y, Z). For example, entering "5" in the X-field causes the model to move 5 units along X-axis of the project's coordinate system.

   _ **Rotation XYZ:** changing these values causes the model to rotate around the selected axis (from left to right: X, Y, Z). For example, entering "90" in the Y-field causes the model to rotate 90-degrees around the Y-axis of the project's coordinate system.

   _ **Scale XYZ:** changing these values unequally distorts the model (i.e. entering different values in the (X, Y, Z fields scales the model by a different amount along each axis.

- **Scale All:** changing this value to something other than "1" causes the model to grow or shrink proportionally. For example "2" will double the size of the model, and "0.5" will half its size.

For a comparison of numerical and visual transforms, see the table in → Using the Transform Manipulator, Page 69.

Using the Transform Manipulator

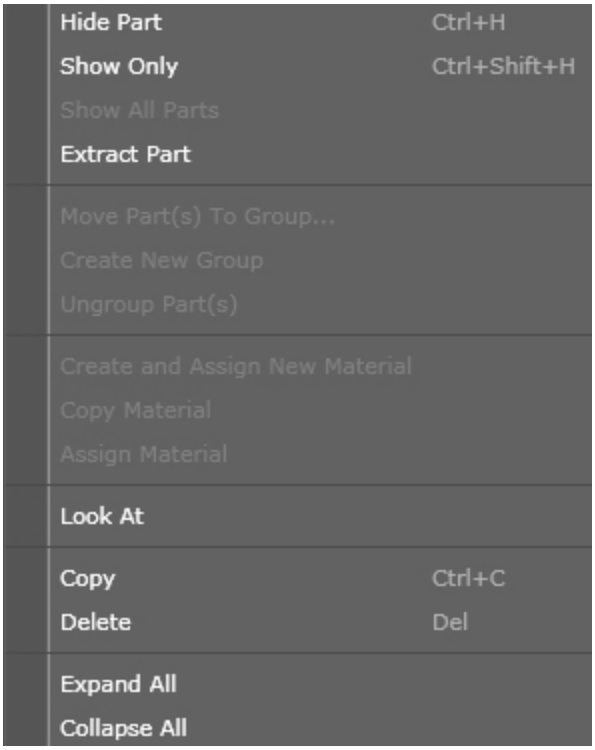
You can transform a model visually with the Transform Manipulator. Visual transforms are quick and easy, but not as precise as numerical transforms.

1. Active the Model Selector Tool in the Toolbar, and select the target model in the 3D Viewport. You can't transform individual parts separately from their parent model.
2. Activate the Transform Tool in the Toolbar, and select either **Move** to translate and rotate the model, or **Scale** to scale the model. The Transform Manipulator appears in the 3D Viewport. Then follow the instructions in the table below.

Action	Numerical Transforms from the Model Tab in the Palette	Visual Transforms with the Transform Manipulator
Move the model	**Position XYZ**: Moves the model along the selected axis (X, Y, or Z) by the distance you specify.	_ Move: left click hold the desired axis and drag the mouse to move the model: _ Red Line: Moves along X-axis _ Green Line: Moves along Y-axis _ Blue Line: Moves along Z-axis _ Yellow Box: Free form moves
Rotate the model	**Rotation XYZ**: Rotates model around the selected axis (X, Y, or Z) in degrees.	Move: left click hold the ring around the desired axis, and drag the mouse to rotate the model around that axis: _ Red Ring: Rotates around X-axis _ Green Ring: Rotates around Y-axis _ Blue Ring: Rotates around Z-axis

Action	Numerical Transforms from the Model Tab in the Palette	Visual Transforms with the Transform Manipulator
Scale the model	**Scale XYZ**: Scales the model along each axis individually (X, Y, or Z), which distorts the model. **Scale All**: Scales the model uniformly. The units are relative to 1 = current size. For example, "2" makes your model twice as large as it currently is.	Scale: left click hold the desired axis and drag the mouse to scale the model: – Red Line: Scale in the X-axis – Green Line: Scales in the Y-axis – Blue Line: Scales in the Z-axis – Yellow Box: Scales uniformly
Set the model on the ground	**Snap to Ground**: Moves the model in the vertical axis, until the model's origin is vertically aligned with the world origin.	n/a
Reset all transforms to their values when you last saved the project.	**Reset**: Resets all transforms made since you last saved the project.	n/a
Rotate model 90 degrees	**Rotate:** Rotates model exactly 90 degrees around the selected axis (X+90, Y+90, Z+90)	Move: Hold the Shift-Key while dragging a ring to rotate the model in 15-degree increments.
Flip the model	**Flip**: Mirror the model across the selected axis (X, Y, Z)	n/a
Attach one model to another	n/a	Move: right clickhold the Yellow Box and drag the mouse to move the selected model onto another model. The pivot points of the two models will stick together.

Hiding / Showing Models and Parts



If your source model has parts defined in it, then RTT DeltaPix will preserve these parts when you import the model. In DeltaPix, you can selectively hide and show individual parts on the models in your project. Hiding parts selectively is very useful when applying materials to layered objects and isolating parts for individual renderings. Here's how:

To show / hide models or parts: In the Model Tab in the Palette, select the target model or part in the Model Tree, and toggle the **Hide** check box. Alternatives:

- To hide a model, right click the **target model** in the 3D Viewport and select **Hide Model** from the context sensitive menu.
- To show all models and parts in the project, right click anywhere in the 3D Viewport and select **Show All** from the context sensitive menu.

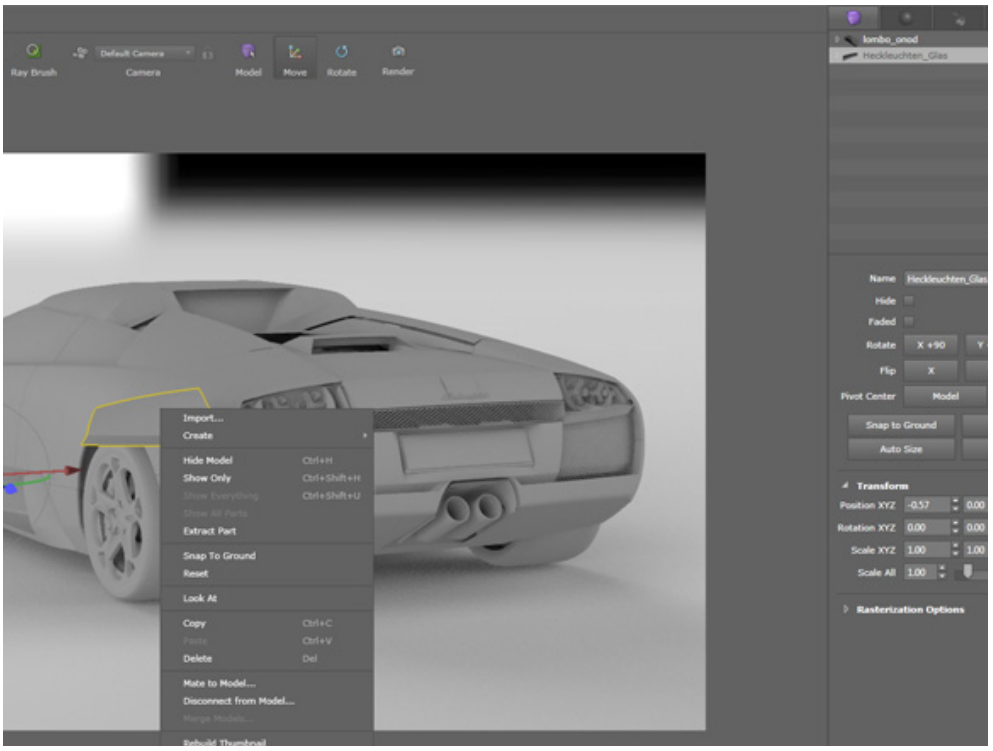
More About Parts

When a material with a texture is mapped to a specific part, some of the mapping properties are inherited from the definition of the material. You can further refine the mapping of the material onto a part you have actively selected in a model. You can also modify the normals in the part, and control Symmetry. Here's how:

Symmetry

Symmetry mirrors the selected part across the specified axis. This is useful for symmetric object because you can import just half the model (have the number of triangles) and instance their symmetric data.

Mate to Model

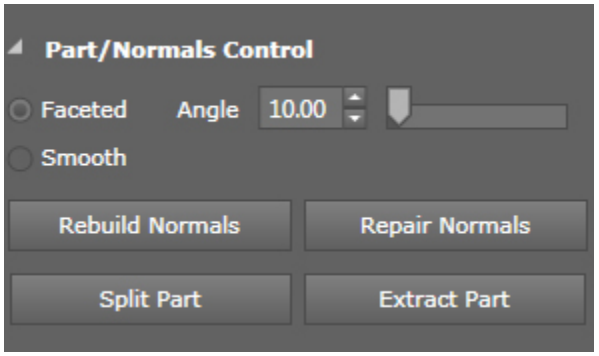


Sometimes it's necessary to add a part to your model. **Mate to Model** makes it easy to fit the part to your model. For example, click on **File > Import**, choose the file with the part, and click **Open**, so you have a new part in your project.

Usually the part is now in the correct position. If not, choose **Model** in the Selection Tool, click on the part with the right mouse button and select **Mate to Model**. After this you can see that DeltaPix placed the imported part in the correct position on your model.

Note: This is only possible, if the imported part is part of the originaly imported model.

Part/Normals Control

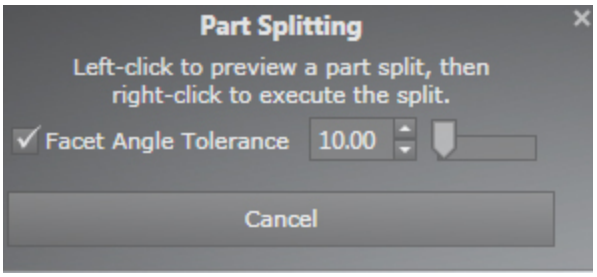


Part and normals control reconstructs normals. This process often solves flipped normals as well as badly formed normals common in SketchUp files and lesser quality data.

Part/Normals Control:

- Faceted: Rebuilds normals with hard edges between the polygons.
- Angle: Defines how sharp an edge is to be.
- Smooth: Rebuilds the normals with a blended joint between polygons, yielding a softer surface description.
- Rebuild Normals: Executes the rebuild process.
- Repair Normals: Aligns normals without rebuilding the texture verts.
- Split Part: See Splitting Models and Parts below.
- Extract Part: See Splitting Models and Parts below.

Splitting Models and Parts



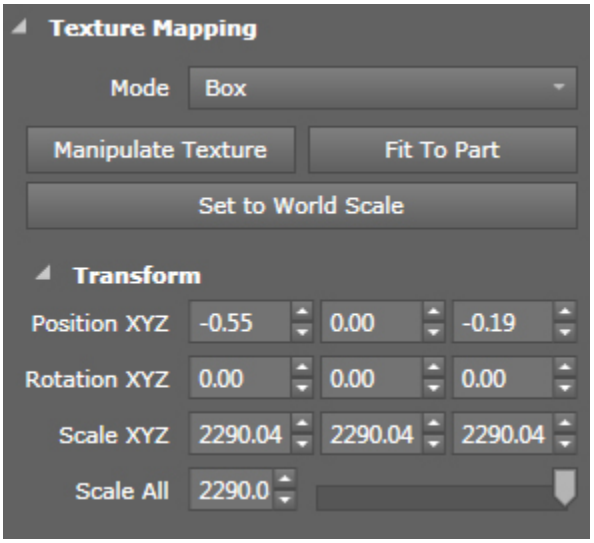
A "part" is a grouping of one or more pieces in a model. Each piece is also a part that can be composed of still smaller pieces, etc. Pieces don't have to be physically next to each other to be grouped together.

Here's how you split parts into smaller pieces:

1. Right click a part in the open scene using the Selection Tool. Alternately, In the Models Tab of the Palette, click the thumbnail of the target part to select it.

2. In the right-click menu, select Extract Part. The Part Splitting dialog appears. Alternately, you can select Extract Part from the Model Tab.
3. In the Part Splitting dialog, adjust the tolerance of part splitting via the Facet Angle Tolerance setting and the slider next to it. To preview the tolerance settings, left click the target part and continue the adjustments.
4. When ready to execute the split, right click the target part again.

Texture Mapping on Parts



The Model Tab in the Palette includes the following Texture Mapping parameters, which appear when you actively select a part in the open model:

Mode: Determines how the selected texture is projected onto 3D surfaces. Each of the following types of texture mapping includes its own parameters for controlling the mapping. For illustrations of all these types except UV mapping, see → Texture Mapping on Parts, Page 74.

- **UV Mapping:** If your object does not have UV coordinates, its textures may not show up initially. Fix by changing projection type.
- **Box:** Uses a "box" projection.
- **Spherical:** Uses a spherical projection with Y being the up-axis. If your object requires spherical mapping in a different direction, rotate the object to align with the projection direction. Move the object back to its original position after mapping.
- **Cylindrical:** Projects the texture as a cylinder standing up (y-direction) for mapping. If your object requires cylindrical mapping in any other direction, rotate the object to align with the projection direction. Move the object back to its original position after mapping.

- **Perspective:** Maps the texture from the current camera angle so that it maps perfectly, but ONLY from the current camera.
- **Planar (X, Y, Z):** Projects a flat texture plane in the X, Y or Z-axis. To determine the direction, turn on the coordinate system in the Image Tab, or use [shift] + C. If the surface you would like to map to is at an angle, you may want to rotate the model so it aligns with the direction of the projection. After mapping, move the object back to its original position, and the mapping will move with it.
- **Radial:** Projects the texture as a circular plane, like a circular version of Planar.

Fit to Part: Sizes the texture projection to the bounding box of the selected part. This option typically yields the best quick fit, and gives you a good starting point to continue editing the placement of the texture.

Manipulate Texture: Lets you visually shift, scale, and rotate the selected texture on an applied surface using the Texture Manipulator, which is a type of Transform Manipulator that acts on textures in materials. For details, see → Texture Mapping on Parts, Page 74.

Set to World Scale: Sets the texture scale to world coordinates so that when that particular texture is applied to multiple parts and each part is set to World Scale, the texture pattern becomes a consistent size on each one of those parts. It will also update on each part when the texture properties such as a tiling, repeat and rotation, are changed.

Transform: Lets you numerically modify the texture mapping on the selected part. The alternative is Texture Mapping on Parts using the Texture Manipulator, as discussed in Manipulate Texture above.

Texture Mapping on Parts using the Texture Manipulator

The Texture Manipulator modifies the 3D projection of a texture in a material, prior to the texture being converted to (U, V) coordinates on the surface of the part the material is applied to. This approach is quite different than using Texture Parameters such as Tile, Shift, and Rotation to adjust texture mapping, because the latter parameters act in (U, V) space after the projection has been applied to the surface of the target part.

The Texture Manipulator functions much like the Transform Manipulator. The obvious difference is that the Texture Manipulator operates on textures in materials, and the Transform Manipulator operates on models.

