Render Elements

This page provides information about the V-Ray Render Elements in Cinema 4D.

Overview

Render Elements are a way to break out renders into their component parts such as diffuse color, reflections, shadows, mattes, etc. This gives fine control over the final image when using compositing or image editing applications to reassemble the component elements. Render elements are also sometimes known as *render passes*.

Render elements appear in the V-Ray Frame Buffer (VFB) and can be viewed from the drop-down at the upper left corner of the VFB. They can also be saved out of the VFB as many common file formats.

Render elements are generated at render time based on the user's selection before rendering. Most render elements have parameters that can be customized to further assist the compositing process. These parameters are described on each render element's individual page.

To enable the Denoise option, first enable the Denoiser from the Render Settings menu.
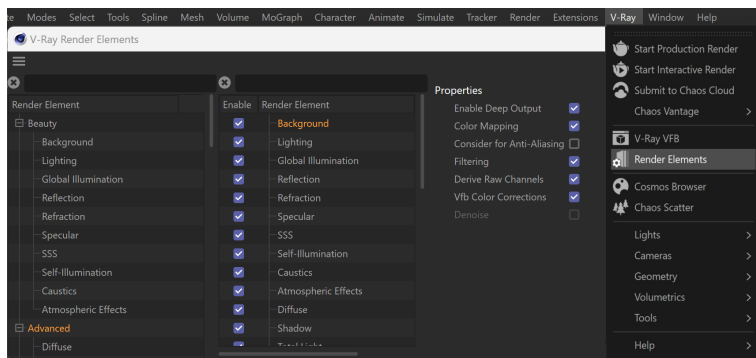
Render Elements Manager

The Render Elements window consists of three panels.

The left panel contains all of the V-Ray render elements. There is a search bar on top to help narrow down your search.

You can drag and drop a render element on its own to add it for rendering or add the whole group. Adding elements can also be done by double-clicking on them. The render elements are grouped into the following categories: Beauty, Advanced, Matte, Geometry, Utility, and Other.

The center panel lists the added render elements that are included in the VFB as render channels. Options are also available to Enable, Filter, and Denoise the render element.

- You can turn on and off each render element using the **Enable** option.
- The **Filter** option toggles whether or not the Anti-Aliasing filter is applied to that render element. It is recommended to disable anti-aliasing for render elements such as Material ID and Object ID.
- The **Denoise** option is disabled by default. It needs to be enabled from the Common tab of the V-Ray Render Settings. It reduces noise produced when rendering.

Properties are displayed on the right-hand panel, which
offers control over the representation of the selected channel.
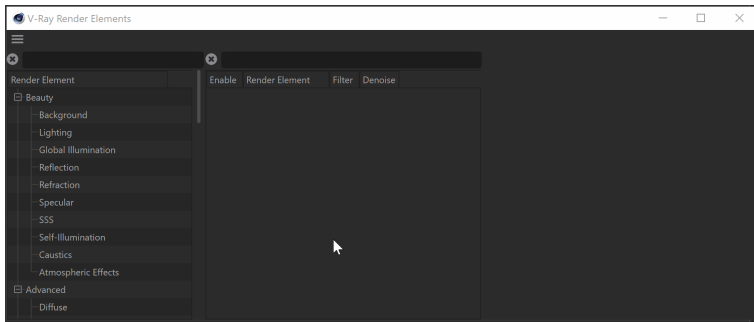
How to manage Render Elements

This section describes an example workflow to customize the
render elements to be included in the V-Ray Frame Buffer.

- Creating folders can be done by right-clicking in the
  center panel and selecting **New Folder**.
- You can duplicate folders by selecting and dragging
  them while holding CTRL.
- Folders can be renamed by double-clicking on their
  names and typing out the new value.
- You can add categories or individual render
  elements. Double-clicking on either adds them to
  the selected folder in the middle section.
- To delete all the created folders, right-click and
  select **Remove All**.
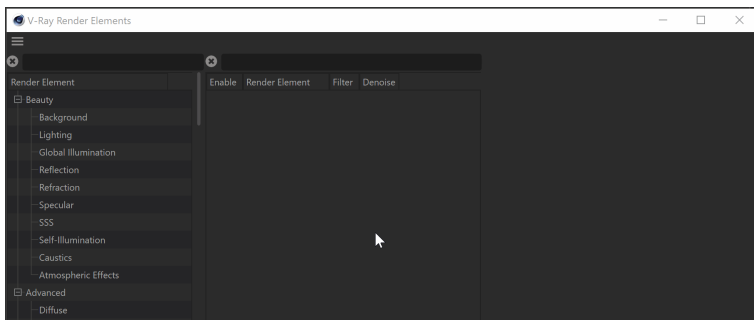
Categories

All render elements are grouped into the following categories:
Beauty, Advanced, Matte, Geometry, Utility, and Other.

