

# RenderMan 25.0



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## Welcome to RenderMan 25.0

RenderMan version 25 provides major upgrades to look development and batch rendering, with many tools that improve artist workflows and complement the creative process. Here are some of the highlights:

### RIS

- **Innovative Denoising Technology** — The RenderMan Denoiser is completely new state-of-the-art denoising technology developed by Disney Research, which takes a new approach to denoising, using machine learning and training data from Disney, ILM, and Pixar. The Denoiser can significantly reduce render times for both feature animation and VFX, while delivering images of the highest quality. The new Denoiser excels on complex, detailed imagery that would cause other denoisers to fail. This technology has been used in production for several years now, including every Pixar feature animation since *Toy Story 4* and has dramatically reduced render times at ILM, Pixar, and Walt Disney Animation Studios.
- **Stylized Looks** — Updates to the toolset allow artists to generate Stylized Looks with more creative control over toon shading, illustrative lighting, and linework. Highlights include line distort, overhauled Toon shading system, more hatching presets, optimized linework, and new Preset Browser Stylized Looks materials that extend the library.
- **MaterialX Lama** — ILM has contributed enhancements and features to MaterialX Lama. These include more accurate calculation of the interaction of light between different material layers, and a new separated iridescence material response has been included.
- **Baking performance and control** — If you're using RenderMan to bake global illumination into textures for real-time applications, we've improved performance up to 2x, as well as added additional controls for controlling resolution.

### XPU

Pixar's XPU technology reaches significant milestones in version 25, including support for volumes, secondary passes, trace groups, and many enhancements for look development, lighting, and interactivity. These milestones represent a major evolution of Pixar's next generation renderer, XPU.

- **Volumes** — The introduction of volume aggregates in XPU is a major achievement, allowing for faster iteration times during the look development phase, as well as quicker final renders. Now render pyrotechnics and more with XPU!
- **LPEs & AOVs** — Full support for LPEs and arbitrary AOVs in XPU empowers artists with the flexibility and control they need to produce high-quality output for compositing and a variety of production scenarios.

- **Look Development Improvements** — The advancements in Look Development in XPU, including support for thin glass and trace subsets, provide better control for artists and help achieve even greater consistency between XPU renders and RIS.
- **Deformation Motion Blur** — XPU adds support for deformation motion blur, enabling studios to use XPU to generate fast quality control renders to give artists the opportunity to validate whether their animation cache was created correctly.
- **Camera Controls** — XPU now supports many controls of PxrCamera. These controls include additional features such as depth of field and chromatic aberration, which can be quickly adjusted during interactive rendering. Please refer to the docs for up to the date support.
- **Interactivity** — Interactivity is a key feature of XPU in RenderMan 25, which prioritizes interactive performance by improving the responsiveness of XPU to camera movements and shader parameter changes, through features such as Progressive Pixels, allowing artists to make quicker and more informed decisions, while providing faster image feedback for refining their choices.
- **Rendering Controls** — The rendering controls in XPU provide a more granular level of control over the rendering process, allowing artists to set trace depths for both diffuse and specular rays on a per-object basis. These controls help to achieve faster convergence speeds and produce renders that more closely match those produced by RenderMan's previous version, RIS.
- **Improved Low-Memory GPU Support** — The texture cache has been improved to perform better on GPUs that are memory constrained. You will get faster renders from the GPU if the texture cache needs to do out-of-core texture lookups.

For further details about RenderMan XPU™, see the following documentation sections:

- [XPU Guide](#) - Overview of XPU in RenderMan 25.
- [Shader & Look Development with XPU](#) - Details on lookdev with XPU.
- [Features & Limitations](#) - Understand the differences between XPU and RIS and known limitations.

## Artist Tools

We have continued to more tightly integrate RenderMan into DCCs, improving usability and stability. Collaboration with the USD and Hydra teams has helped drive RenderMan to its fullest potential. The enhancements provide a more seamless workflow for artists using RenderMan in their production pipeline.