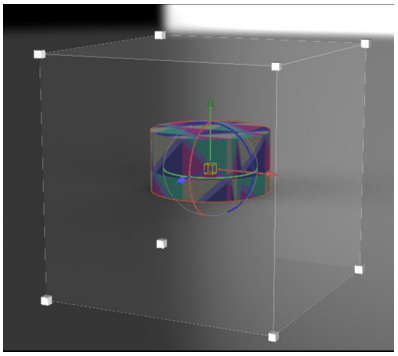
Another key difference is that the Texture Manipulator combines the Move and Scale Transform Manipulator into a single control. Translation and rotation operate the same for both controls, but the scale operates differently on the Texture Manipulator control.

1. Enable the Texture Manipulator, which you can do in 2 ways:
   - If the Selector Tool is in Material Mode, selecting a part in a model causes its parameters to appear in the Model Palette. Then, under Texture Mapping, select the **Manipulate Texture** button.
   - In the Toolbar: If the Selector Tool is in Material Mode, activating the Move Transform Tool displays the Texture Manipulator.

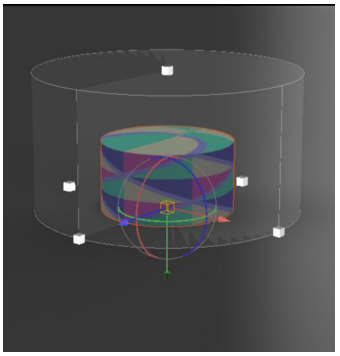
2. To scale with the Texture Manipulator, simply left click hold one of the boxes at the corners of the manipulator, and drag the mouse.
3. To translate and rotate with the Texture Manipulator, follow the instructions for Using the Transform Manipulator, Page 69 – bearing in mind that translation and rotation will affect the texture projection on a part instead of the model itself.

Also of note are minor changes to the Texture Manipulator depending on the projection mode you are using. Here are all variations:

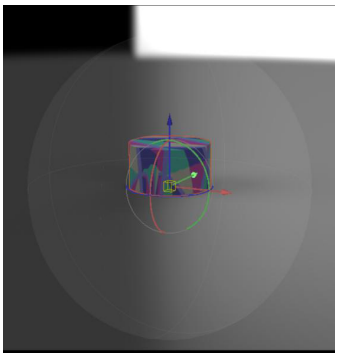
Box

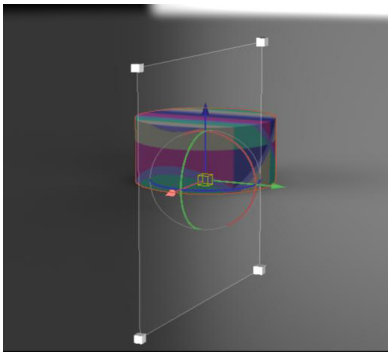


Cylinder

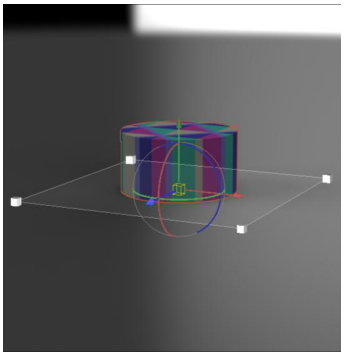


Sphere

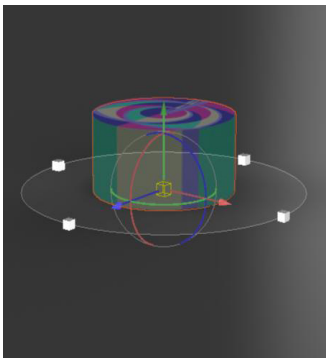




Planar X



Planar Y



Radial

> UV projection mode does not have a corresponding texture manipulator, but all other 3D projection modes do.

Deleting Models and Parts

You can delete individual parts from a 3D model, or delete the entire model. The part or model is not permanently deleted until you save the RTT DeltaPix project.

To delete a model: In the Model Tree of the Model Tab in the Palette, right click the **name** of the target model, and select **Delete** from the context sensitive menu.

_ Alterative: Using the **Model Selector** in the Toolbar, select the target model in the 3D Viewport, and press the DELETE-KEY.

To delete a part in a model: In the Model Tree of the Model Tab in the Palette, right click the **name** of the part, and select **Delete** from the context sensitive menu.

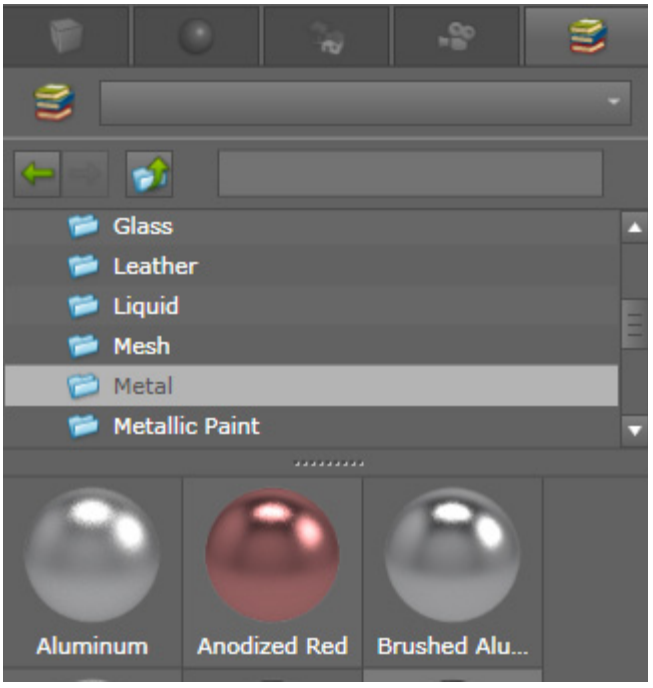
_ Alterative: Using the **Part Selector** in the Toolbar, select the target part in the 3D Viewport, and press the DELETE-KEY.

Working with Materials

RTT DeltaPix comes with a library of pre-defined materials that you can apply to 3D models in your RTT DeltaPix projects. You can also create new materials quite easily. This chapter describes how to work with materials.

For details on the types of materials that come with RTT DeltaPix, and the properties of each type.

Display The Material Library



To display the Material Library, select the **Library Tab** in the Palette, and then select **Materials** from the drop-down menu near the top of the Library Tab.

Apply Materials

You can add an existing material to the open project in two ways: apply a material in the Material Library to a model; and load a material from a model into the Material Tab (i.e. into the project). Once a material is part of the open project, you can then apply materials to parts in models.

A "part" is a subset of a model. A complex car model could have thousands of parts, for example: Each of the 4 wheels could be a separate part, and each wheel part could be composed of smaller parts for the metal rim, rubber tire, lock nuts, and brake rotors.

You cannot define parts in RTT DeltaPix. Parts are defined in the 3D modeling software used to create the original model. When you import a model with parts into RTT DeltaPix, the parts will be preserved.

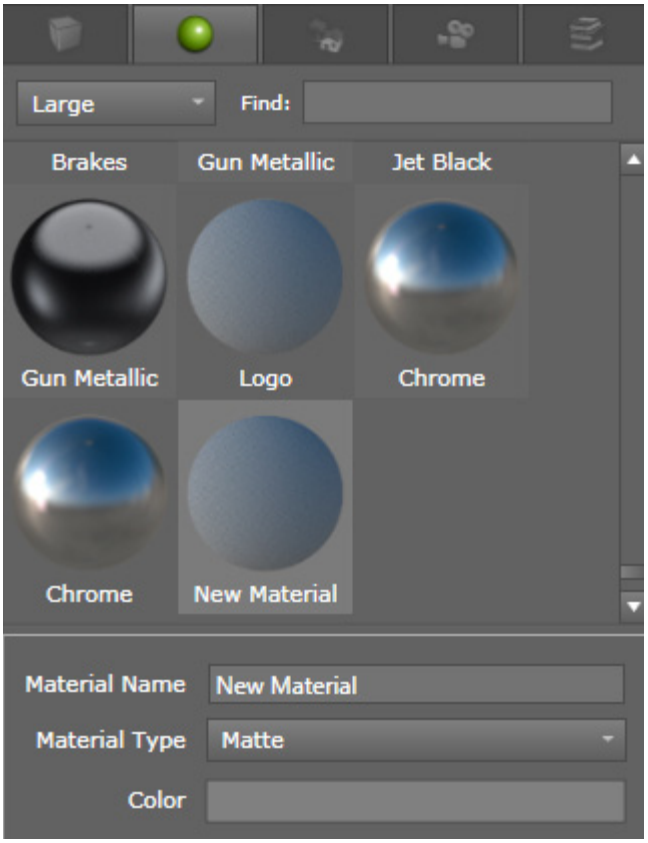
A material in the open project is totally independent from the materials in the Material Library:

- The materials in the open project are saved in the BIF file with the rest of the assets in the project (e.g. models, HDRI images, backplates, cameras, etc.)
- The materials in the Material Library are the files in the **RTT Content \ Materials** folder, by default.

When you apply XYZ material in the Material Library to a model / part in the open project, DeltaPix adds the XYZ material to the project. If you then edit the XYZ material in the project, via the parameters in the Material Tab of the Palette, then the copy of the material in the project will be affected, but the source material in the Material Library will be unaffected. The reason is that materials in the project and those in the Material Library are totally independent of each other,even if they have the same names and parameter values.

When you open a project containing materials that are not in your Material Library, then the new materials will appear in the Material Tab of the Palette. To add such a material to your Material Library, simply select the target material in the Material Tab, and left click the **Save Material To Library** button.

Apply Materials to Parts in Models



The process in this case varies slightly depending on whether your source the material from the Material Library or the materials already in the open project, as explained below.

Use a Material in the Material Library

To apply a material in the Material Library to a part of a 3D model, do the following:

1. Display the material library.
2. drag and drop the desired material from the Material Library onto the target part of the 3D model.

Use a Material in the Open Project

To apply a material in that's already in the open project to a part on a model, do the following:

1. left click the Material Tab in the Palette to activate Material Mode and access a list of materials in the open project.
2. drag and drop the desired material from the Material Tab,not the Material Library in the Library Tab, onto the target part of the 3D model.

Material transfer from DeltaGen to DeltaPix

Approximately 90% of materials used in DeltaPix and DeltaGen Look Libraries are compatible with each other. The remaining 10% of the materials listed below have compatibility issues. There are following limitations when transferring materials from DeltaGen 10.0. / 10.0.1 to DeltaPix via CSB or JT format: Global illumination mode is the reference mode.

Not supported:

Reflection: Blending

_ Modulate

_ Add

Fresnel: Exponent

Textures, Settings, Blending

_ Replace

_ Add

_ Decal

Flakes

BTF measured material

Textures with 2 channels e.g. *.rgb normal maps

Not 100% matching conversion, approximation used:

Fresnel

_ Sum of minimum and scale does not equal 1

Colors

_ Sum of diffuse and specular component > 1

Bump texture: Height iray bug, possibly fixed; absolute value will be used

Transparency Attributes: Absorption Coefficient

Fresnel, if no reflection is activated

Fresnel IOR Minimum, Scale, Exponent is unequal to Transparency Attributes: Refractive index

Textures, if greyscale -> get different gamma if textures have ICC profiles; only observed with tifs

Creating, Editing, and Sharing Materials

RTT DeltaPix's materials are fundamentally different than shaders found in traditional rendering applications. All the materials in RTT DeltaPix are scientifically accurate. It therefore requires far less guesswork to create or edit a RTT DeltaPix material to have the properties you're after.

When you create or modify materials, the changes are saved in the BIF file for the open project, and the new or modified materials are listed in the Material Tab of the Palette. Creating or editing a material in the Material Tab does not add the material to the Material Library. To add such a new or modified material to your Material Library, simply select the target material in the Material Tab, and left click the **Save Material To Library** button.

Create and Edit Materials

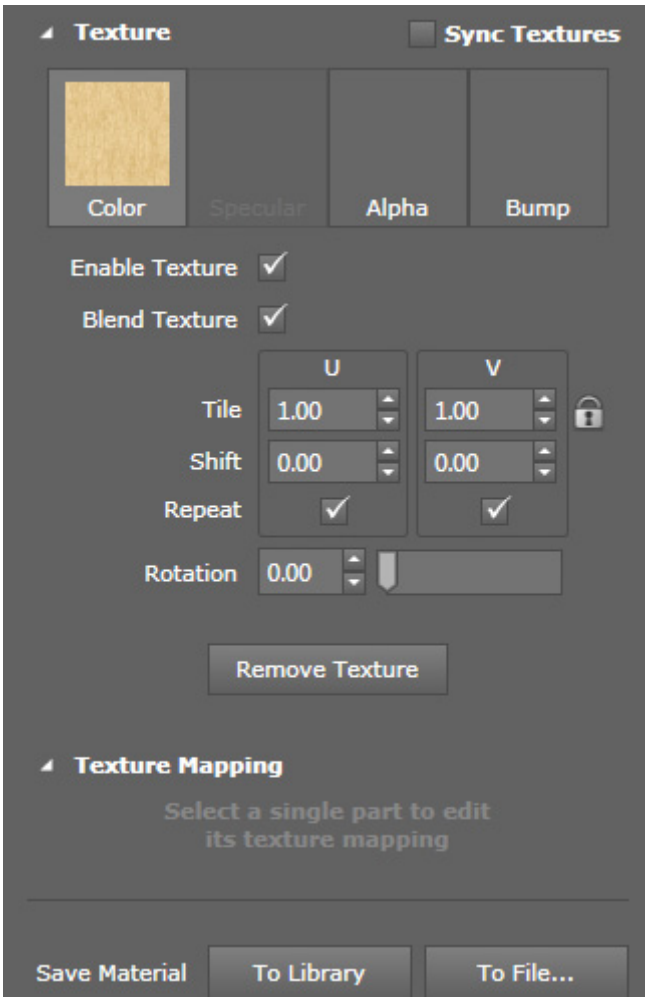
Creating a new material, and editing an existing material, are nearly identical procedures:

1. To create a new material, right click in the Material Tree of the Material Tab in the Palette, and select **New Material** from the context sensitive menu. Or to edit an existing material, left click the desired material in the Material Tree to select the material, and then change the values of its parameters.
2. You can more clearly see the changes you are about to make to a material if you first apply the material to a model in the open scene: drag and drop the target material from the Material Tab to a part of a model in the open project.
3. In the Material Tab of the Palette, ensure that the target material is selected, and then change the **Material Type** parameter, if necessary, by selecting the target type from the drop-down menu.
   - Each type of material has unique parameters. You can change the values of these parameters, but you cannot change which parameters are available except by switching to a different type. Hence, you should first decide upon the target type of the new or edited material before changing any of its parameters.
   - For details on the types of materials that RTT DeltaPix supports, and the parameters of each type, see → Supported Import Formats, Page 125.
4. In the Material Tab, you can edit the values of the Material Parameters for the selected material, as desired.
5. Also in the Material Tab, you can optionally assign textures to your materials, as described in the next section.
6. Once you finish editing a material, you can optionally add it to the Material Library, as follows:

   Select the target material in the Material Tab of the Palette, and left click the **Save Material To Library** button.

Regardless of whether or not the material originated in the Material Library, saving it from the Material Tab to the Material Library adds the modified material to the Library as though it were a totally new material.

Add and Edit Textures in Materials



You can optionally use almost any 2D image as a texture that can be added to a material. When a material with textures is applied to a part of a model, DeltaPix maps the textures on the part according to the properties of the textures. Here's how:

1. In the Material Tab, select the target material in the Material Tree.
2. left click the Color, Specular, Alpha, or Bump channels in the Material Tab to display the Import Textures dialog.

