

# Output: Image Layers (AOVs)

## Overview

Using the *Image Layers* group of attributes the user specifies one or several layers of images to output simultaneously from the rendering process. Each can be set to be displayed on screen (in a window) or be saved in a file or both. By default, the *Image Layers* group of attributes is setup to output only one image layer: the RGBA components representing the main image, also commonly referred to as the *Beauty*. And it is setup to be displayed on screen and saved in a file.

It is possible to add any number of layers, each set to output any complementary information to the *Beauty* image, such as:

- Variables computed inside shaders, commonly called *Arbitrary Output Variables* (AOVs), such as depth values associated to the *Beauty* image, original color of surfaces (without the effect of the lighting), the specular and diffuse shading components of the *Beauty* image. Refer to [AOV Selector](#) for further details on supported AOVs and how to define custom ones.
- Contribution of individual or group of lights to the *Beauty* image.
- Any number of arbitrary masks derived from objects and/or materials.

Such layers can be useful for compositors to have many options while composing the final image and/or rapidly establishing the right light balance.

Layers can not only be generated for different AOVs, *Lights* and *Masks*, they can also:

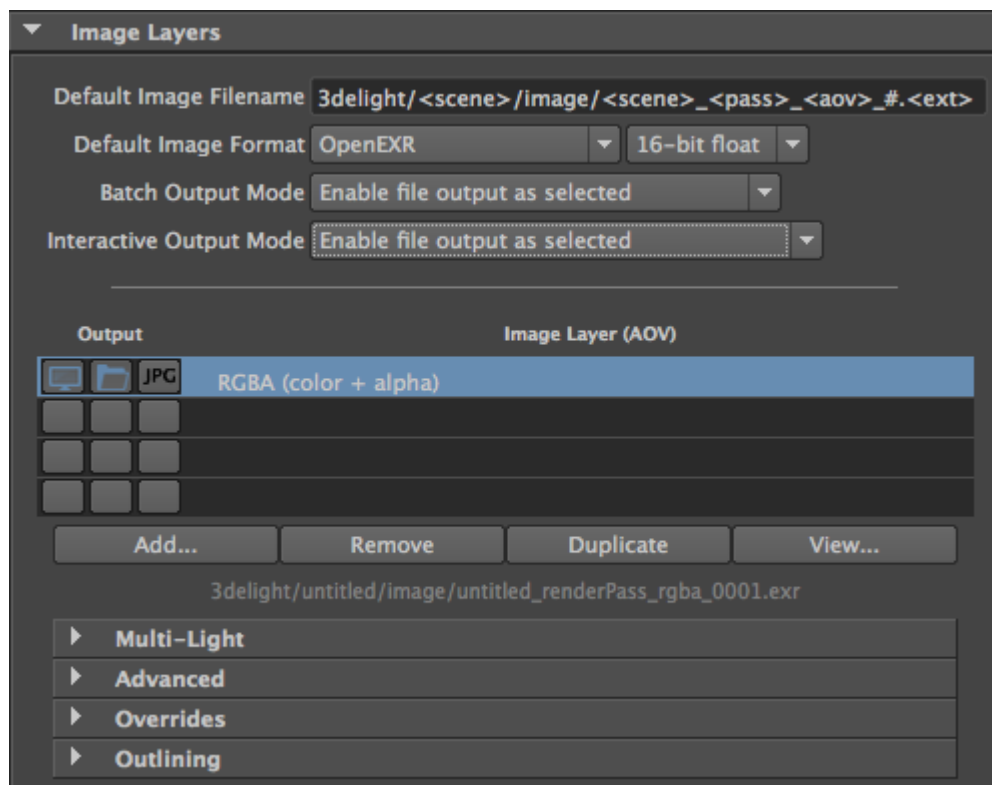
- Have different camera angles. This is very useful for fast simultaneous multi-camera rendering (for 3D stereo for example).
- Contain a different subset of objects in the scene.

**i** All the layers are rendered simultaneously. Adding many layers do not generally increase rendering time significantly. This is different and not to be confused with the *3Delight for Maya* functionality of *Render Passes*. Those are processed sequentially and can produce totally different output from one pass to another.

**!** **Windows only:** Writing to disk many *Image Layers* may result in a performance bottleneck on Windows file systems. This is not the case on more efficient file systems such as Linux (ext4) and MacOSX (hfs+).