- **Support Updates** — The latest versions of most DCCs are now supported by RenderMan: Houdini, Katana, Maya & Solaris (with support for the latest Blender to follow, while Maya 2024 is not supported).
- ). There are also general stability improvements in all of the DCCs, including the Preset Browser and the Texture Manager.
- **New Preset Libraries** — The Library of assets that ship with the Preset Browser expands substantially with several new collections for fur, hair, stylization, diverse skin, and more. All are available from the RenderMan Preset Browser.
- **Production-Grade Pyrotechnics** — A library of pyrotechnic presets now ship with version 25. The library includes Smoke, Flames, Campfire, Smokey Campfire, & Fire Ball for use in Blender, Houdini, Maya & Katana, and were developed in collaboration with Pixar VFX TD, Hope Schroers.
- **Houdini Pyro HDA** — Houdini based Kaboom Box HDA with advanced VBD processing for photoreal pyro volumes, smoke, fire and everything in between, all wrapped up an artist friend UI and created by Pixar FX TD, Hope Schroers.
- **Solaris & MaterialX** — RenderMan's capabilities in Solaris have been improved with support for MaterialX, enhancements to controlling the camera shutter, and motion blur fixes.
- **Katana 6 Support** — The latest version of Katana 6 now has support for soloing material nodes in RenderMan.

## Additional Features

RenderMan version 25 also includes:

- **VFX Reference Platform 2021** — All plug-ins are now updated to conform to the standard.

## Stylized Looks

RenderMan's Stylized Looks toolset in version 25 offers more creative control for artists to create non-photorealistic images. Updates include improved Toon shading, hatching, and line optimization. The UI has been reorganized to be more intuitive, and new features such as Line Distort, Toon Mask, and Color Spline Ramp offer artists new creative controls. Highlights:

- **Lines** — RenderMan now supports distorted lines out-of-box for a more hand-drawn appearance. There are also optimizations for line thickness and line sorting to improve performance.
- **Toon** — The Stylized Control toolset now includes Toon Mask support, and the Stylized Toon feature has been updated with a new Color Spline Ramp for increased creative control. Additionally, the whiteshader calculations have been improved and Signal Pre Gain/Gamma have been added to the toolset.
- **Hatching** — The Stylized Hatching has received updates to triplanar projections, hatching mask, toon shading, blending, and rainbow test visualizer.

- **UI Overhaul** — An overhaul of the user interface for Stylized Looks makes the toolset more user-friendly for artists. The parameters have been reorganized to be more intuitive and easier to use.

## Details

- **PxrStylizedControl:**

- Toon Mask support
- NPRdistort feature & AOV requirement
- New parameters for Distort feature: distortU, distortV, distortBumpSwitch, distortScale
- Distort Bump Switch for alternative distort using Bump Normal

- **PxrStylizedToon:**

- Color Spline Ramp for added creativity
- Toon Mask support
- UI page & naming improvements
- Improved whiteshader calculations
- Signal Pre Gain/Gamma
- Threshold Min and Max for Signal Energy
- Updated Visualizer renamed to Result

- **PxrStylizedHatching:**

- Triplanar Projections: 8-val progressive blending
- Triplanar Projections: new UI dropdown behavior with default sticky projection
- Toon Shading in Hatching: 1 button replace textures
- Hatching Mask non binary: works with upstream Pxr nodes (ex PxrRamp)
- Updated blending with Black Darkest & White Lightest
- Rainbow test visualizer: updated blending
- Signal Pre Gain/Gamma
- New Override\_SignalAOV\_CameraRange toggle
- Rename Diffuse Luminance to Signal Luminance
- Conditional visibility on Signal AOV based on Camera Range (since its ignored when on)
- Conditional visibility on Signal Energy From the dropdown, based off Camera Range (since its ignored when on)
- Re-arranged order of Camera Range page controls to under Signal AOV
- New UI page for Color, Masking, Output
- Extended help for Texture Sets
- Rework of Camera Range Hatching functionality: works as a separate mode with other Visualizer modes, not a separate Visualizer only option
- Camera Range Hatching works with Signal Pre Gain/Gamma & Spline
- Fix Visualizer Hatching Blend to not be always red
- Fix Hatching Mix to work with Visualizer mode "Hatching on Beauty"
- New hatching\_aov\_channel drop-down choice for RGB
- Support daisy chain of custom AOV & RGB channel for each Hatching node
- Visualizer Hatching On Beauty (instead of Hatching Final)
- New hatching\_aov\_string custom user AOV per node if daisy chained
- New Toon\_Colors\_Switch functionality for Toon Shading overrides textures
- Updated Visualizer renamed to Result
- Invert Signal feature
- UI page & naming improvements