   _ **Alternative:** Drag-and-Drop a 2D image from your desktop, email, or similar source, to the target **Part** of a model in the open scene. Then select which channel to apply the texture to, for example Color.

- With Color textures, non-transparent materials can use a 2D texture instead of a base color. However, Some types of materials, such as Emissive, multiply the base color by the Color texture RGB values.
- If you are adding an Alpha texture for transparency, RTT DeltaPix uses the transparency data in the Color texture only.

3. In the Import Texture dialog, locate and select the target texture.

> You can use any 2D image in a supported format such as JPEG or TIFF, among others. However, if your texture contains transparency, you must use a format such as PNG that supports an alpha channel.
>
> For a list of supported texture formats, see → Import Formats for Backplates and Textures, Page 126.

4. After a texture has been added to a material, you can display most of its parameters in the Material Tab by selecting the icon of the material in the Material Tree; or by using the Material Selector Tool to select a part that the material has been applied to.

> You can control how the texture is applied to a specific part in a model by selecting that part. Texture Mapping parameters will appear in the Model Tab of the Palette.

5. In the Material Tab, when you select a texture in a material, you an edit its parameters as discussed in → Material Tab, Page 42.

Mapping Textures

If you select an applied material on a part in a model, and the material includes textures, then you can customize its texture mapping in these ways:

- Visually with the Texture Manipulator, as explained in → Texture Mapping on Parts, Page 74.
- Numerically using basic UV mapping, as explained in → Texture Parameters, Page 43.
- Numerically using more advanced types of mapping, as listed in → Texture Mapping on Parts, Page 74.

Share Your Materials

It's easy to share your materials with others. RTT DeltaPix saves the materials in your Material Library in BMF files. These BMF files are located in the Materials Library, which is contained in the `RTT Content \ Materials` folder by default.

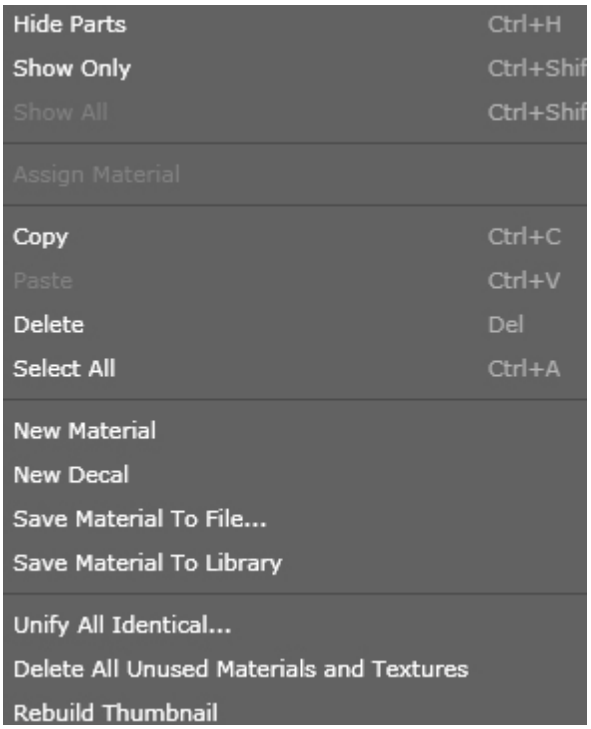
To share materials with others, just give them copies of the BMF files in your Material Library. BMF files can be emailed.

When the recipients save your BMF file into their local Material Library folder, they will be ready to use your materials in their next RTT DeltaPix session.

Decaling

Decals are materials with a texture that includes a transparency channel, so that whatever is underneath shows through. Decals are commonly used to put logos on top of other materials, for example.

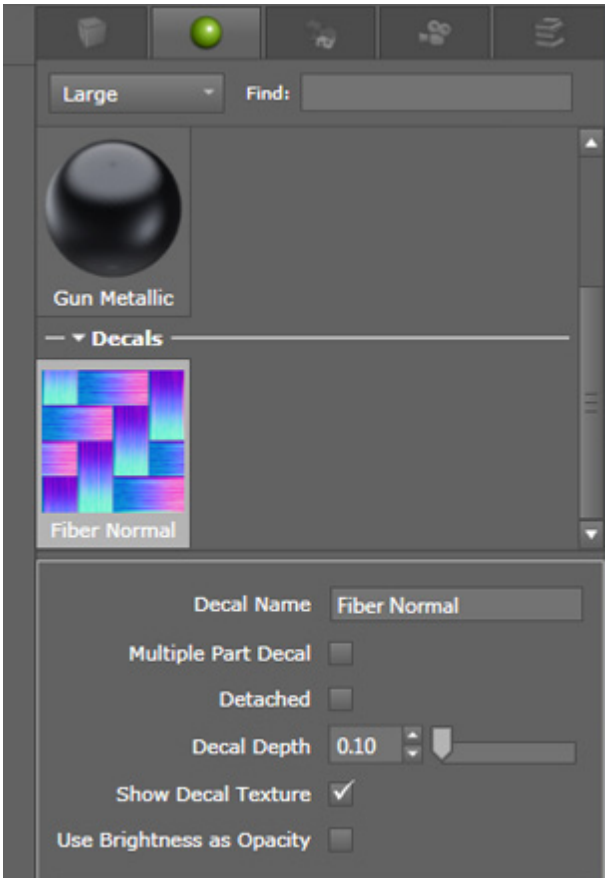
Creating Decals



The texture that you load for a decal should use a transparency channel to define the areas in the decal that you want to be transparent:

1. To create a decal, right click a new blank material on the tree of the Material Tab, and select New Decal from the context-sensitive menu (see figure).
2. In the file browser that appears, locate and load a decal texture.

Editing Decals



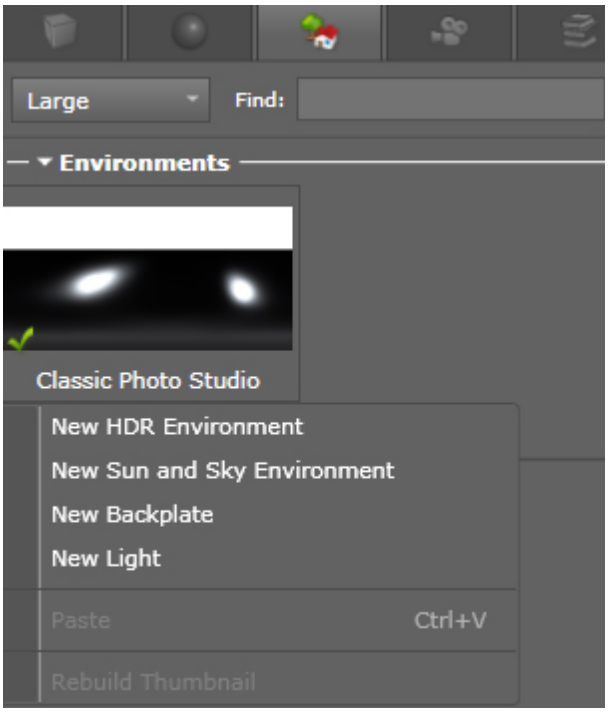
To edit the properties of a loaded decal, select the decal icon in the tree of the Material Tab (see figure), and tune its properties:

- Decal Name lets you rename the decal if you wish.
- Multiple Part Decal allows the decal to span multiple parts of the model.
- Detached Decal removes the association of the decal from all parts, and lets you move it by itself.
- Decal Depth defines how deep beyond the surface the decal penetrates.
- Show Decal Texture toggles whether the image represented on the decal is shown or overwritten by white to use as a stencil.
- Use Brightness as Opacity causes any dark portions of the decal to be transparent. The closer to black the pixels, the more transparent that area of the decal becomes.
- Decal Width lets you determine the physical width of the Decal in meters.
- Decal Height lets you determine the physical height of the Decal in meters.
- Project from Current Ortho Camera lets you project the decal from the active camera, provided the active camera is an Orthographic camera.

Working with Scenes

In DeltaPix, you use High Dynamic Range Images HDR as the light source for your projects. How? RTT DeltaPix Move maps an HDR image of your choice onto a spherical environment that envelops your models like a giant bubble. The HDR image thereby radiates light into the scene according to the RGB values of each and every pixel in the image. This technique closely simulates real world lighting, even when wide contrast ranges are called for.

When you rightclick in the tree near the top of the Scene Tab, options appear for loading new HDR images, lights, and backplates.



Create and edit HDR Environment Images

A single High Dynamic Range Image HDR provides realistic lighting for projects created in RTT DeltaPix. For instructions, see Load a HDR Environment Image below.

Load a HDR Environment Image

Loading a new HDR image into an environment replaces the old HDR image. Once loading completes, you will see the lighting in your scene change to use the light from the new HDRI image.

1. Select **Project > New HDR Environment** from the Main Menu.
2. In the Open Environment dialog, navigate to the desired HDR file and open it. The HDR image loads into the environment of your scene.
   - Alternative 1: To apply a previously loaded HDR image to your project, double left click the desired image in the Scenes Tab.
   - Alternative 2: In the Scene Tab of the Palette, right click within the Environment Tree near the top, which lists the environments saved with your project, and select **New HDR Environment.**

Tune HDR Environment Images

Upon import, RTT DeltaPix preserves the brightness and gamma settings in the source HDR file. After import, you can change these settings, as well as make other adjustments to the environment, on the Environments Tab of the Palette.

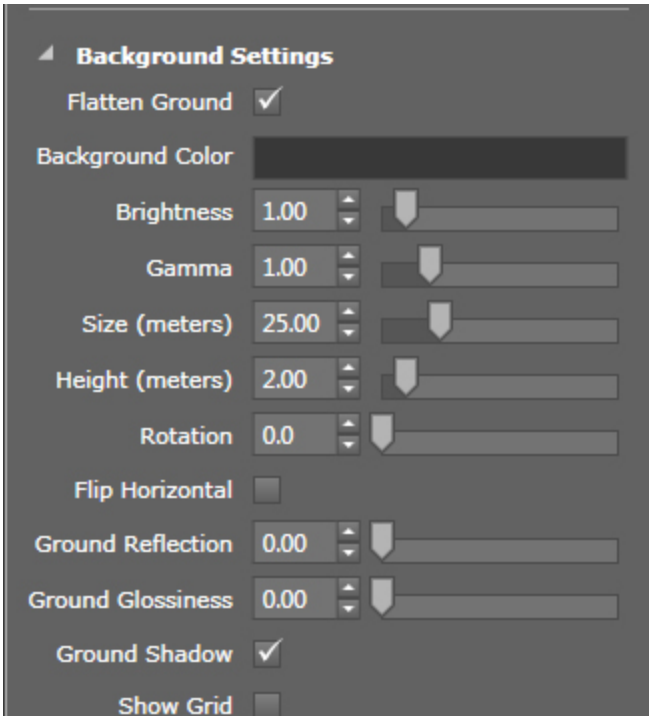
To display all the tools, left click the Tools button on the Quick Start bar, or left click the expansion bar on the far right edge of the RTT DeltaPix Window. Then select the Environment Tab to display Environment Tools.

Show / Hide the Environment

To toggle the visibility of the environment image, left click the **Show Environment Image** check box on the Environment Tab of the Palette.

- Even when hiding an HDRI environment image from direct view, the image continues to radiate light into the project as well as reflect visibly off shiny surfaces.
- When an environment image is hidden, and a backplate if any is also hidden, the color of the background is defined by the Background Color parameter in the Environment Tab.

Transform the Environment



By default, the HDRI image used in a RTT DeltaPix environment is mapped onto a sphere with a radius of 25 meters centered at the world origin. The sphere envelops your entire project with HDRI light that very closely simulates the light in real world environments.

You can rotate, scale, and offset the environmental sphere relative to the world origin. See the subsections below for details.

Rotate the Environment

To rotate the environment, and thereby change the direction of light radiated by the environment image, edit the **Rotation** parameter on the Environment Tab of the Palette. Rotation is in degrees.

Scale the Environment

To make the environment sphere whatever radius you wish, within reason, change the **Size meters** parameter on the Environment Tab of the Palette.

Offset the Environment

To vertically offset the environment image relative to the world origin, edit the **Height meters** parameter on the Environment Tab.

Adjust Brightness and Gamma

You can adjust the brightness and gamma of the light emitted by the environment image in your project. For details, see the sections below.

Environmental Brightness and Gamma

Modifying the brightness of the environment image changes the exposure of the image.

> RTT DeltaPix changes brightness and contrast in real-time. The source file of the environment image is not altered.

Changing the exposure of the environment image alters the luminance (intensity) of the light that the image radiates into your open project.

> Everything except backplate images are affected by the light emitted from the applied HDRI environment image.

Modifying the gamma of an environment image changes contrast indirectly. Modifying gamma also changes brightness, but in a very different way from the Brightness parameter. Although gamma is not the same as contrast, you can use gamma to adjust contrast, while using brightness to adjust luminance. Used together, these two controls enable you to fine tune the combined brightness and contrast of the lighting in your project.

Because HDRI images have so much data (32-bits per channel of RGB data), they have a very wide contrast range. Hence, small changes to the brightness and contrast of an HDRI image usually produce high quality results.

1. Display the **Environments Tab** in the Palette.
2. On the Environments Tab, change the **Brightness** parameter and observe the results in the Realtime View. Higher values increase brightness; lower values decrease it.
3. Change **Gamma** on the Environments Tab, and observe the results in the Realtime View. Higher values decrease contrast and increase brightness; lower values increase contrast and decrease brightness.

Display Shadows

RTT DeltaPix can calculate the shadows that each 3D model casts on itself, on other models, and on the ground. Enabling shadows can impact performance due to the increased number of calculations required.

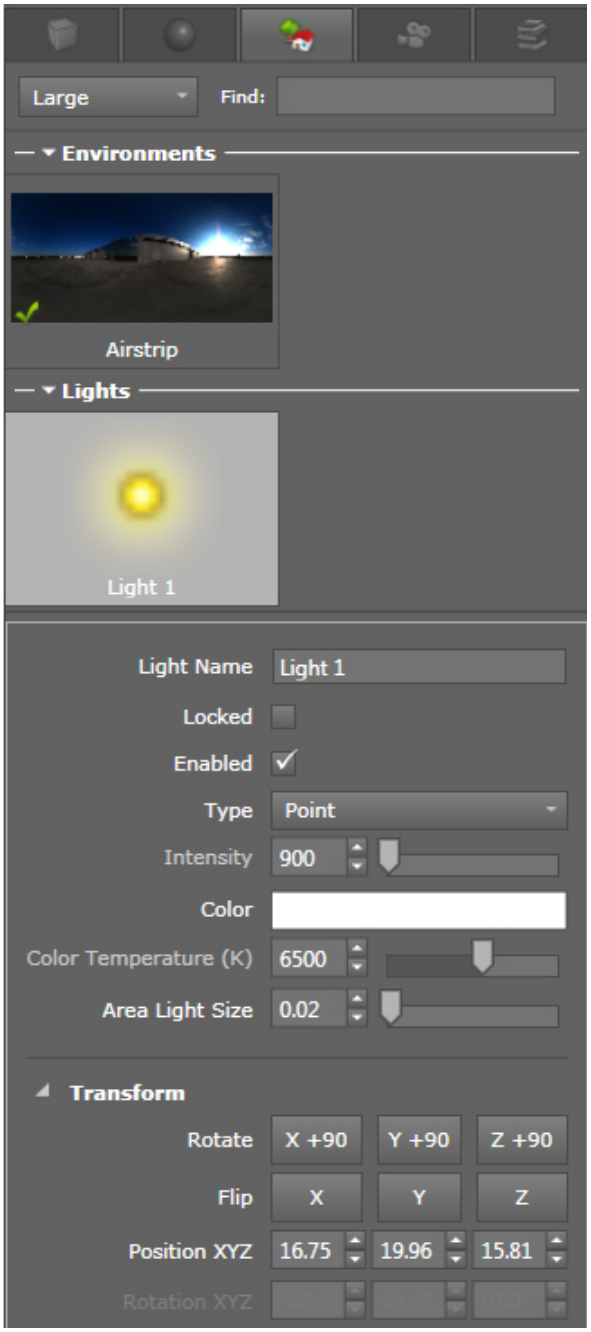
To enable or disable ground shadows, toggle the **Ground Shadow** parameter on the Environment Tab of the Palette.

