Denoiser Tool

This page provides information about V-Ray's standalone Denoise Tool.

Overview

The V-Ray installation includes a standalone denoising tool called **vdenoise** that can be used to denoise still images or animations outside of the V-Ray host application. This is especially useful for animations because the standalone tool can look at multiple frames at once and produce a better denoising result.

The **vdenoise** tool is both a command-line utility and a GUI application. It works with either *.vrimg* or multichannel OpenEXR files and writes out files with the same format.

Currently, the **vdenoise** tool does not support deep images.

The **vdenoise** tool requires certain render elements in order to work correctly. These render elements can be generated easily with the **VRayDenoiser Render Element**.

Location

To open **vdenoise**, go to **Start Menu >** host application **> Denoiser tool**. This opens up the **vdenoise** GUI along with its associated command prompt window. If you prefer not to use the **vdenoise** GUI, you can navigate to the **vdenoise** executable through any command-line interface and run it with one of the possible commands listed below.

The folder to which the Denoiser Tool navigates to, by default, is: **C:\Program Files\Chaos Group\V-Ray\[host_application]\tools** or **C:\Program Files\Chaos Group\V-Ray\[host_application]\vray\bin,** depending on the platform being used.

Required Render Elements

The required render elements are listed below. Add the **VRayDenoiser** or **Denoiser** Render Element to your scene to generate the necessary render elements automatically.The standalone denoiser will still run when some or all of these render elements are missing, but results might be too blurry.

For single pass RGB denoising:

- Noise level (named **noiseLevel**) - The denoiser relies heavily on this render element to provide information used during the denoising operation.
- Defocus amount (named **defocusAmount**)
- World positions (named **worldPositions** or **wpp**)
- World normals with bump mapping (named **worldNormals**)
- Diffuse filter (named **diffuseFilter** or **VRayDiffuseFilter**)
- Reflection filter (named **reflectionFilter** or **VRayReflectionFilter**)
- Refraction filter (named **refractionFilter** or **VRayRefractionFilter**)

GUI Usage

Running **vdenoise** without any parameters, or from the Start Menu on Windows, will open the GUI version of the tool. This allows you to denoise still images or animations; as well as save and load preferred denoise configurations.

Input File... – Specifies the .vrimg/multichannel .exr image, .vlplfx, or sequence of images to denoise. Wildcards (?) can be used to define a sequence. For example, if the images in the sequence are named *anim_0001.exr*, *anim_0002.exr*, etc., the question mark (?) replaces the digits in the sequence's file names. In this case - *anim_????.exr*

Specify Frame Interval – When enabled, specifies which frames to process.

Start – Specifies the start frame.

End – Specifies the end frame.

By – Specifies the frame increment step.

Blend Frames – Specifies the number of adjacent frames to use when denoising animations. This reduces flickering between adjacent frames.

Skip existing frames – When enabled, skips an input image if an output image with the corresponding file name already exists.

Select denoise elements – Opens the Select denoise elements dialog that allows selecting which color elements to denoise.

Engine - Specifies the engine for denoising the RGB channel and multiple render elements. For more information, visit the *Denoising Engines* section.

Default V-Ray - The default render engine. It is slower but more accurate.

NVIDIA AI - Requires a compatible NVIDIA GPU. This render engine is faster but less accurate.

Intel Open Image - This render engine is faster but less accurate.

Preset – Selects a preset for the strength of the denoiser.

Default – Applies a mid-level denoising.
Mild – Applies a less intensive denoising than the **Default** preset.
Strong – Applies a stronger level of denoising than the **Default** preset.
Custom – Allows the **Strength** and **Radius** parameters to be set to custom values.

Strength – Specifies the strength when Preset is set to custom. Large values remove noise more effectively but may blur the image too much. The default value 1.0 uses the noise level render element as it is.

Radius – Specifies the pixel radius for denoising when Preset is set to custom. Large values slow down the denoiser, but may produce smoother results.

Threshold – Specifies threshold for denoising when the noise levels render element is missing. Typically, this is equal to the noise threshold for anti-aliasing in V-Ray.

Boost – Boosts the effect of the selected preset.

Wrap Around Border - Improves quality when denoising a 360 panorama view. Reduces artifacts when gluing left and right borders.