- **PxrStylizedLines:**

- Algorithm optimization for Line Thickness & Dilate+Sort, speed improvements
- New Distort Lines feature
  - Works with PxrStylizedControl Distort data
  - New NPRdistort AOV requirement
- Updated Visualizer renamed to Result
- UI page & naming improvements

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## Look Differences

All the look differences below are in RIS in RenderMan 25 compared to RenderMan 24. In XPU, we continue to make fixes to make it a closer match to RIS.

- The roughness parameter in LamaHairChiang has been reparameterized to produce a more linear response.
- The default longitudinal roughness values in LamaHairChiang have changed from 0.2 0.3 0.3 to 0.13 0.27 0.27. (The azimuthal roughness is unchanged at 0.35).
- Some parameters in the set of the MaterialX Lama nodes have changed their name. Specifically, the "color" and "normal" names have been renamed to avoid conflict with some OSL keywords.

## Changes in Behavior

- [Aggregate Volumes](#) are now the default in RIS, and the only supported volume workflow in XPU. Each of our integrations in the DCCs has been enhanced to automatically add volumes to the global volume aggregate. You can create different volume aggregate groups manually.

## Deprecations

We have deprecated the C++ out-of-the-box patterns in favor of an equivalent set of OSL patterns. The new patterns have the same names and functionality as the old patterns, so no changes to your networks are necessary. We now provide OSL patterns because they run in both XPU and RIS, whereas the C++ patterns only worked with RIS.

## Removals

RenderMan continues to evolve. We periodically need to deprecate functionality, and then after a time, we remove the features from the product. Below is the list of features that had been previously deprecated, and have now been removed.

### RenderMan

- PxrSeExpr was deprecated in RenderMan 24. It has been removed from the documentation and will eventually be removed from the distribution.

### RenderMan for Maya

- RIB within ZIP archives is no longer supported.
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## Known Limitations

### Installation + Licensing

- macOS 11 or 12 (Big Sur or Monterey): The installer can download the packages from Pixar, but can't run them to get them unpacked. You must manually double-click on the .pkg files that the installer leaves in the Downloads folder. RMAN-18802
- macOS: During installation, you will see the RenderMan 24 License Server instead of the RenderMan 25 License Server. This is expected. RMAN-20602
- macOS 11 or 12 (Big Sur or Monterey): You may need to periodically restart your license server because the operating system will periodically remove the content of /tmp. RMAN-19247

### Denoiser

- macOS/Apple Silicon: The denoiser is not supported on Apple Silicon, even with Rosetta. RMAN-20408
- If your image has NaNs from either RIS, the denoiser will fail on macOS and Windows.
- The denoiser cannot denoise images from XPU, it currently produces blurry images. The denoiser works for RIS.

### RIS and XPU

- Color Management: Although we have upgraded to the VFX Reference Platform 2021, there are still color management limitations:
  - IT does not support OCIO 2.0 configs yet. RMAN-19921
- MaterialX: Material layering is not supported. RMAN-20365

### RIS

- Transform edits of aggregate volumes is not working properly – pieces of the volumes will get cut off or other artifacts exist. RMAN-20453
- The albedo on Lama dielectric goes to white at grazing angles. This differs from Lama dielectric in previous versions of RenderMan, and current PxrSurface material equivalents. RMAN-20423
- Lama BxDFs output albedo even when objects are matted. RMAN-20433
- Lama emits warnings about the name of parameters "color" and "normal". These warnings can be ignored. RMAN-20421