Flatten the Ground

HDRI images are spherical by default, with the equator corresponding to the imaginary level of the ground. Flattening the ground converts the environment sphere to a half-sphere. The image is re-mapped to the resulting half-sphere, and the bottom becomes a visible ground.

To flatten the ground of an environmental sphere, toggle the **Flatten Ground** parameter on the Environments Tab.

Create, move, and edit custom lights



You can supplement the HDR lighting in your scene by creating and tuning individual lights. Here's how:

1. In the Project Menu, select New Light to create a new light in your scene.

   _ Alternative: Right click in the tree near the top of the Scene Tab, and select New Light from the context-sensitive menu.

2. On the Toolbar, select the Move Manipulator Tool. To select the light, click on either the icon for the light source or its look-at point in the scene. Alternatively, you can select the light's icon in the Scene Tab. The properties of the selected light appear in the Scene Tab.
3. Optionally edit the Light Parameters in the Scene Tab.
4. Using the Move Manipulator, you can move the selected light in the open scene, as follows:
   - Click-hold and drag the blue ring by +22.5 degrees to rotate the light around the Z-axis.
   - Click-hold and drag the green ring to rotate the light +90 degrees around the Y-axis green arrow.
   - Click-hold and drag the grey arrow to bring the light closer to its look-at point, until the light icon is within view.

You can optionally create multiple lights by repeating the above procedure. Note that multiple lights can substantially reduce real-time performance and add to rendering times.

Create and edit Backplate Images

A backplate allows you to load a high resolution 2D image in the background of your RTT DeltaPix project. Once loaded, the backplate image always remains in the background no matter where you move the camera.

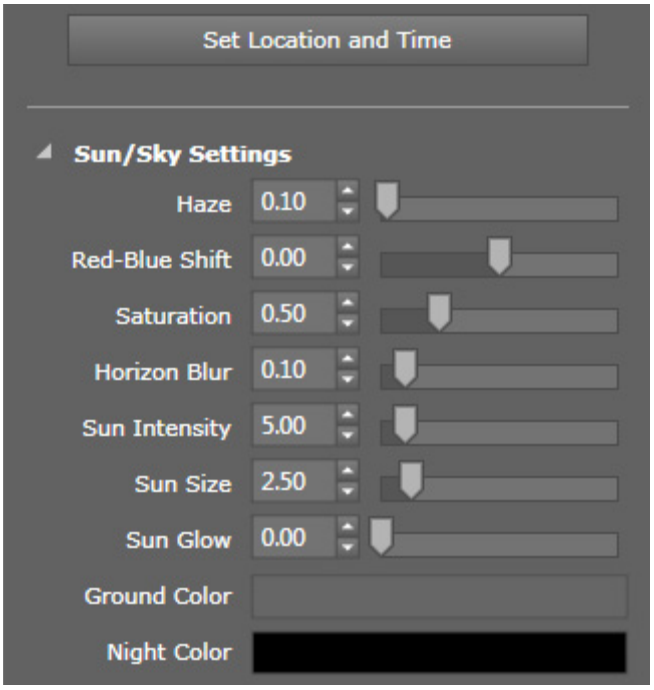
3D models in the scene retain the lighting specified by a HDRI environment image, without influence from the backplate image. The reason is that backplate images do not emit light in your scene, do not cast shadows, and do not reflect in shiny surfaces. They just look great in your background.

Create a New Sun and Sky Environment

DeltaPix can simulate the lighting at a specific location and time of day on the earth. The resulting Sun and Sky Environment is different in some ways than an HDR image, although both radiate full HDR light.

1. Select **Project > New Sun and Sky Environment** from the Main Menu. The parameters unique to Sun and Sky Environments appear on the Environments Tab of the Palette.
   - Alternative: On the Environment Tab of the Palette, right click in the Environment Tree near the top, which lists the environments saved with your project, and select New Sun and Sky Environment.
2. Fill in the parameters for sun and sky environments as described below.

Parameters for Sun and Sky Environments



When creating or editing a Sun and Sky Environment, you determine its properties by setting the values of the following parameter:

Show Environment Image: Toggles visibility of the environment image loaded in the 3D Viewport. Even when invisible, the loaded environment image still emits light into the scene.

Location Settings

Location: Informational (read-only) latitude and longitude of the geo-location being simulated.

Date and Time: Informational (read-only) month and time of day at the geo-location being simulated.

Set Location and Time: Click this button to change the location and/or the date and time being simulated. .

Sun/Sky Settings

Haze: Set the amount of haze in the simulated air.

Red-Blue Shift: Set the degree of red or blue shifting in the white balance of the simulated light, relative to neutral sunlight (5500 Kelvin).

Saturation: Set the saturation of the color shift (if any) of simulated light.

Horizon Blur: Set the degree to which the horizon blurs out, to simulate the visibility limits.

Sun Intensity: Set the intensity of the simulated sunlight.

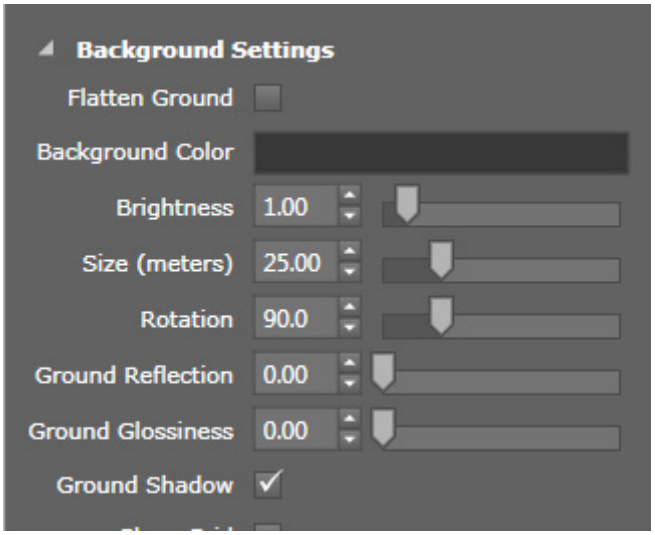
Sun Size: Set the size of the solar disk in the sky.

Sun Glow: Set the size and diffusion of the glow around the sun's disk.

Ground Color: Set the color of the ground plane.

Night Color: Set the color of the night (ambient) color.

Background Settings



Flatten Ground: When enabled, the environment becomes a half-sphere. When disabled, the environment becomes a full sphere.

Background Color: Determines the background color of the 3D Viewport outside the environment sphere. left click the color to display a standard color picker.

Brightness: Adjusts the overall brightness of the selected environment image.

Size: Determines the radius, in meters, of the environment sphere.

Rotation: Rotates the loaded environment image on the environment sphere.

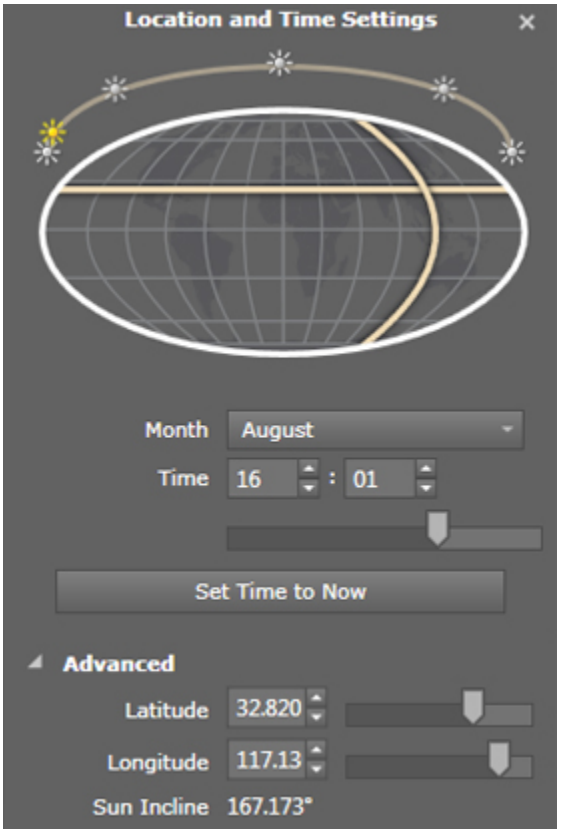
Ground Reflection: Adjust the visibility of the ground reflection where 0 is off and 1 is full reflection.

Ground Glossiness: Adjusts the roughness of the ground reflection where 0 is perfectly crisp and 1 is fully rough.

Ground Shadow: Toggles the projection of shadows on the ground in both Performance and Raytrace Modes.

Show Grid: Toggles visibility of a grid in the XZ-plane.

Set Location and Time Button



When you click the **Set Location and Time** button, a dialog appears with the following parameters you can edit:

Sun and earth graphic:

Click one of the suns to set the **Sun Incline** value quickly, or enter it precisely by changing the **Time** value (since time of day is the biggest factor in determining the incline of the sun at a fixed geo-location). The sun on the far right is 0 degrees, then 45, then 90 over north pole, then 135, then 180.

Click **Latitude** and **Longitude** lines to set their approximate values quickly. Or enter precise values in the fields below.

Month: Set the general time of year being simulated.

Time: The time of day being simulated on a 24-hour clock. In combination with **Month**, **Latitude**, and **Longitude**, the **Time** value determines the **Sun Incline** (below). You can change **Time** numerically or by dragging the slider below it.

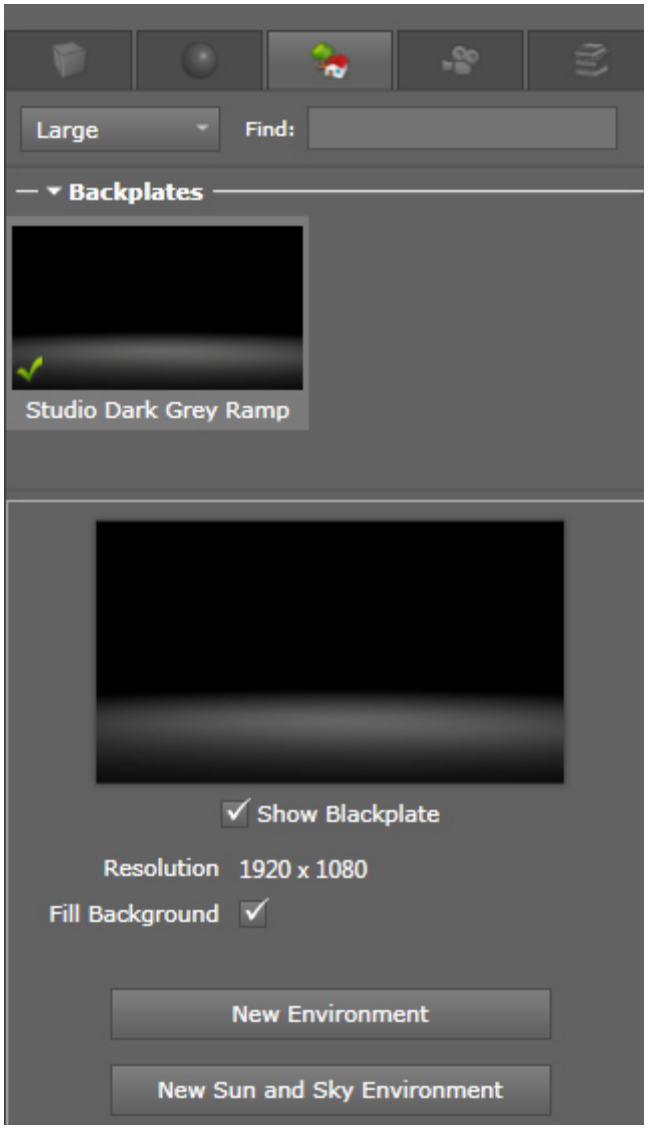
Set Time to Now: Sets the **Month** and **Time** values to your system time.

Latitude: The latitude of the location being simulated.

Longitude: The longitude of the location being simulated.

Sun Incline: Use the slider below **Time** to set the angle of incoming sunlight, and adjust the Time of day accordingly.

Load Backplate Images



To load a new backplate image into your DeltaPix project, or replace the current backplate image:

1. Select Project > New Backplate from the Main Menu. The Open DeltaPix Plate dialog appears.
2. In the Open Background Plate dialog, navigate to the image you wish to import and open it. The image loads into the background of the open project, and stays in the background regardless of camera movements.

   _ Alternative 1: Place your background images into the Plates Library. Then double left click the desired image in the Plates Library to apply the image to your open project.

   _ Alternative 2: In the Scenes Tab of the Palette, right click anywhere in the Scene Tree near the top, and select New Backplate.

Note: The Auto-Fit Camera parameter on the Scenes Tab automatically fits the camera to the backplate, while matching the aspect ratio of the active camera to that of the backplate.

Loading a new image into the background of your scene replaces the old backplate image, if any. Backplate images do not affect the lighting in your scene. To show or hide a loaded backplate image, first select it in the Scenes Tree in the Scenes Tab of the Palette. When its parameters appear, toggle the Visible parameter to show or hide the backplate image.

Saving and Outputting

Saving

In RTT DeltaPix, whenever you use **File > Save Project** to save a file, RTT DeltaPix saves the open project in the Projects Library, using its native BIF format. This format packages all assets associated with the project into a single file.

When you select **File > Save As**, RTT DeltaPix gives you the choice of saving the BIF file to a different folder.

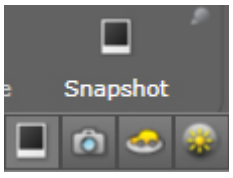
Outputting Images

RTT DeltaPix can output images of your projects in the following ways:

- Snapshot (High Speed) quickly captures what you see on your screen with a lot more user control than an ordinary screen shot.
- Render (High Quality) invokes raytracing at the quality and resolution you specify.

Snapshot (High Speed)

Taking a Snapshot is like taking a screen shot, but with more options.



Take a Snapshot

Taking a Snapshot of an open RTT DeltaPix project uses the current camera to capture what you see in the 3D Viewport. Here's how:

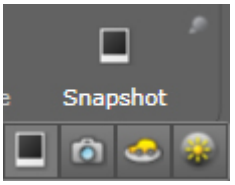
Configure Snapshots

You must do the following things before you take Snapshots:

1. Press CTRL-K to display the Options dialog. In the 3D Viewport Tab of the dialog, set the **Maximum Resolution** to the desired size (in pixels) of the output Snapshots.
2. In the User Interface Tab of the Options dialog, under Screenshot Options, select the desired output format: JPEG, BMP, TIFF, HDR 32-bit per channel, and PSD.