Temporal mode – Only available with the NVIDIA AI denoiser. When enabled, the Denoiser uses information from previous frames to create a smoother transition. Useful for rendering animation.

NVidia AI upscale – Only available with the NVIDIA AI denoiser. NVIDIA's AI upscaling technology represents an advanced method based on machine learning which provides better and more detailed results when compared to a standard image interpolation. When enabled, the already saved image is upscaled to 2x the original resolution using NVIDIA's AI upscaling technology.

Hardware acceleration – When enabled, the denoiser attempts to use all suitable OpenCL (GPU) devices, and falls back to the CPU if unsuccessful.

GPU Memory Limit (MB) – Sets a maximum GPU memory usage limit when Hardware acceleration is enabled. The default 0 uses all available memory.

Verbosity – Specifies the type of information that is printed upon denoising.

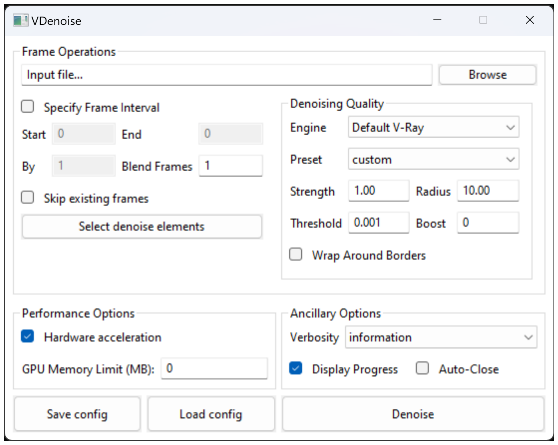
Display Progress – When enabled, the denoising result is displayed in a preview window.

Auto-Close – Automatically closes the preview window after the denoising is complete.

Save config – Saves the current denoise configuration into an .xml file.

Load config – Loads a previously saved .xml denoiser configuration.

Denoise – Denoises the selected frame(s).


VDenoise

Frame Operations

Input file...

□ Specify Frame Interval

Start 0 End 0

By 1 Blend Frames 1

□ Skip existing frames

Denoising Quality

Engine Default V-Ray

Preset custom

Strength 1.00 Radius 10.00

Threshold 0.001 Boost 0

□ Wrap Around Borders

Performance Options

☑ Hardware acceleration

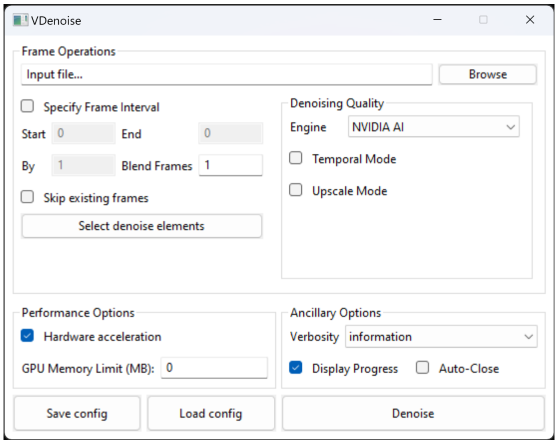
GPU Memory Limit (MB): 0

Ancillary Options

Verbosity information

☑ Display Progress □ Auto-Close

Default V-Ray denoiser


VDenoise

Frame Operations

Input file...

□ Specify Frame Interval

Start 0 End 0

By 1 Blend Frames 1

□ Skip existing frames

Denoising Quality

Engine NVIDIA AI

□ Temporal Mode

□ Upscale Mode

Performance Options

☑ Hardware acceleration

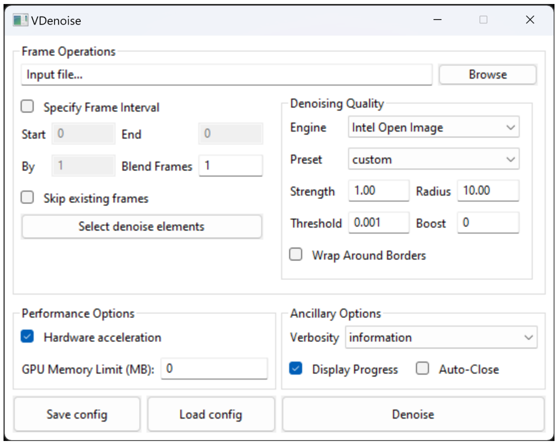
GPU Memory Limit (MB): 0

Ancillary Options

Verbosity information

☑ Display Progress □ Auto-Close

NVIDIA AI denoiser


VDenoise

Frame Operations

Input file...