Beauty – Contains all the needed render
elements for "Back to Beauty" compositing inside the
V-Ray Frame Buffer.

When selecting the Affect All channels option of VRayMtl, be
aware that the information of the respective component will
affect all render elements; therefore, the Back to Beauty
composition will not match the RGB result from the renderer.

Advanced – Contains render elements for an advanced beautification of the light, coat, and sheen.
Matte – Contains all the needed render elements for matte compositing in the V-Ray Frame Buffer.
Geometry – Contains all the render elements responsible for editing geometries from the scene, such as Object ID, Normals etc.
Utility – Contains render elements that assist your work in the V-Ray Frame Buffer.
Raw – Contains render elements that concern RAW layers.

You can find the applied render elements in the dropdown menu in the VFB. The new render elements become visible in this list after a new render is started.
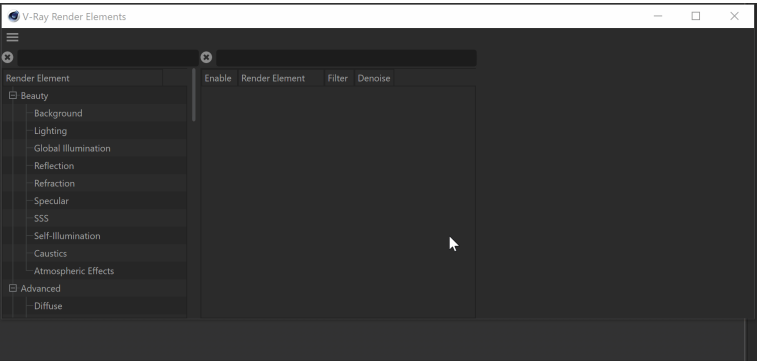
Supported Render Elements

V-Ray supports the following render elements. All render elements support native V-Ray materials.

In order to render a correct **Raw** render pass, you need to also render the corresponding main element and filter. For example, **Raw Reflection** will require you to render the **Reflection** and **Reflection filter**. For **Raw GI**, you need **GI** and **Diffuse**, etc.

Beauty

Render element	Color Depth of EXR floating-point channels	Description
Background	16bit/32bit	Image background, such as any Background Texture specified in the Environment overrides.
Lighting	16bit/32bit	Diffuse direct surface lighting.
Global Illumination (GI)	16bit/32bit	The diffuse surface global illumination. Only present if Global illumination is enabled.
Reflection	16bit/32bit	All indirect reflections from a surface.
Refraction	16bit/32bit	Refractions through a surface.
Specular	16bit/32bit	All direct specular highlights coming from a surface.
SSS	16bit/32bit	Renders just the subsurface part of the VRaySSS2 material on a separate layer.
Self Illumination	16bit/32bit	Self-illumination of the surface.
Caustics	16bit/32bit	The caustics on the material. These caustics are present only when the Caustics option of V-Ray is enabled. This channel does not include GI caustics.
Atmospheric Effects	16bit/32bit	Atmospheric effects, such as Environment Fog.

Advanced

Render element	Color Depth of EXR floating-point channels	Description
Diffuse	16bit/32bit	Pure diffuse surface color.
Shadow	16bit/32bit	Diffuse light that is blocked by other objects.
Total Light	16bit/32bit	Total lighting in the scene, both direct and indirect.
Reflection Filter	16bit/32bit	Reflection filter (the color by which the raw reflections are multiplied to give the final surface reflection). This may be considered an alpha channel for reflections.
Refraction Filter	16bit/32bit	The refraction filter mitigates the raw refraction layer. This render element returns the color by which the raw refractions are multiplied to give the final surface refraction. This may be considered an alpha channel for refractions.
Light Mix		Provides adjustment control to the lights in the scene from inside the V-Ray Frame Buffer.
Light Select	16bit/32bit	Extracts the contribution of a user-defined light or a set of lights in the scene as a separate render element.
Reflection IOR		Used to enhance or reduce Fresnel IOR effects in the final composite.
Reflection Glossiness	16bit/32bit	Returns a float value that corresponds with the Reflection Glossiness value of an object's material.
Refraction Glossiness	16bit/32bit	Returns a float value that corresponds to the Refraction Glossiness value of an object's material.
Reflection Highlight Glossiness		Returns a grayscale image that corresponds to the value in the Highlight Glossiness of the materials in the scene.
Metalness	16bit/32bit	Returns a grayscale image that corresponds to the metalness values of the materials in the scene.
Coat	16bit/32bit	Isolates the reflected light in the scene.
Coat Filter	16bit/32bit	Reflection filter for V-Ray Material Coat layer.
Coat Reflection	16bit/32bit	Indirect reflections coming from the Coat layers of the V-Ray Material used in the scene.
Coat Glossiness	16bit/32bit	Returns a float value that corresponds with the Coat Glossiness value of the V-Ray Material Coat layer.
Sheen	16bit/32bit	Isolates the reflected light in the scene.
Sheen Filter	16bit/32bit	Reflection filter for V-Ray Material Sheen layer.
Sheen Reflection	16bit/32bit	Indirect reflections coming from the Sheen layer(s) of V-Ray Material used in the scene.
Sheen Glossiness	16bit/32bit	Returns a float value that corresponds with the Sheen Glossiness value of the V-Ray Material Sheen layer.
Toon	16bit/32bit	Creates a toon-like effect on the render.