> If you enable the Save Camera File parameter, then DeltaPix will save the camera you used to take the snapshot along with the snapshot itself. The camera file will be saved in the Cameras Library, and the snapshot will be saved in the Images Library.

Take a Shot



1. Click the **Render Button** located in the right corner of the Toolbar. In the Render dialog that appears, choose **Snapshot** from the Render Type drop-down list.
2. Click **OK** to take the snapshot and save it to the Images Library by default.

Render (High Quality)

RTT DeltaPix can generate high quality renderings that are incredibly realistic, but it can take some time depending on your hardware, the complexity of your RTT DeltaPix project, and the resolution of the render.

DeltaPix gives you the following options for high quality rendering:

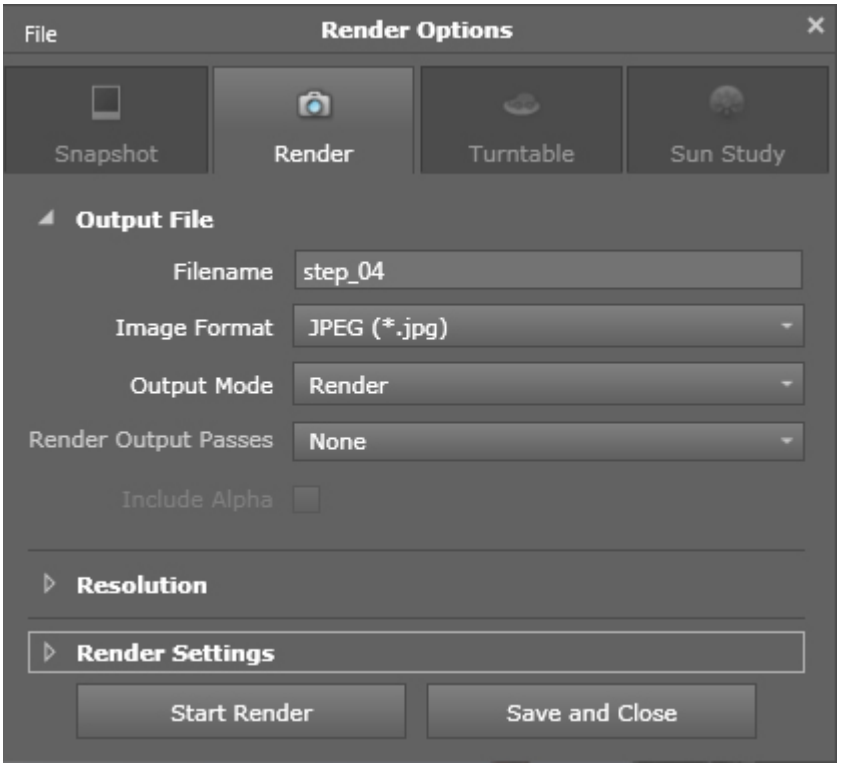
- Basic Render
- Render All Cameras
- Turntable Animation
- Sun Study Animation

Basic Render

Here's how you make a single high quality rendering of the open RTT DeltaPix scene, from the perspective of the current camera:

1. Click the **Render** Button located in the right corner of the Toolbar (or select **Tools > Render** from the Main Menu).
2. In the Render Options dialog that appears, choose **Render** from the Render Type drop-down list.
3. In the Render Options Tab of the dialog (described below), select the output options you prefer.
4. left click **OK** to start the rendering process. The HUD will show the progress. When completed, DeltaPix will save the rendering in the Images Library by default.

Render Options Tab



All or some of the following options are available, depending on your selection in the Render Type drop-down list:

Output File:

- **Filename**: Give the file to be output a filename.
- **Image Format**: Select the format of the output file from the list. The HDR format preserves 32-bit per channel RGB data.
- **Output Mode**: Select from the following output modes:
  - **Render:** Renders a single image using the current camera.
  - **All Cameras:** Renders a single image using each and every camera in the open scene – producing the same number of renderings as you have cameras in the scene.

- **Render Output Passes:**
  - **Beauty:** The regular raytraced image.
  - **Ground Shadows:** Only ground shadows.
  - **Glossy:** 50% rough chrome for isolating reflections.
  - **Specular:** 100% chrome for isolating highlights.
  - **Incandescent:** Lights the scene using lights that have been placed in the scene, if any, but not the HDRI environment. If no lights have been manually placed in the scene, this output pass will be black.
  - **Global Illumination:** Paints the objects in the scene flat white, and captures internal shadowing (i.e. the object shadowing itself).
  - **Clown:** Paints each part a separate flat color.
- **Include Alpha**: If enabled, the output file includes an alpha channel.

Resolution:

- **Resolution**: the number of pixels (width by height) in the output file.
- **Print Resolution**: the pixels per inch in the output file.
- **Print Size**: the printed size of the output file, given its resolution and print resolution.
- **Print Units**: selects between inches and centimeters for Print Size.

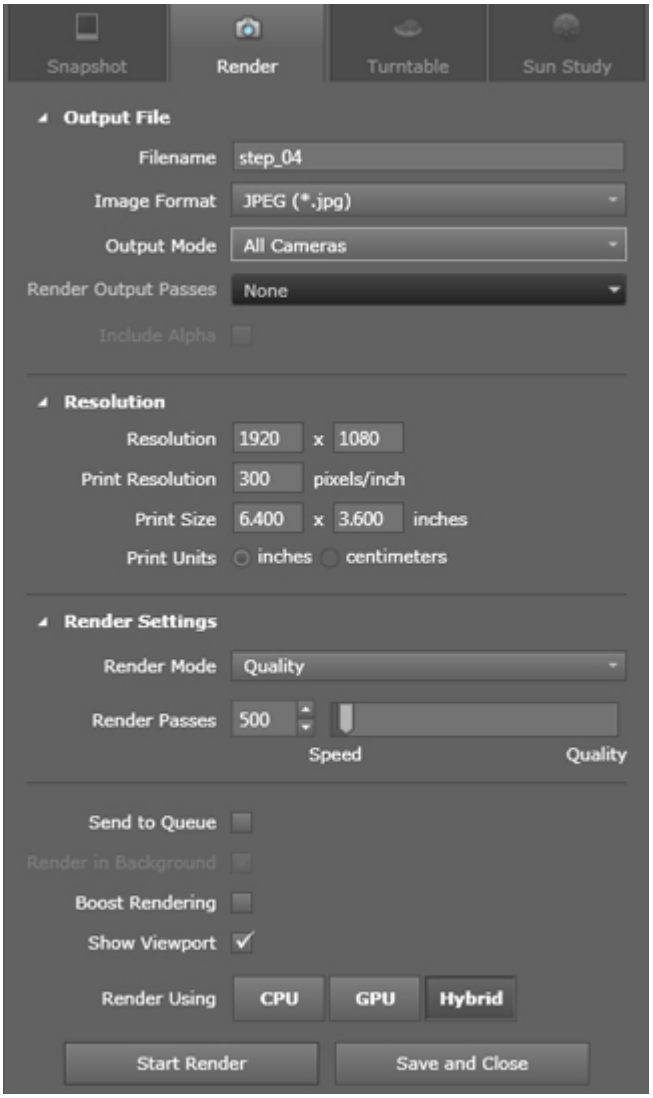
Render Settings:

- **Render Mode**: Gives you the following options for rendering:
  - **Time Limit**: Stops the rendering after reaching a time limit, regardless of the final quality. After the render starts, you can optionally stop it early.
  - **Quality**: Stops after a designated number of rendering passes, regardless of time.

General:

- **Render Using**: CPU only, GPU only, or Hybrid (both).
- **Boost Rendering**: Lets you leverage other PCs on the same LAN to speed up rendering. For details, see → RTT Boost, Page 110.
- **Send to Queue**: Lets you add the current rendering to a queue, so you can do it later. For details, see → RTT Queue, Page 116.
- **Show Viewport**: If enabled, DeltaPix updates the real-time view in the Viewport to show the rendering as it happens.
- **Render in Background**: Causes DeltaPix to render "in the background," so DeltaPix uses less memory. Users of 32-bit operating systems should consider selecting this option – particularly with high res renders.

Render All Cameras



Renders all the cameras you have in the Camera Tab of the Palette, with the render setting that you've specified in the Render Options Tab as well as the All Camera Tab:

1. Click the **Render** Button located in the right corner of the Toolbar.
2. In the Render Options dialog that appears, choose **Turntable Animation** from the Render Type drop-down list.
3. In the Render Options Tab tab of the dialog, select the general rendering options you prefer.
4. In the Turntable Options Tab tab of the dialog, select the options controlling the turntable.
5. Left click **OK** to start the rendering process. The HUD will show the progress. When completed, DeltaPix will save the rendered images in the Images Library by default.

All Camera Tab

Output File

- **Filename**: Give the file to be output a filename.
- **Image Format**: Select the format of the output file from the list. The HDR format preserves 32-bit per channel RGB data.
- **Output Mode**: Select from the following output modes:
  - **Render:** Renders a single image using the current camera.
  - **All Cameras:** Renders a single image using each and every camera in the open scene – producing the same number of renderings as you have cameras in the scene.
- **Render Output Passes:**
  - **Beauty:** The regular raytraced image.
  - **Ground Shadows:** Only ground shadows.
  - **Glossy:** 50% rough chrome for isolating reflections.
  - **Specular:** 100% chrome for isolating highlights.
  - **Incandescent:** Lights the scene using lights that have been placed in the scene, if any, but not the HDRI environment. If no lights have been manually placed in the scene, this output pass will be black.
  - **Global Illumination:** Paints the objects in the scene flat white, and captures internal shadowing (i.e. the object shadowing itself).
  - **Clown:** Paints each part a separate flat color.
- **Include Alpha**: If enabled, the output file includes an alpha channel.

Resolution

- **Resolution**: the number of pixels (width by height) in the output file.
- **Print Resolution**: the pixels per inch in the output file.
- **Print Size**: the printed size of the output file, given its resolution and print resolution.
- Print Units: selects between inches and centimeters for Print Size.

Render Settings

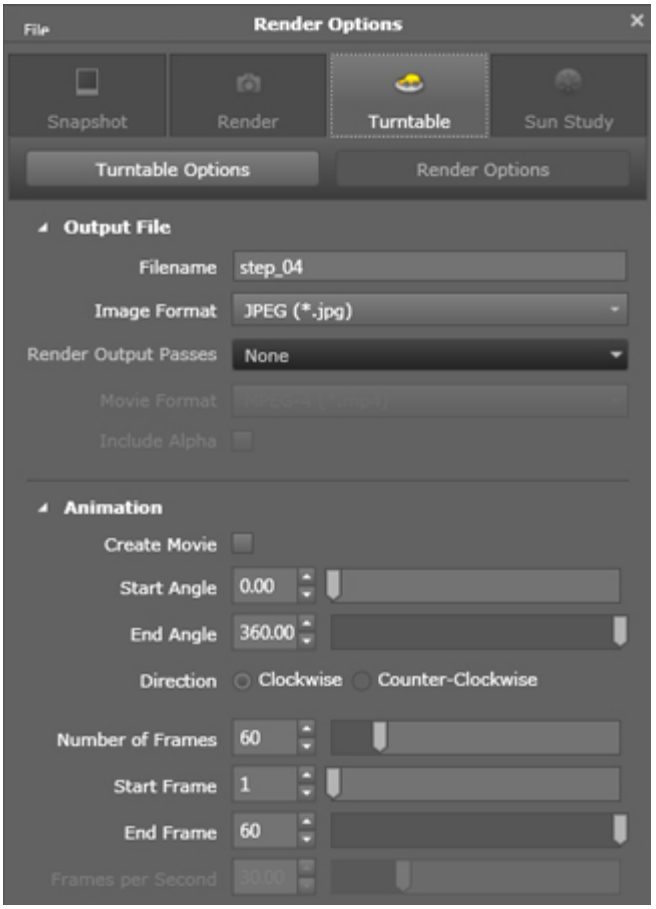
- **Render Mode**: Gives you the following options for rendering:
  - **Time Limit**: Stops the rendering after reaching a time limit, regardless of the final quality. After the render starts, you can optionally stop it early.
  - **Quality**: Stops after a designated number of rendering passes, regardless of time.

General

- **Render Using**: CPU only, GPU only, or Hybrid (both).

- **RTT Boost Rendering**: Lets you leverage other PCs on the same LAN to speed up rendering. For details, see → RTT Boost, Page 110
- **Send to Queue**: Lets you add the current rendering to a queue, so you can do it later. For details, see → RTT Queue, Page 116.
- **Show Viewport**: If enabled, DeltaPix updates the real-time view in the Viewport to show the rendering as it happens.

Turntable Animation



Here's how you make a series of high quality renderings that show your models rotating 360 degrees around their own centers, or together around the world origin:

1. Click the **Render** Button located in the right corner of the Toolbar.
2. In the Render Options dialog that appears, choose **Turntable Animation** from the Render Type drop-down list.
3. In the Render Options Tab tab of the dialog, select the general rendering options you prefer.
4. In the Turntable Options Tab tab of the dialog, select the options controlling the turntable.

5. left click **OK** to start the rendering process. The HUD will show the progress. When completed, DeltaPix will save the rendered images in the Images Library by default.

Turntable Options Tab

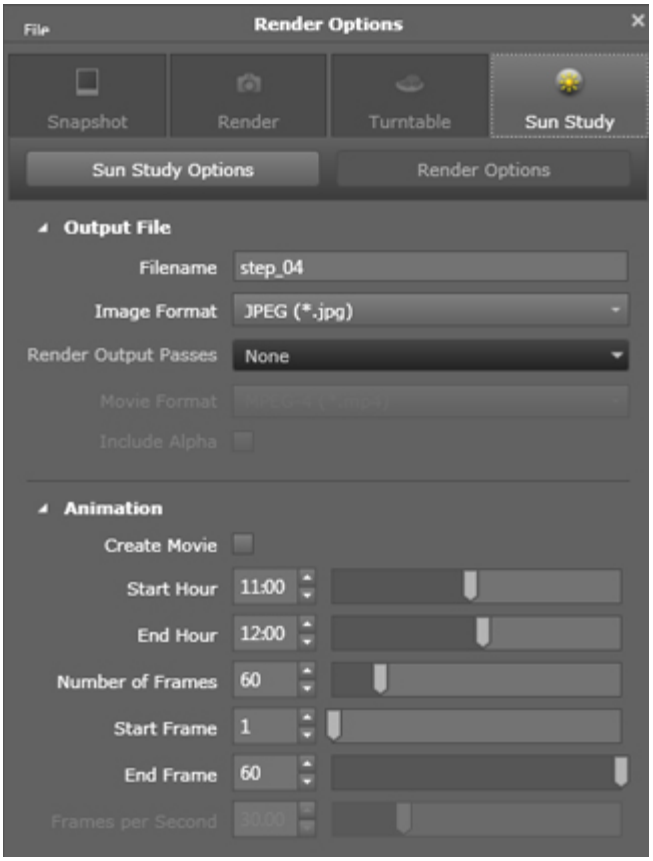
Output File

- **Filename**: Give the file to be output a filename.
- **Image Format**: Select the format of the output file from the list. The HDR format preserves 32-bit per channel RGB data.
- **Render Output Passes:**
  - **Beauty:** The regular raytraced image.
  - **Ground Shadows:** Only ground shadows.
  - **Glossy:** 50% rough chrome for isolating reflections.
  - **Specular:** 100% chrome for isolating highlights.
  - **Incandescent:** Lights the scene using lights that have been placed in the scene, if any, but not the HDRI environment. If no lights have been manually placed in the scene, this output pass will be black.
  - **Global Illumination:** Paints the objects in the scene flat white, and captures internal shadowing (i.e. the object shadowing itself).
  - **Clown:** Paints each part a separate flat color.
- **Movie Format:** Sets the format of the output movie.
- **Include Alpha:** If enabled, the output file includes an alpha channel.