□ Specify Frame Interval

Start 0 End 0

By 1 Blend Frames 1

□ Skip existing frames

Denoising Quality

Engine Intel Open Image

Preset custom

Strength 1.00 Radius 10.00

Threshold 0.001 Boost 0

□ Wrap Around Borders

Performance Options

☑ Hardware acceleration

GPU Memory Limit (MB): 0

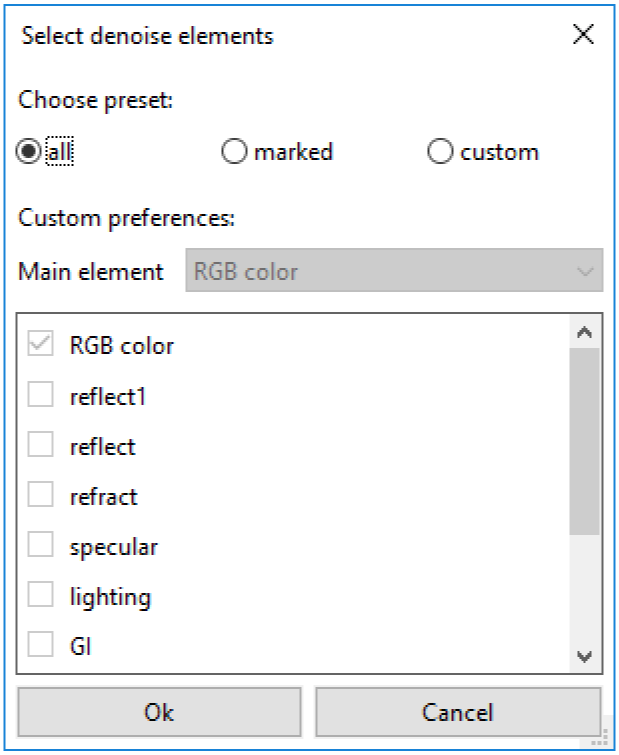
Ancillary Options

Verbosity information

☑ Display Progress □ Auto-Close

Intel Open Image denoiser

Select Denoise Elements Dialog



Choose preset:

● all ○ marked ○ custom

Custom preferences:

Main element: RGB color

☑ RGB color
□ reflect1
□ reflect
□ refract
□ specular
□ lighting
□ GI

Choose preset – Allows you to select the color elements for denoising:

> **all** – Denoises all color elements based on RGB color as the main element.
> **marked** – Denoises all color elements that are marked for denoising in the host application (before the image is rendered) based on RGB color as the main element.
> **custom** – Allows you to manually select the color elements for denoising.

Main element – The main element on which the denoising of all elements is based.

The denoising Render Elements workflow with the GUI version of the Denoiser Tool is as follows:

1. Load the multichannel .exr file into the latest VDenoiser.
2. Select the Render Elements you want to denoise in the **Select denoise elements** dialog.
3. The VDenoise saves the result in a new file that contains the denoised Render Elements.
4. Load the denoised Render Elements into compositing software.

Command Line Usage

The denoiser can also be used as a command-line utility without GUI display. Simply run the executable with one of the following commands to denoise an image or a sequence of images from within your command-line interface. You can also change the settings and behavior of the denoiser through CLI. To do so, please refer to the **Denoiser Options** tables below for a list of all available options.

Denoising Still Images

To denoise a single .vrimg or .exr image, use the following format for the command:

```
vdenoise -inputFile="path\to\image.exr"
```

where *path\to\image.ext* is the path and file name of the *.vrimg* or *.exr* file that you want to denoise.

For example, if the file you want to denoise is called *render.exr* and is located in the folder *c:\renderoutput*, the full command will be

```
vdenoise -inputFile="c:\renderoutput\render.exr"
```

Denoising Animations

To denoise a sequence of images, you must have all frames already rendered, as the denoiser needs to look at several frames at the same time. Use the following format for the command:

vdenoise -inputFile="path\to\sequence_????.exr"

where the question mark (?) replaces the digits in the sequence's file names.