Matte

Render element	Color Depth of EXR floating-point channels	Description
Material ID	–	Material ID of scene objects.
Material Select	16bit/32bit	Renders only the object(s) assigned to a user-specified V-Ray compatible material. The material can be a top-level material or a sub-material of a VRayBlendMtl.
Multi Matte		Uses a single R, G, or B channel to create a matte.
Multi Matte ID		Isolates objects with specific Multi Matte IDs for compositing purposes.

Object ID	–	Returns solid un-shaded colors to represent numerical identifiers set through that object's Attributes, Object Property, or assigned material. Useful for selection masks. *EXR*s and *.vrimg* formats are stored as integer values.
Object Select	16bit/32bit	Renders only the object(s) called out with a specific Object or Material ID. This effect is reversible to create a render element that excludes a particular object or objects according to Object or Material ID.
Render ID	–	Node render ID of the object that contributes most to the pixel value.
Cryptomatte	forced 32bit (for multi-channel files)	Uses the Cryptomatte convention by Psypop to encode mattes into multichannel OpenEXRs.
Matte Shadow	16bit/32bit	The matte shadow part of the image.

Geometry

Render element	Color Depth of EXR floating-point channels	Description
Normals	16bit/32bit	Surface normals in screen space (which is not the same as camera space).
Bump Normals	16bit/32bit	Normals generated by bump maps in screen space (which is not the same as camera space). Use the VRaySamplerInfo utility texture node to get the normals in camera, world, or object space.
Z-depth	forced 32bit (for multi-channel files)	Z-depth of surfaces in the scene.
Velocity	16bit/32bit	Surface velocity of an object. This render element is useful for generating motion blur in post-production.

Utility

Render element	Color Depth of EXR floating-point channels	Description
Sample Rate	16bit/32bit	Shows an image where the pixel brightness is directly proportional to the number of samples taken at that pixel.
Extra Tex (ture)	forced 32bit (optional for multi-channel files)	Renders the entire scene with a single defined texture mapped on all objects.
Coverage	16bit/32bit	For each pixel, the final values for the render element are taken from the object that makes the largest contribution to that pixel.
Sampler Info	forced 32bit (for multi-channel files)	Provides information about various aspects of the shaded points - position, normal, bump normal, reflection/refraction vectors, and UVW coordinates. Can be used for world position passes or normal passes.
DR Bucket	16bit/32bit	Displays the machine that rendered each bucket when using distributed rendering with the Bucket Image Sampler.

Raw

Render element	Color Depth of EXR floating-point channels	Description
Raw Lighting	16bit/32bit	Raw diffuse direct illumination before it's multiplied by the diffuse surface color.
Raw GI	16bit/32bit	Raw diffuse global illumination (not multiplied by the diffuse surface color). Only present if Global illumination is enabled.
Raw Total Light	16bit/32bit	The sum of all raw lighting, both direct and indirect.
Raw Reflection	16bit/32bit	Pure surface indirect reflection before it is multiplied by the reflection filter color.
Raw Refraction	16bit/32bit	Pure surface refraction before it is multiplied by the refraction filter color.

Raw Coat Filter	16bit/32bit	Creates a solid mask showing the areas of reflection in the Coat layer without being affected by Fresnel.
Raw Coat Reflection	16bit/32bit	Pure surface indirect reflection from a V-Ray Material Coat layer before it is multiplied by the reflection filter color.
Raw Sheen Filter	16bit/32bit	Holds information similar to Sheen Filter RE, but without being affected by Fresnel.
Raw Shadow	16bit/32bit	Raw light that is blocked by other objects.
Raw Sheen Reflection	16bit/32bit	Pure surface indirect reflection from a V-Ray Material Sheen layer before it is multiplied by the reflection filter color.