Animation

- **Create AVI Movie**: If enabled, DeltaPix encodes AVI data into the output.
- **Start Angle**: Sets the initial angle of the turntable(s) on the first frame of the animation.
- **End Angle**: Sets the final angle of the turntable(s) on the last frame of the animation.
- **Direction:** Lets you spin the turntable either clockwise or counterclockwise.
- **Number of Frames:** Sets the total number of frames to render in the entire sequence.
- **Start Frame**: Sets the first frame to render in the animation sequence.
- **End Frame**: Sets the last frame to render in the animation sequence.
- **Frames Per Second**: Sets the frame rate of intended playback.

Sun Study Animation



Here's how you quickly and easily animate the rise and fall of sunlight over a specific time frame:

1. Click the virtual **Render** Button located in the right corner of the Toolbar.
2. In the Render Options dialog that appears, choose **Sun Study Animation** from the Render Type drop-down list.
3. In the Render Options Tab tab of the dialog, select the general rendering options you prefer.
4. In the Sun Study Options Tab tab of the dialog, select the options controlling the turntable.
5. left click **OK** to start the rendering process. The HUD will show the progress. When completed, DeltaPix will save the rendered images in the Images Library by default.

Sun Study Options Tab

You control the Sky Study via the following parameters:

You control the turntable via the following parameters:

Output File

_ **Filename**: Give the file to be output a filename.

- **Image Format**: Select the format of the output file from the list. The HDR format preserves 32-bit per channel RGB data.
- **Output Mode**: Select from the following output modes:
  - **Render:** Renders a single image using the current camera.
  - **All Cameras:** Renders a single image using each and every camera in the open scene – producing the same number of renderings as you have cameras in the scene.
- **Render Output Passes:**
  - **Beauty:** The regular raytraced image.
  - **Ground Shadows:** Only ground shadows.
  - **Glossy:** 50% rough chrome for isolating reflections.
  - **Specular:** 100% chrome for isolating highlights.
  - **Incandescent:** Lights the scene using lights that have been placed in the scene, if any, but not the HDRI environment. If no lights have been manually placed in the scene, this output pass will be black.
  - **Global Illumination:** Paints the objects in the scene flat white, and captures internal shadowing (i.e. the object shadowing itself).
  - **Clown:** Paints each part a separate flat color.
- **Movie Format:** Sets the format of the output movie.
- **Include Alpha**: If enabled, the output file includes an alpha channel.

Animation

- **Create AVI Movie**: If enabled, DeltaPix encodes AVI data into the output.
- **Start Hour**: For scenes using a Sky Study Environment, Start Hour sets the time of day the turntable animation begins.
- **End Hour**: For scenes using a Sky Study Environment, Start Hour sets the time of day the turntable animation begins.
- **Number of Frames**: Sets the total number of frames to render in the entire sequence.
- **Start Frame**: Sets the first frame to render in the animation sequence.
- **End Frame**: Sets the last frame to render in the animation sequence.
- **Frames Per Second**: Sets the frame rate of intended playback.

Using the Ray Brush

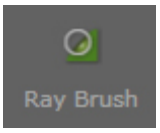
With most types of rendering, you have the option to use the Ray Brush. The Render Brush lets you render more important areas in super detail, while spending less time than rendering the entire scene at the same super detail.

You do this by selecting a circular area within which raytracing happens, and outside of which raytracing does not happen. First let the less important parts of your scene render to point you're happy with just them, and then activate the Ray Brush and select a smaller area where raytracing continues to happen for a while longer.

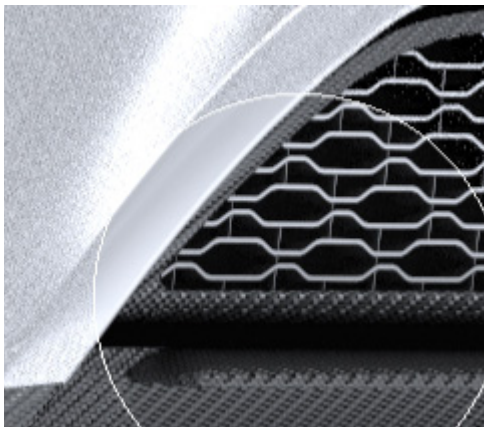
In short, the Ray Brush thereby lets you raytrace selected parts of complex objects at high quality in far less time than raytracing the entire object. Or you can raytrace the entire object to medium quality, and then use the Ray Brush to increase the quality in a few key spots.

Instructions for using the Ray Brush:

1. As a rendering is happening on your screen, turn on the **Ray Brush** by clicking its icon in the Toolbar. A **circle** appears in the 3D Viewport, along with the Ray Brush Controls.



2. Move the Ray Brush circle over the area of the scene that you wish to raytrace.



3. Adjust the size of the circle by dragging the **Radius** slider in the Ray Brush Controls.

> If Magnification is enabled, then the circle will appear larger than it really is.

Click an area in the scene. Raytracing takes place only within the circle of the Raybrush Tool when and where you clicked.

RTT Boost

Overview

RTT Boost works in conjunction with RTT DeltaPix to speed up rendering times. The increased speed is achieved by using the resources of multiple computers to share the burden of processing. RTT Boost uses other computers (with DeltaPix installed) on the same LAN as you to help process your renderings. Similarly, other DeltaPix users on the same LAN can use your computer to help process their renderings. Each DeltaPix user can independently exclude or include his or her machine.

Install RTT Boost

RTT Boost is automatically installed when you install RTT DeltaPix. The same version DeltaPix (and therefore RTT Boost along with it) must be installed on all computers used by RTT Boost.

Use RTT Boost

For details on using RTT Boost, see the following sections:

- Use the RTT Boost Console
- Activate RTT Boost

Use the RTT Boost Console

The RTT Boost Console provides you with a summary of the hardware and drivers on your system relative to the requirements of DeltaPix and RTT Boost. It also lists the status of the local and remote machines involved in the rendering. In addition

to providing this information, the RTT Boost Console lets you make your computer unavailable or available to other RTT DeltaPix users on the same LAN:

- By default, RTT Boost allows users on the same LAN to conscript your machine to help with their renderings. You can optionally make your machine unavailable to others by selecting **File > Exclude me from RTT Boost** in the Main Menu in the RTT Boost Console.
- If your machine is currently set to block others from conscripting it, you can make your machine available to others again by selecting File > **File > Include me in RTT Boost** from the Main Menu in the RTT Boost Console.
- You can also make the above selections without opening the RTT Boost Console. Just rightclick the RTT Boost icon in the system tray and toggle the selection via the drop-down list.
- The RTT Boost icon in the system tray shows you the rendering progress as a percentage of the total job.

Activate RTT Boost

Here's how you use RTT Boost to speed up processing times for any type of rendering supported by DeltaPix.

1. Prepare your scene in RTT DeltaPix.
2. When your scene is ready to render, click the **Render Button** located in the right corner of the Toolbar, and select the type of rendering from the drop-down icons.
   - Alternative: Select **Tools > Render** from the Main Menu. In the Render Options dialog that appears, choose any rendering option (except snapshot) from the Render Type drop-down list.

   RTT Boost works with basic Render, Render All Cameras, Turntable Animations, and Sun Study Animations.

   RTT Boost does not work with Snapshots because a snapshot is just a standard screen capture (without raytracing) that takes less than 1 second to do locally on one machine.
3. Still in the Render Options dialog, check the **RTT Boost Rendering** box to ensure that RTT Boost will speed up rendering by using the combined resources of all available machines meeting its **System Requirements**.
4. Select **Start Render** to begin the rendering. You can track the progress of the rendering (as a percentage of completeness) from the RTT Boost icon in the system tray.

Troubleshooting

Firewall settings often need to be adjusted on all machines running RTT Boost directly or indirectly. If these adjustments are not made, DeltaPix or RTT Boost will inform you.

Firewall Settings

RTT Boost makes very direct use of the resources of remote machines. Hence, you may need to adjust the user account and firewall settings on all computers that will be using RTT Boost, as described below, in order for RTT Boost to function on your network.

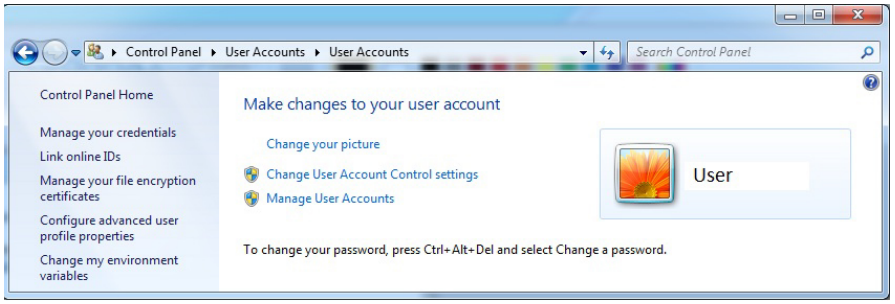
Windows 7

Windows 7 users need to make the following 4 settings on all computers sharing the same LAN that will be using RTT Boost:

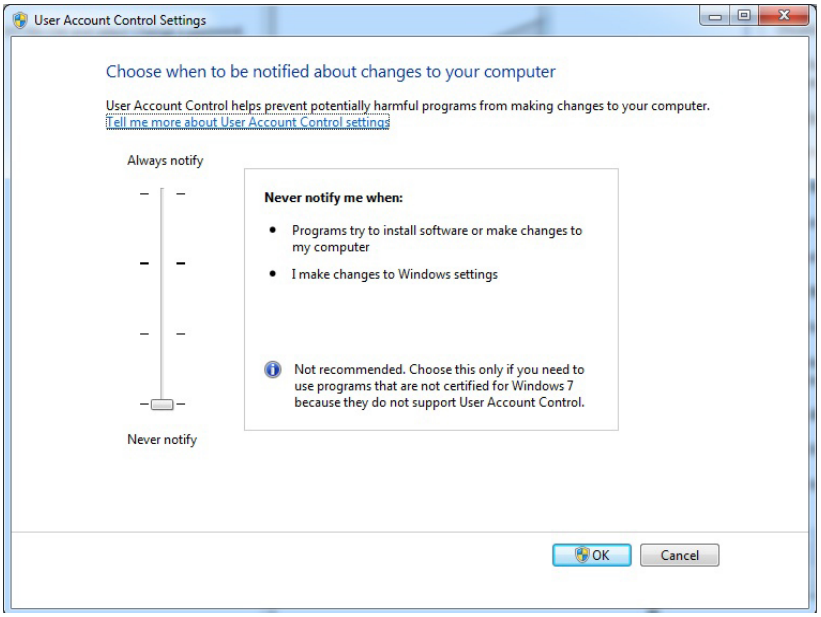
- Disable User Account Settings
- Return Firewall Settings to Default Values
- Adjust Advanced Security Settings
- Allow RTT Programs through Firewall

Disable User Account Settings

1. In the Control Panel of your PC, select User Accounts.
2. In the User Accounts screen, select Change User Account Control Settings.

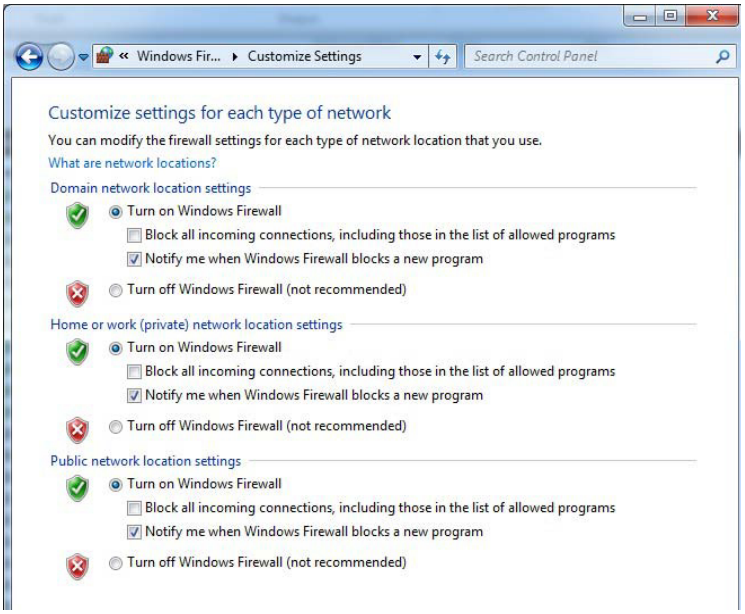


3. In the Change User Account Control Settings screen, change the setting to **Never Notify**



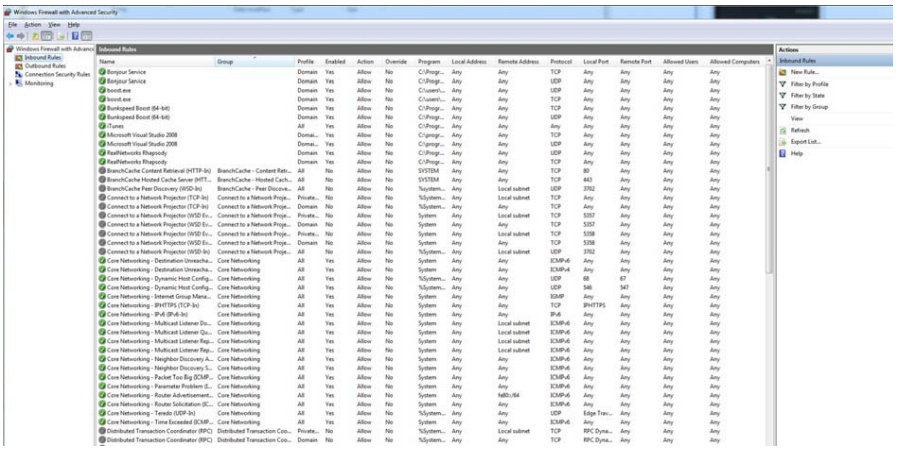
Return Firewall Settings to Default Values

1. In the Control Panel of your PC, select Windows Firewall.
2. In the Windows Firewall screen, select Restore Defaults to reset the values to those shown in the image below.