**✓** **Multi-Layer EXRs:** to write all Image Layers in the same EXR file, simply set the exact same Image Filename. In the screenshot below this would imply removing the `<aov>` keyword, therefore resulting in:

```
3delight/<scene>/image/<scene>_<pass>_#. <ext>
```



The Image Layers group

# Global Options

The first section of the *Image Layers* group is use to specify default values and output behaviour for all image layers.

## Default Image Filename

Specifies the default file location for the image layers. By default, the location is based on the scene name, the render pass name and the AOV name. See [File Path Expressions](#) for details on how it is possible to construct relative paths and paths containing dynamically expanded tokens.

## Default Image Format

Specifies the default file format for the image layers, including the pixel bit depth. The default is 16-bit float EXR files. Many formats are supported and each have specific options for bit depths. Refer to [Image File Formats](#) for more details.

## Batch Output Mode

Each image layer have a file output toggle controlling wether it should be saved to file during rendering (this is explained below). Since these toggles may be manipulated frequently while working interactively and may be forgotten in a OFF position when sending the rendering to a render farm (using the *Maya Batch* command line), the *Batch Output Mode* controls wether these toggles should be ignored (overridden) when rendering in batch mode. This option is useful to make sure all image layers are saved when rendering using the *Maya Batch* command line, regardless of the status of the file output toggle. The options are:

Enable file output as selected	Indicates to output the image layers to file (in batch mode) only if their corresponding file output toggle are selected. This is the default, it follows the same behaviour as in interactive mode.
Enable all file output and selected JPEG	Indicates to ignore (override) the file output toggles and request that all image layers be saved to file when in batch mode. With regard to the output of a JPEG file, only those that are selected will be output to file (meaning the <i>Batch Output Mode</i> have no overriding effect to the JPEG output toggle and those are output only if enabled, wether in batch or interactive mode).

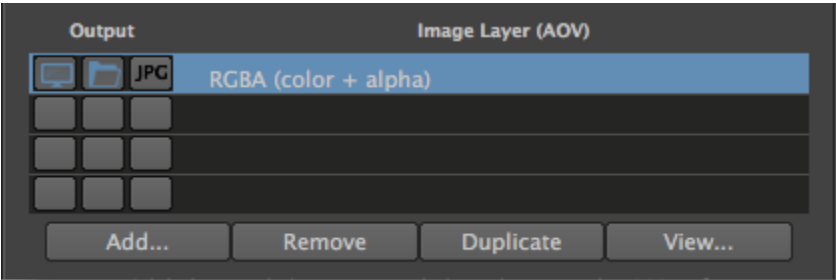
## Interactive Output Mode

The *Interactive Output Mode* allows to globally control the behaviour of the file output toggles while working during an interactive session. The options are:

Enable file output as selected	Indicates to output the image layers to file (in interactive mode) only if their corresponding file output toggle are selected. This is the default behaviour.
Disable file output	Indicates to disable the output of the image layer to file (in interactive mode). Both the regular and JPEG file output toggles will be ignored. This is useful while working interactively and displaying image layers on screen only and to ignore the file output toggle (and possibly let it be used for batch mode only).
Enable file output only for selected displays	This is an hybrid option. While working interactively, one may be interested to output to file only those image layers that he is actively working on: those that are selected to be displaying on screen. With this option, the image layers will be saved to file only if the display on screen toggle in selected.




# List of Layers (AOVs)

The second section of the *Image Layers* group is use to specify the list all the layers that will be generated during the rendering process (subject to the selection of any of the three output toggles in te list). By default, the list is populated with only one image layer, the RGBA ("Beauty") layer. When there are many layers, it is possible to re-order them in the list for organisational purpose (to visually group them). This is done through a middle-click and drag. It is a bit finicky to use though - you need to drop the layer while a line in between two layers is highlighted for the re-order to work. If you drop the layer while another layer is highlighted, nothing happens.



List of Layers (AOVs)

Each layer can be selected to be displayed on screen while rendering or be saved to file or both. They can be saved in the specified format and also simultaneously in JPEG (similar in concept to a digital camera that can save simultaneously a RAW and a JPEG image). These outputs (display on screen and save to file) for each layer is controlled using three toggles located left of the layer name in the list. If no output toggles are selected, the image layer with its AOV is inactive.