For example, if the images in the sequence are named *anim_0001.exr*, *anim_0002.exr*, etc. and are located in the folder *c:\renderoutput*, the full command will be

vdenoise -inputFile="c:\renderoutput\anim_????.exr"

Denoiser Options

You can control the denoiser through optional switches on the command line. To list all available options in the command prompt window, run the denoiser without any arguments (**vdenoise** command) or use the **-help** switch:

vdenoise -help

The table below shows the optional switches, which are also displayed by the **vdenoise -help** command. To use a switch, precede the switch with a hyphen (-) and follow it with an equals sign (=) and the desired parameter, as shown in the table.

Switch	Description
-configFile="*ConfigFile.xml*"	Specifies the config file from which all denoise parameters are set. If other options are specified, they are ignored.
-inputFile="<*fileName.exr*>**"**	Specifies the input . *vrimg* or *.exr* file. Can contain paths and wildcards such as a question mark (?) to indicate digits in file names. Examples: **vdenoise -inputFile="c:\renderoutput\render.exr"** - Denoise a single image named *render.exr* located in the *c:\renderoutput* folder. **vdenoise -inputFile="c:\renderoutput\anim_????.exr"** - Denoise a sequence of frames in the c:\renderoutput folder named *anim_0001.exr* , *anim_0002.exr* , etc. Note that in order to denoise a sequence of images you must have all frames already rendered, as the denoiser needs to look at several frames at the same time.
-lensEffectsParams=" filename.vrscene"	Specifies the config file from which all lens effects parameters are set. With this option you can apply Lens Effects to the denoised image, the settings of which are taken from the .vrscene file.
-lensEffectsParams=" filename.vlplfx"	The New VFB exports lens effects in a *.vlplfx* file format. **vdenoise -inputfile=C:\Users\UserName\Desktop\LENS.exr -lensEffectsParams=C:\Users\UserName\Desktop\LENS.vlplfx** - Denoises the image and then the lens effects configuration file is applied.
-mode=strong | default | mild	Sets one of three predefined presets for the radius/threshold/noise level multiplier.
-boost=0|1|2	Boosts the effect of the selected preset. 0 - No boost. (default) 1 - Moderate boost. 2 - Large boost.
-skipExisting=0|1	Determines the file-processing behavior when a corresponding output image already exists. 0 - Do not skip: The input image is processed and the existing output image is overwritten. (default) 1 - Skip: The input image is skipped and the existing output image is not affected.
-frames= N-Na; Nb | N-Na, Nc	Specifies the frames and/or frame intervals to process. N - denotes start frame. Na - denotes end frame. Nb - denotes single frame. Nc - denotes frame increment. If not specified, all frames in the sequence are processed. Example: `"-frames= 1-100; 160-180; 200;201" -` the denoiser works with frames 1 to 100 and 160 to 180 as well as frames 200 and 201 from the animation. `"-frames= 1-200, 2"` - the denoiser works with every second frame from 1 to 200.

-denoiseElements="elementName{;elementName}" **-denoiseElements=**all	When used with <elementName>, specifies the render element(s) that should be denoised. The element names can contain wildcards and are not case sensitive. If not specified, the RGB Color element, Alpha, and all color elements that are marked for denoising in the input file are denoised. The first matched render element specifies the main element on which the denoising of all elements will be based. For example, "rgb color;vrayreflection;*lightselect*" will denoise the RGB Color, VRayReflection, and all light select elements, based on the RGB Color element. When used with "all", denoises all color elements in the input file based on the RGB Color element.
-display= 0 | 1	Specifies whether to display a preview window with the denoising result. 0 - Do not display preview window. 1 - Display preview window. (default)
-autoClose=0 | 1	Specifies whether to automatically close the preview window after denoising is complete. 0 - Wait for user to close preview window. (default) 1 - Automatically close preview window.
-useCpu=1	Forces usage of CPU version even if OpenCL support is found.
-useGpu=0 | 1 | 2	Specifies when to use GPU (OpenCL) or CPU version for denoising. 0 - Use CPU. (default) 1 - Attempt to use the best OpenCL device available, and fall back to CPU if unsuccessful. (experimental) 2 - Attempt to use all suitable OpenCL devices, and fall back to CPU if unsuccessful.
-verboseLevel=0 | 1 | 2 | 3 | 4	Specifies the verbose level of information printed to the standard output. 0 - Print no information. 1 - Print only errors. 2 - Print only errors and warnings. 3 - Print only errors, warnings, and informational messages. (default) 4 - Print all output.
-outputDirectory="string**"**	Specifies the full or relative path to an output directory for the denoised files. If the directory does not exist, it is created. If no output directory is specified, the output directory is the directory of the input files.