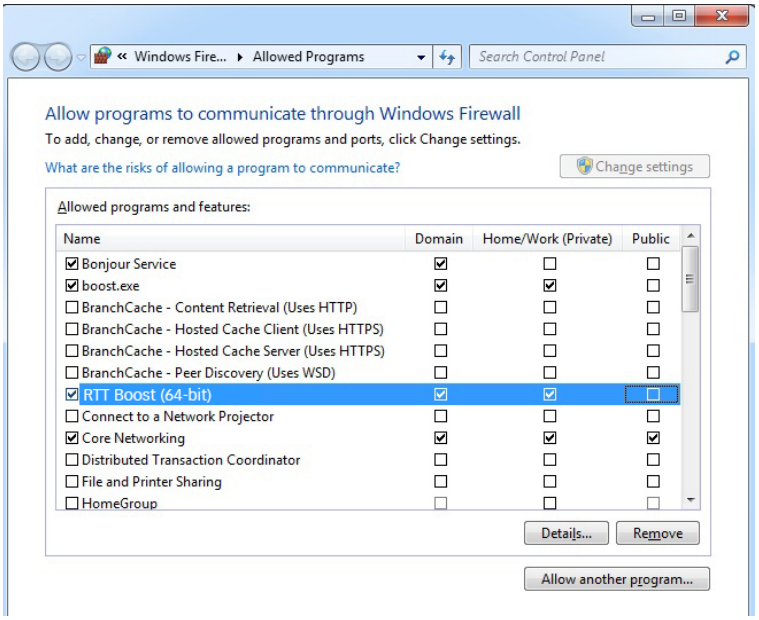
Adjust Advanced Security Settings

1. In the Control Panel of your PC, select Windows Firewall.
2. In the Windows Firewall screen, select Advanced Settings.
3. In the Advanced Settings screen, select Inbound Rules. In the table of rules, verify that RTT Boost is enabled, as are `Boost.exe` and RTT Boost.exe if either appear in the list.



Allow RTT Programs through Firewall

1. In the Control Panel of your PC, select Windows Firewall.
2. In the Windows Firewall screen, in the Home/Work Private section, verify that RTT Boost is checked, as well as Boost.exe and RTTBoost.exe if either appears in the list.

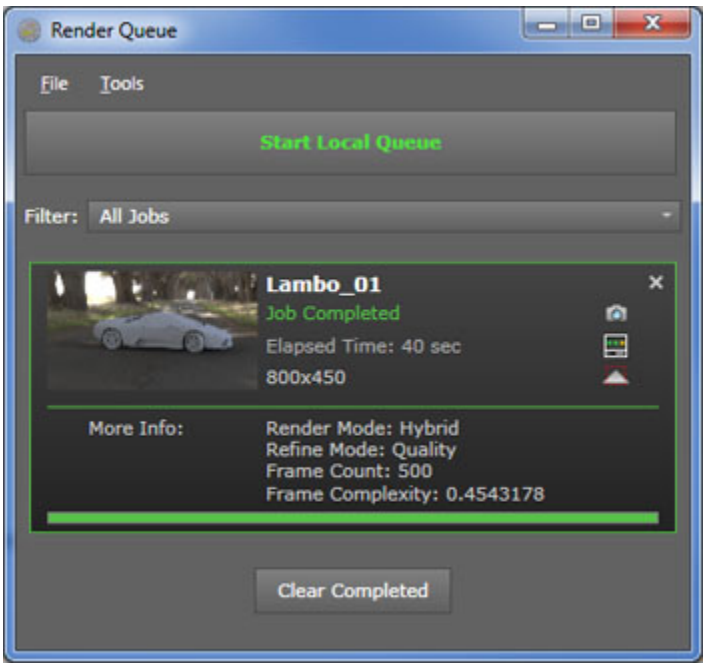

« Windows Fire... ▸ Allowed Programs
Search Control Panel
Allow programs to communicate through Windows Firewall
To add, change, or remove allowed programs and ports, click Change settings.
What are the risks of allowing a program to communicate?
Change settings
Allowed programs and features:
Name
Domain
Home/Work (Private)
Public
Bonjour Service
boost.exe
BranchCache - Content Retrieval (Uses HTTP)
BranchCache - Hosted Cache Client (Uses HTTPS)
BranchCache - Hosted Cache Server (Uses HTTPS)
BranchCache - Peer Discovery (Uses WSD)
RTT Boost (64-bit)
Connect to a Network Projector
Core Networking
Distributed Transaction Coordinator
File and Printer Sharing
HomeGroup
Details...
Remove
Allow another program...

RTT Queue

QueueServer

The QueueServer provides server-side support for processing your jobs. The QueueServer has no user interface, and does not require interaction. RTT Queue includes the QueueServer and QueueClient.

QueueClient

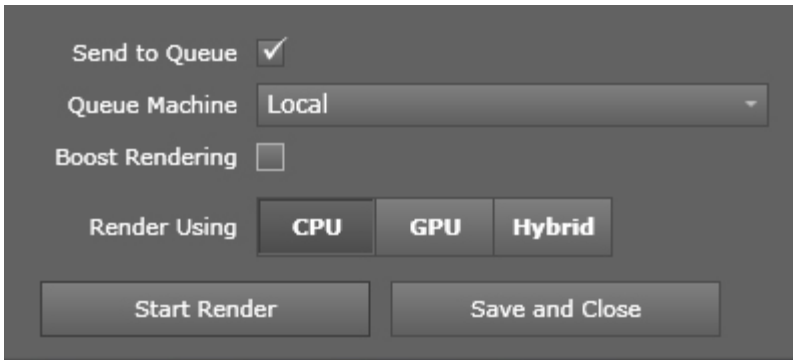


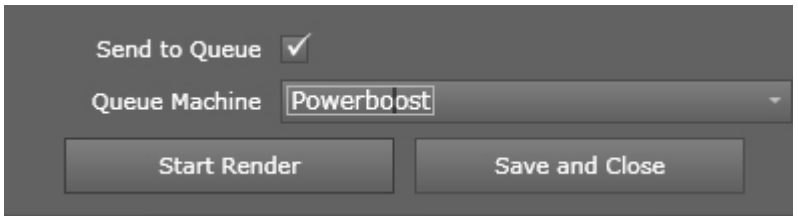
RTT QueueClient provides controls and information for you to manage jobs in the Queue waiting to be processed later. The next few sections provide instructions for using QueueClient.

Sending jobs to Queue

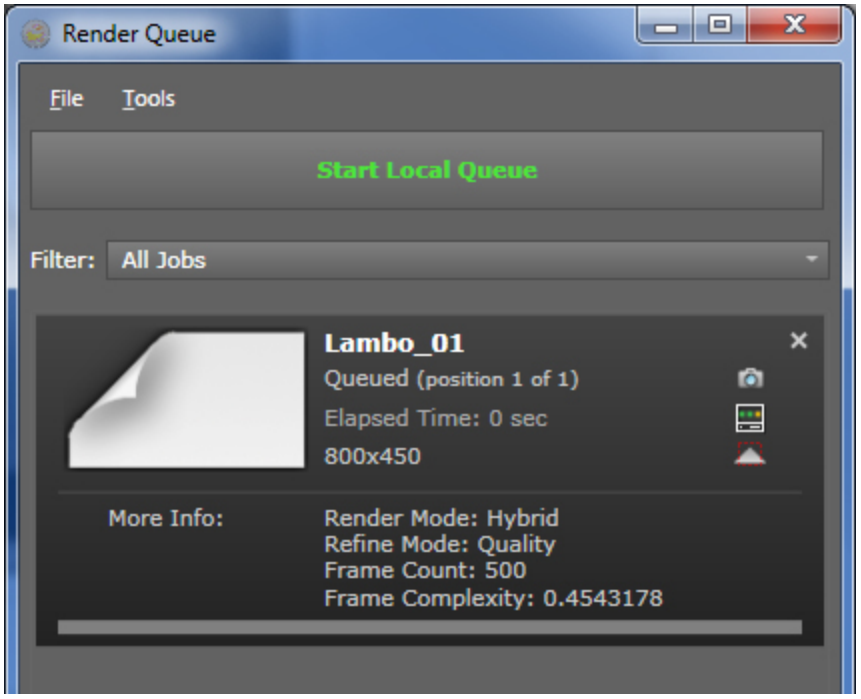
From DeltaPix you can send projects to the Queue to be rendered and animated at a later time of your choosing. To send a project to the Queue, proceed as follows:

1. When you're ready to render in DeltaPix, select any rendering option except Snapshot.
2. In the Rendering Options dialog, enable Send to Queue. Notes:
   - The default Queue Machine of **Local** renders the scene with your local hardware, see first figure below.
   - The default Queue Machine of "PowerBoost" renders your scene using powerful remote servers, see second figure below. Note: To use PowerBoost, you must have a license for PowerBoost, and an account on a PowerBoost server set up.





3. Still in the Rendering Options dialog, set the other rendering options you prefer, and then select Start Render to send the scene to the Queue. The current job will be added to the bottom of the list in QueueClient, so you can process it later.
4. Start RTT QueueClient. All the projects you have sent to the Queue will appear in the QueueClient, in the order they were sent.



5. In the Filter drop-down menu, select one of the following options:
   - All Jobs: Lists all local and remote jobs.
   - Remote Jobs Only: Lists only jobs you sent to a remote PowerBoost server.
   - Local Jobs Only: Lists only jobs you sent to your local queue.
6. Click Start Local Client to start processing the next job in the Job List.
   - PowerBoost users cannot control when jobs are processed on PowerBoost servers, because jobs are processed in the order they are submitted by various remote users. PowerBoost users can use the Remote Jobs Only filter to monitor the order of their jobs in the shared Queue.
   - To pause a job, click Pause Local Client.
   - Useful information is provided by the various text and icons in the Job List. For details, see Job Info.
7. When a local job finishes, it is saved in the RTT Content / Images folder on your PC.

JOB INFO

The text and icons in the Job List provide you with the following information:

- Thumbnail: Shows a thumbnail of the scene to be rendered.
- Title: The filename of the job.
- Status can be any of the following:

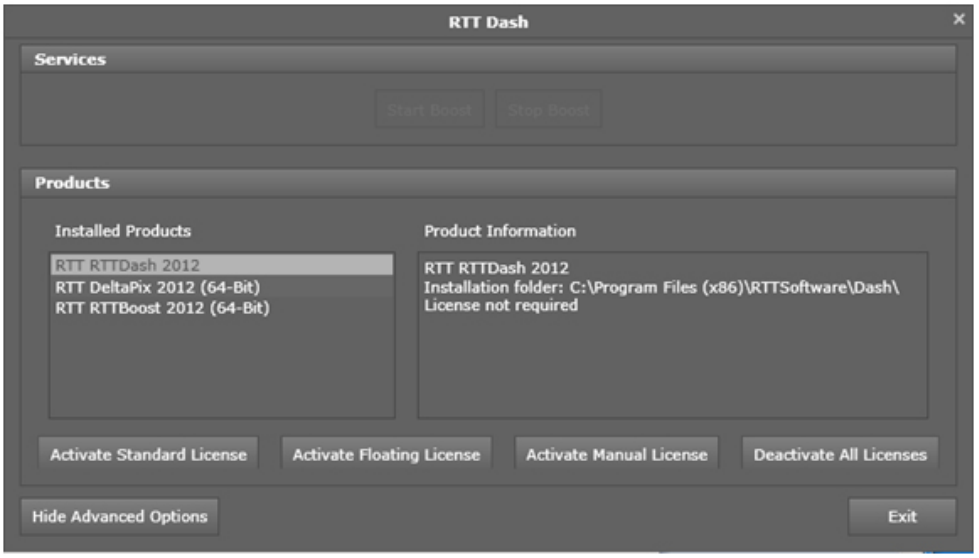
- Queued: Indicates the job is waiting in the Queue; lists the order of the job in the queue.
- Rendering: Indicates the job is being processed.
- Done: Indicates the job finished successfully.
- Failed: Indicates the job failed to process.

- Elapsed Time: Shows the time the current job has been rendering.
- Resolution: Shows the pixel size of the job being rendered.
- Boost Icon: Indicates whether Boost is being used to help process the current job.
- Job Type Icon: Indicates the type of job e.g. regular rendering, animation, turntable, or sun study.
- More Info Toggle: Shows or hides additional information about the job.

RTT Dash

RTT Dash offers you a simple management of your licenses. In RTT Dash you have a normal view, and an advanced view.

In the normal view you can activate your licenses.



When you click on **Show Advanced Options** than you have following options:

Services: Here you can start and stop RTT Boost and RTT Queue.

Products: Under Products you see your installed RTT products and the product informations.

License: You have following options to edit your license:

- **Activate Standard License:** Here you can activate your node locked license.
- **Activate Floating License:** Here you can activate your floating license.
- **Activate Manual License:** Use this function, if you want to activate your license manually.
- **Deactivate All Licenses:** This function deactivated all your licenses.

Appendix

Hot-Keys

Using hot-key shortcuts, i.e. keyboard and mouse combinations, you can quickly access many of the functions in RTT DeltaPix. This section summarizes the functionality of each hot-key.

For most of the hot-keys in the table below, you can hold the Ctrl-Key to make any adjustment in finer steps, i.e. typically 1/10 the step size of the default.

General	
Ctrl + N	New File
Ctrl + S	Save File (.bif)
Shift + Ctrl + S	Save As (.bif)
Ctrl + O	Open File (.bif and .bip)
CTL + W	Close Project
Ctrl + K	Open Options
Alt + F4 and Ctrl + Q	Close Application
Edit	
Ctrl + Z	Undo
Ctrl + Y	Redo
Ctrl + X	Cut
Ctrl + C	Copy
Ctrl + V	Paste
Backspace	Delete
Delete	Delete
Mode	
F1	Help

Spacebar	Toggle Palette
M	Open Library to Material Tab
Ctrl + 1	Model Mode
Ctrl + 2	Material Mode
Ctrl + 3	Environment Mode
Ctrl + 4	Plates Mode
Ctrl + 5	Camera Mode
Ctrl + 0	Library Mode
Ctrl + R	Render Using Current Settings
Shift + Ctrl + R	Render With Dialog
Ctrl + P	Snapshot Using Current Settings
~	Toggle Raytracing
Display	
F11	Toggle Full Screen
Tab	Cycle Through Editable Interface Items
Ctrl + U	Toggle Heads-Up Display (HUD)
P	Pause / Resume Real-Time Rendering
Presentation	
Alt + 3	Next Environment
Shift + Alt + 3	Previous Environment
Alt + 4	Next Plate
Shift + Alt + 4	Previous Plate
Alt + 6	Next Camera
Shift + Alt + 6	Previous Camera
Manipulation	
Right Mouse Button Click in Center of Transform Manipulator	Snap Selected Object to Surface
Selection	
A	Cycle Through Selection Modes
Z	Cycle Through Manipulators
Ctrl + A	Select All
Shift + Ctrl + A	Deselect All
Ctrl + H	Hide Selection