Toggle	Output Destination
 display on screen	Enables the display of the image layer in a window on screen: either in the <i>Maya Render View</i> or <i>3Delight i-Display</i> . The selection of which window (and accordingly which application) is a user preference that can be specified in the <a href="#">The 3Delight Preferences</a> .  <div><p><b>i</b> Unlike <i>3Delight i-Display</i>, the <i>Maya Render View</i> does not support to display simultaneously multiple layers. When this toggle is enable for multiple layers, only the first one is displayed.</p></div>
 file output	Enables the output of the image layer to file using the file format and location specified by the <i>Default Image Filename</i> and <i>Default Image Format</i> attributes (unless overridden for that layer in the options listed below the list of layers).
 jpeg output	Enables the output of the image layer as a JPEG. The file location is the same as specified for the standard file, only this time with the <code>.jpg</code> extension.

If all three toggles are selected, the image layer will be outputted simultaneously in a screen window, on file (in the specified format) and as a jpeg.

Below the list of layers there are four buttons. Except for *Add*, their function applies to the selected layers in the list:

*Add...*

For adding layers. The *AOV Selector* will pop for enabling one or more AOVs. All the AOVs selected in the AOV Selector are presented in the list of layers.

*Remove*

Select one or more layers in the list and press *Remove* to remove. Note that the RGBA ("Beauty") layer can not be removed.

*Duplicate*

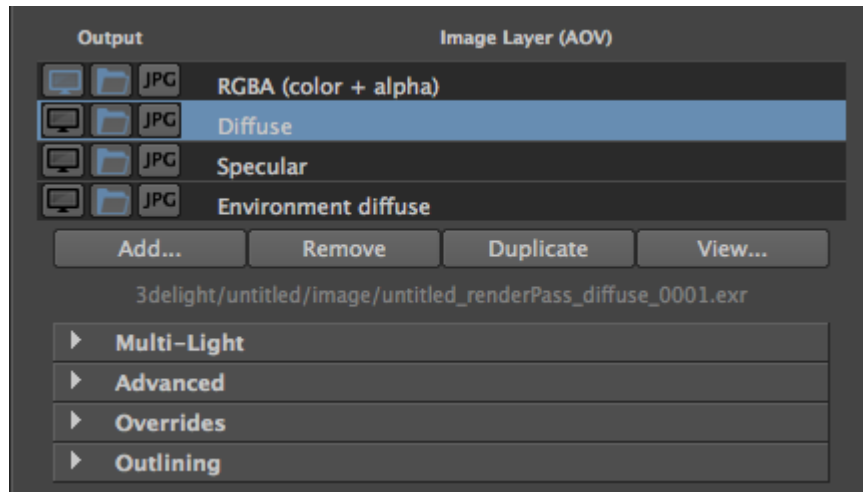
Select a layer in the list and press *Duplicate* to duplicate. You can then change some of the per layer attributes for any of the duplicated layer (otherwise you simply end up with exactly the same Layer/AOV without any difference). For example, you can have two *Diffuse* layers saved in different file format, or each with a different *Pixel Filter* or *Display Subset* (specified in the *Advanced* groups of attributes).

*View...*


Select a layer and press *View* to view it. This opens the *Image Filename* for that layer in a viewing application. Refer to [The 3Delight Preferences](#) for how to select which application should be launched.

## Per Layer Attributes

When selecting a layer (only one) in the list of layers, its attributes are listed in collapsable groups below the Add/Remove/Duplicate/View buttons. These are per-layer attributes. The expanded file name for the selected layer is shown just above these collapsable groups.



Groups of attributes for a specific Layer

Collapsible Group	Description
Multi-Light	See <a href="#">Layers Multi-Light</a> .
Multi-Mask	See <a href="#">3Delight Multi-Mask</a> .
Advanced	See <a href="#">Layers Advanced</a> .
Overrides	<p>This group is to override the following attributes for the selected layer:</p> <p><i>Image Filename</i></p> <p>Use to override the <i>Default Image Filename</i>. The options are "Default" to use (not override) the <i>Default Image Filename</i> and "Custom" to specify a custom filename for the selected layer. When default is selected, the complete expanded filename is listed just below (expanded from the token).</p> <p><i>File Format</i></p> <p>To override the <i>Default Image Format</i>. The options are "Default" to use (not override) the <i>Default Image Format</i> and "Custom" to specify a custom file format, including the pixel bit depth.</p> <div><p> It is recommended to leave these attributes to "Default" and set the file location and format using the <i>Default Image Filename</i> and <i>Default Image Format</i> at the top. This way, whenever you change these default, the change will apply to all the layers that refer to these "default" settings.</p></div>
Outlining	See <a href="#">Layers Outlining</a> .