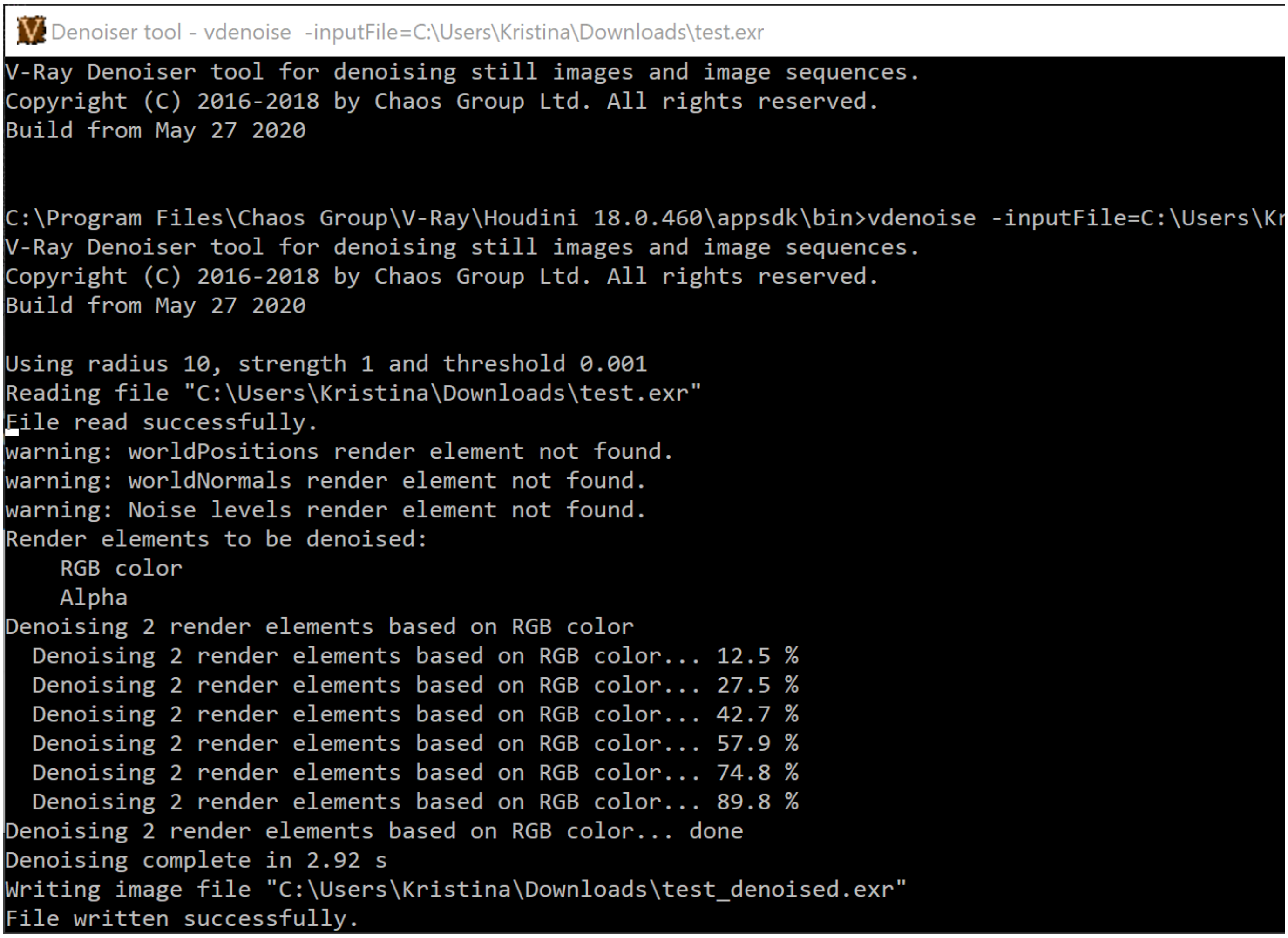
Advanced Options

Switch	Description
-abortOnOpenCLError=0 | 1	Specifies the behavior of the denoiser when an error is encountered while attempting to use OpenCL. 0 - If an error is encountered, fall back to CPU. (default) 1 - Denoising is canceled upon any OpenCL error.
-strength=N	**Sets a value for the strength of the denoising based on the noise present in the noiseLevel Render Element. Larger values remove noise more aggressively but might blur the image too much. The default is 1.0, which uses the noise in the noiseLevel Render Element as is without adding any additional strength.**
-radius=N	Specifies pixel radius for denoising. Larger values slow down the denoiser but might produce smoother results. The default is 10 pixels, which corresponds to the **Default** preset.
-frameBlend=N	Specifies the number of adjacent frames to use when denoising animations. Higher values help reduce flickering between adjacent animation frames. The default is 1, which uses one frame before and one frame after the current frame.
-oclquery=" *<string>* **"**	Explicitly specifies which OpenCL devices should be used for denoising. Examples: **-oclquery="nvidia"** - Use only NVIDIA OpenCL devices. **-oclquery="fiji"** - Use only Fiji-based AMD OpenCL devices.
-strips=N	Forces image to be split into N strips for processing. The default is -1 (negative 1), which uses an algorithm to automatically determine the optimum number of strips.
-autoRadius=0 | 1	Specifies whether to automatically adjust the denoising radius based on the level of noise present in the **noiseLevel** Render Element. 0 - No adjustment. Fixed radius is used for the entire image based on the **-radius** switch if set, or the default value of 10 if not set. (default) 1 - Automatically adjusts the denoising radius. For very noisy images, this setting might slow down the denoiser significantly.
-threshold=N	Specifies a threshold for denoising when the **noiseLevel** Render Element is missing. This value is typically equal to the noise threshold for antialiasing in V-Ray. If this switch is not set, the denoiser relies on the **noiseLevel** Render Element and a threshold of 0.001 is used.