Shift + Ctrl + U	Show All
Shift + Ctrl + H	Show Only
Shift + Ctrl + Right Click	Focus on Selection
Scene	
R	Toggle Ground Reflections
G	Flatten Ground
E	Toggle Environment
B	Toggle Backplate Image
Ctrl + Alt + Left Mouse Button	Rotate Environment
Ctrl + E	Load Environment Image
Ctrl + B	Load Backplate Image
Control + G	Toggle Grid (when Raytracing is off)
Shift + Ctrl + [	Decrease Environment Brightness by .05
Shift + Ctrl +]	Increase Environment Brightness by .05
Shift + Ctrl + ;	Decrease Environment Gamma by .05
Shift + Ctrl + '	Increase Environment Gamma by .05
Ctrl + [	Decrease Environment Brightness .25
Ctrl +]	Increase Environment Brightness .25
Ctrl + ;	Decrease Environment Gamma .25
Ctrl + '	Increase Environment Gamma .25
Material Controls	
Double-Click LMB	Select Material and its Properties
Shift + LMB	Copy Material (when in Material Mode)
Shift + RMB	Paste Material (when in Material Mode)
Camera Controls	
Alt + LMB	Tumble Camera
Alt + MMB	Pan Camera
Alt + RMB and Scroll Wheel	Zoom Camera
Alt + Scroll Wheel	Increase/Decrease Focal Length of Lens
Alt + Ctrl + Scroll Wheel	Twist Camera
Ctrl + Shift + C	Reset Camera
Ctrl + Shift + L	Lock Camera

Alt + Ctrl + RMB	Pick Camera Look-At Point

Supported Import Formats

In addition to its native file format (BIF), RTT DeltaPix can import a variety of common formats for 3D models, HDRI environment images, and standard 2D images. See the following sections for details:

_ Import Formats for 3D Models, Page 125
_ Import Formats for HDR Environments, Page 126
_ Import Formats for Backplates and Textures, Page 126

Import Formats for 3D Models

_ DeltaGen 8 and earlier, (CSB)
_ SolidWorks 2010 and earlier (SLDASM, SLDPRT) or plugin
_ Pro/ENGINEER Wildfire 2, 3, 4 (ASM, PRT) via plugin (Pro/ENGINEER must be installed and licensed)
_ Rhino 4.0 and prior (.3DM) direct or via plugin
_ SketchUp 7 or prior (.SKP) direct or via plugin
_ ALIAS Studio (.WIRE) via plugin, (Alias must be installed and licensed)
_ Alibre (via IGES or STEP)
_ 3D Studio Max (.3DS)
_ IGES (IGS)
_ STEP (STP)
_ OBJ
_ Wire
_ JT
_ PLMXML
_ Filmbox (FBX) stills only (no animations)
_ Collada (DAE)
_ 3DXML

Import Formats for HDR Environments

The text below is adapted from Wikipedia:
http://en.wikipedia.org/wiki/High_dynamic_range_imaging

HDRI stands for High Dynamic Range Imaging, which is a set of techniques that allow a much greater range between light and dark areas of an image than normal imaging techniques. HDRI is designed to accurately reproduce the wide range of lighting levels found in real scenes from direct sunlight to deep shadows.

Information stored in high dynamic range images usually corresponds to the physical values of luminance or radiance that can be observed in the real world. This is different from traditional digital images, which represent colors that should appear on a monitor or a paper print. Therefore, HDR image formats are often called "scene-referred", in contrast to traditional digital images, which are "device-referred" or "output-referred".

Furthermore, traditional images are usually encoded for the human visual system, maximizing the visual information stored in the fixed number of bits, which is usually called "gamma encoding" or "gamma correction". The values stored for HDR images are often linear, which means that they represent relative or absolute values of radiance or luminance (gamma 1.0).

RTT DeltaPix uses HDRI images for environments that radiate the light in your scenes. RTT DeltaPix supports two formats for HDRI images: EXR and HDR. Both are described below.

OpenEXR (EXR)

OpenEXR (.EXR extension) is a high dynamic range imaging image file format that stores a vast exposure range and color depth by providing 32-bits-per-channel of RGB information.

High Dynamic Range Image (HDR)

High Dynamic Range Images (.HDR extension) is a high dynamic range imaging image file format that stores a vast exposure range and color depth by providing 32-bits-per-channel of RGB information.

Import Formats for Backplates and Textures

RTT DeltaPix can import the following 2D file types for use as backplates or textures for use in materials. These formats cannot be used as environmental images, and cannot emit light into your project.

- Bitmaps (BMP)
- Targa (TGA)
- GIF
- JPEG (JPG)
- PNG

_ TIFF (TIF)

Types of Materials in RTT DeltaPix

RTT DeltaPix includes a material library that contains many pre-configured materials. All RTT DeltaPix materials are based on scientifically accurate materials.

Each type of RTT DeltaPix material is defined by a unique set of Material Parameters and Texture Properties that simulate a real material, such as glass or leather. When you select a material in the Material Library, or on an object, you can view and edit its Material parameters and Texture properties in the Material Tab of the Palette.

For details on the properties of Color, Specular, Alpha, and Bump textures that you can optionally assign to materials, see Texture Parameters, Page 43 and Texture Mapping, Page 44. For details on the Material Parameters that are unique to each type of pre-defined RTT DeltaPix material, see the sections below:

_ Anisotropic

_ Emissive

_ Flat

_ Generic

_ Glass

_ Matte

_ Metal

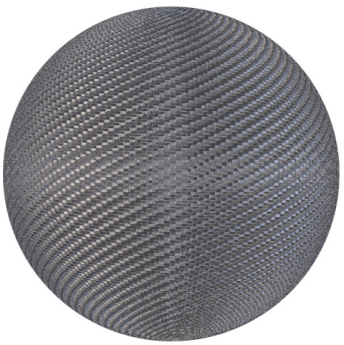
_ Metallic Paint

_ Paint

_ Plastic

Anisotropic

The Anisotropic material simulates a surface with an asymmetrical specular highlight that changes when the surface rotates, relative to the light sources. Put another way, an anisotropic material has a "grain" or directionality. This material is most commonly used to simulate brushed finishes on metallic surfaces.

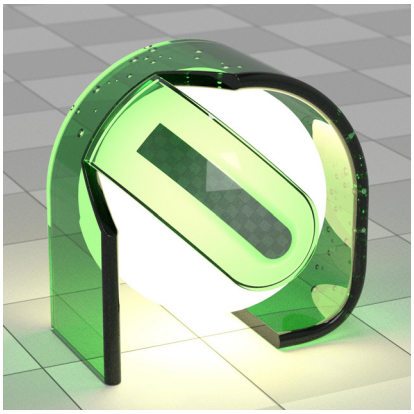


The material's parameters are:

- **Base Color:** sets the color of the material in diffuse white light
- **Highlight Color:** sets the color of the material's specular highlights
- **Roughness:** controls the size of the highlight. The rougher the material, the more it diffuses the highlight, i.e. the larger and less focused the highlight becomes.
- **Distortion**: controls the amount of distortion by changing the ratio of roughness in one direction on the surface, verses the perpendicular direction. Zero causes no distortion, and 100 causes maximum distortion.
- **Angle:** sets the direction of the Distortion effect.

Emissive

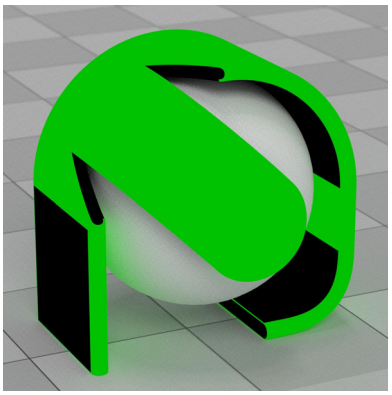
The Emissive material emits light into the scene – provided that you assign a **Color** texture, the only type of texture supported by emissive materials, and enable the **Blend Texture** option in the Texture Parameters of Material Tab. If you don't do this, then the Emissive material will reflect the light that's shining on it, but will **not** radiate any additional light into the scene – even if you crank up the Intensity parameter very high.



- **Color:** in the absence of light, the material radiates the Emissive color. In typical scenes, the color the Generic material is the sum of Base Color plus Emissive Color, plus Highlight Color for highlights.
- **Intensity:** multiplies the Color value, by adding luminance, i.e. causing more light to be emitted by the material. Due to clipping in monitors, adding intensity can make the Color appear washed out. To counterbalance this tendency, add saturation to the Color value after increasing Intensity.

Flat

The Flat material is not shaded, so it does not react to light or shadows. Hence, the Flat material has a constant color regardless of lighting and shadows. The Flat material is so obviously unrealistic, it is perfectly suited for masking and such.



- **Color**: sets a fixed color for the material. This color does not change regardless of the light falling on the material, i.e. this material is not shaded.

Generic

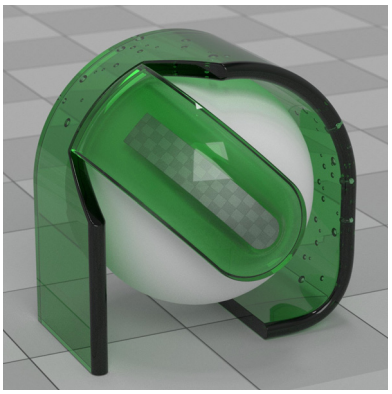
The Generic material can simulate a wide range of materials – making it possible to precisely control how light interacts with a material.

This material's parameters are as follows:

- **Diffuse Color:** sets the color of the material in diffuse white light
- **Specular Color:** sets the color of the material's specular highlight
- **Transparency Color:** the tint acquired by light passing through partially transparent materials.
- **Diffusion**: how much light diffuses through partly transparent materials.
- **Roughness:** simulates surface roughness by controlling the size of the highlights in reflected light. The rougher the material, the more it diffuses highlights, i.e. the larger and less focused the highlight becomes.
- **Internal Roughness**: simulates internal roughness that affects light refracting through the material instead of reflected off its surface.
- **IOR**: directly controls how much materials with transparency bend light passing through them; indirectly affects reflectivity.
- **Solid**: toggles two-sided verses one-sided properties, e.g. IOR Out applies only to two-sided objects
- **Color Density**: adds more of the Diffuse Color, i.e. from faint to intense as the object gets thicker.

Glass

The Glass material is optimized for windows. It can handle thin or thick glass. Typical applications include the windshield and head lamps of an automobile.



This material's parameters are as follows:

- **Solid**: toggles two-sided verses one-sided properties, e.g. IOR Out applies only to two-sided objects
- **Color**: sets the color of the material in diffuse white light.
- **IOR:** sets the index of refraction, i.e. the amount of bending, of light passing into the glass. When using a surface without thickness, the IOR will affect the reflectivity of the surface, but the light passing through it will not refract. On a

surface with thickness, this material will cause light to refract as it passes through the Solid object.

_ **IOR Out**: sets the index of refraction, i.e. the amount of bending, of light passing out of the glass.

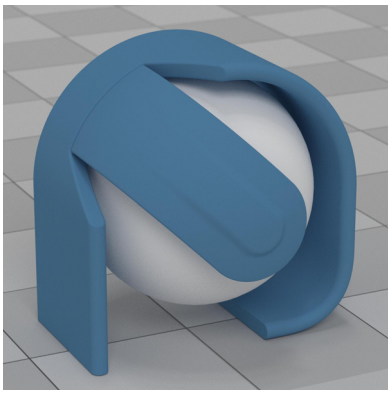
> Transparent objects with thickness, like most gems and glass, refract light when entering and leaving the object.

_ **Thickness (mm):** determines the intended thickness of the simulated surface, compared to comparable solid glass in reality.

_ **Roughness:** controls the size of the highlight. The rougher the material, the more it diffuses the highlight, i.e. the larger and less focused the highlight becomes, – such as with frosted glass.

Matte

This simple material simulates matte surfaces, like flat paint with no specular highlights.

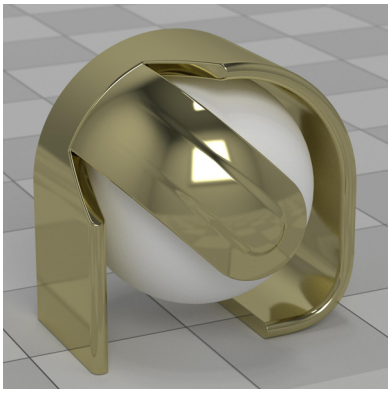


This material's parameters are as follows:

_ **Color:** sets the color of the material in diffuse white light

Metal

The metal material is used to simulate metals such as aluminum, gold, and silver, with different finishes such as polished, powder coated, cast, etc.

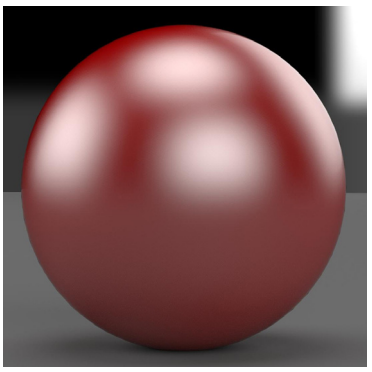


This materials parameters are:

- **Color:** sets the color of the metal in diffuse white light
- **Roughness:** determines how much the metal diffuses specular highlights. A value of zero would cause no diffusion at all, which would make the metal appear very smooth with sharp specular highlights.

Metallic Paint

This material simulates metallic paints such as car paints, but can also be used to simulate multilayer plastic finishes.

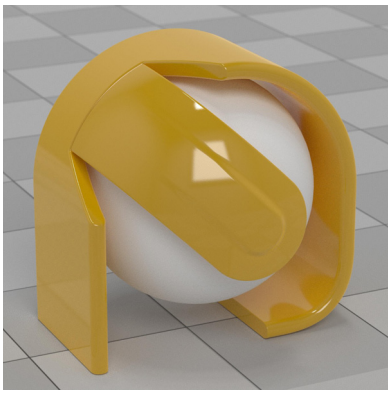


This materials parameters are:

- **Color:** sets the color of the base paint in diffuse white light
- **Metal Color:** sets the color of the metallic flake in diffuse white light
- **Metal Roughness:** determines the degree the metal diffuses specular highlights. A value of zero would cause no diffusion at all, which would make the metal appear very smooth.
- **Metal Coverage:** sets the density of the metallic flakes. If the value is 0, the flake will disappear, 0 - 100 range.
- **Clearcoat:** the index of refraction (IOR) of the clear coat. It indirectly determines the surface reflection on the clear coat.

Paint

This material simulates non-metallic paint.

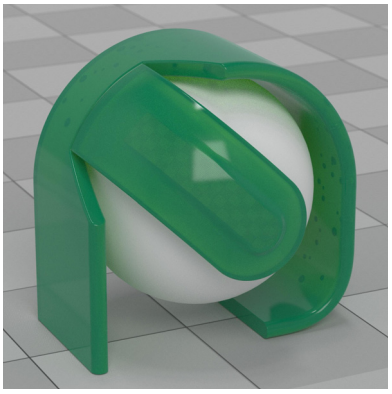


Parameters:

- **Color**: sets the color of the material in diffuse white light
- **Clearcoat**: the index of refraction (IOR) of the clear coat. It indirectly determines the surface reflection on the clear coat.
- **Clearcoat Roughness**: determines how much the clearcoat diffuses specular highlights. A value of zero would not diffuse reflections at all, causing specular highlights to be pinpoint sharp.

Plastic

The Plastic material is optimized to simulate many plastic types.



This material's parameters are:

- **Color**: sets the color of the material in diffuse white light
- **Highlight Color**: sets the color of the material's specular highlight
- **Transparency Color:** the tint acquired by light passing through partially transparent materials.

- **Diffusion Color:** scattering of light in translucent materials, such as clear plastic.
- **IOR**: directly controls how much the material bends light passing through it, and indirectly affects reflectivity.
- **Roughness**: controls the size of the highlight. The rougher the material, the more it diffuses the highlight, i.e. the larger and less focused the highlight becomes.