-memLimit=N	Forces the GPU memory usage limit to N gigabytes. The default value of 0 specifies that all available memory be used.

-**outputOffset**=N	Offsets the frame number (if present) of the output file. Example: `-frames=0-20 -outputOffset=10` leads to output frame numbers: `0010,0011,0012,...,0030` and `-frames=0-20 -outputOffset=-4` leads to: `-004,-003,-002,...,0016` (default is 0 - no offset)

Output

When the standalone Denoise tool is run, it outputs information about the process, including settings, warnings, progress, and files written in the command prompt window.


Denoiser tool - vdenoise -inputFile=C:\Users\Kristina\Downloads\test.exr

```
V-Ray Denoiser tool for denoising still images and image sequences.
Copyright (C) 2016-2018 by Chaos Group Ltd. All rights reserved.
Build from May 27 2020


C:\Program Files\Chaos Group\V-Ray\Houdini 18.0.460\appsdk\bin>vdenoise -inputFile=C:\Users\Kr
V-Ray Denoiser tool for denoising still images and image sequences.
Copyright (C) 2016-2018 by Chaos Group Ltd. All rights reserved.
Build from May 27 2020

Using radius 10, strength 1 and threshold 0.001
Reading file "C:\Users\Kristina\Downloads\test.exr"
File read successfully.
warning: worldPositions render element not found.
warning: worldNormals render element not found.
warning: Noise levels render element not found.
Render elements to be denoised:
    RGB color
    Alpha
Denoising 2 render elements based on RGB color
  Denoising 2 render elements based on RGB color... 12.5 %
  Denoising 2 render elements based on RGB color... 27.5 %
  Denoising 2 render elements based on RGB color... 42.7 %
  Denoising 2 render elements based on RGB color... 57.9 %
  Denoising 2 render elements based on RGB color... 74.8 %
  Denoising 2 render elements based on RGB color... 89.8 %
Denoising 2 render elements based on RGB color... done
Denoising complete in 2.92 s
Writing image file "C:\Users\Kristina\Downloads\test_denoised.exr"
File written successfully.
```