### XPU

- Textures in the renderer are not automatically updated during an interactive render session when using the Texture Manager. You must restart XPU to pick up the change to the texture. RMAN-20377
- For some homogeneous volumes, volume aggregates render with noisier alpha than RIS. Heterogeneous volumes such as clouds, explosions, and smoke are not affected. RMAN-20100
- Volumes with colored extinction aren't rendering correctly. RMAN-20125
- Subsurface scattering is currently assigned to the wrong AOV. RMAN-19902
- Extinction color in PxrSurface is rendering differently in XPU than RIS. RMAN-16771
- If you change the resolution while rendering interactively to "it", "it" will crash. RMAN-20237
- OSL backfacing() method isn't working correctly in XPU. RMAN-20232
- The GPU portion of XPU can render artifacts with the trace:reflectexcludesubset. RMAN-20393

## RenderMan for Houdini

- When batch rendering from a RIB exported from Houdini, the searchpath may contain an invalid path that causes RenderMan to load the wrong OpenVDB shared library, causing batch renders to fail. The workaround is to edit the "procedural" searchpath in the RIB to \$RMANTREE/lib/plugins instead of the one in the RenderMan for Houdini directory. RMAN-20297
- RfSolaris: Displacement not working when material is referenced from /mat. RMAN-19243
- RfSolaris: Texture memory limits are not properly respected. RMAN-20563
- RfSolaris: If you render to "it", the render may happen twice. RMAN-19591

## RenderMan for Maya

- F-Stop is divided by 10X with PxrCamera. RMAN-20475
- Chromatic aberration is different in RIS than XPU with RfM. RMAN-20474
- When loading 25.0 in RfM, several warnings are in the script editor about being unable to validate OCIO configuration path. RMAN-20565
- RfM fails to export rib to a folder that has spaces in the name. RMAN-20517
- Bezier and Constant interpolation types for ramps are not supported. RMAN-19486
- Overriding PYTHONPATH can cause denoising to fail. RMAN-20546
- If you are using the RenderMan Hydra Render Delegate in Maya, and are rendering when you close Maya, there will be a crash on exit. RMAN-18308
- LamalrIdescence has no out color visible in Hypershade. You can manually get the output plug, or you can hit the "hamburger" icon for the node several times to cause the plug to be visible. RMAN-20584
- If you want to render to "it" on Windows with Maya 2020, you must first manually launch "it". RMAN-16719

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## Known Limitations - Existing

### Interactive/Live Rendering Limitations

- Bucket order or size cannot be changed during live rendering.
- Changes to Presence do not update when using the opacity cache option (RIS only).
- Objects are not re-diced during interactive camera edits.
- Mesh lights cannot be interchanged as geometry without restarting.

## RenderMan Pro Server

- Shading
  - PxrUnified integrator does not yet support all the standard rendering features.
  - <primstr:nameofvalue> substitution of data from a constant primvar or user attribute on an object for dynamic filename substitution is not yet working for the gettextureinfo() OSL call.
  - Using the ' . ' character in the handle for an OSL shader could cause unpredictable results during re-rendering.
- General rendering
  - Load on demand procedurals are not supported anymore, all procedurals are now loaded immediately.
  - RenderMan does not read point data from OpenVDB files.
  - Per-Instance baking is not supported, only the reference instance.
  - PxrBakePointCloud cannot directly render ptex.
  - Sample + Display filter plug-ins do not have access to lighting services for light dependent effects, e.g. lens flare.
  - Adding new mesh light on existing geometry during IPR results in double geometry.
  - Motion blurred polygons do not motion blur normals when deformed. Use Subdivision meshes instead.
  - When attempting to access an array primvar, you must first check the size of the array primvar and allocate the appropriate space. Not doing so may lead to a crash.
  - Points and curves cannot be used as geometric lights.
  - Analytical lights placed inside non-aggregate volumes may yield artifacts when made visible to the camera. As a work around, the light camera visibility should be turned off, and a geometry with a similar shape should be used (visible to camera, invisible to transmission and indirect rays), with the proper emissive bxdf.
  - Indirect Path Guiding in the PxrUnified integrator causes a crash.
- Bridge Products:
  - RfH: Soloiing MaterialX Lama nodes in complex shading networks can give an incorrect result.

## RenderMan XPU™

Please refer to the [XPU section of the documentation for the current list of limitations](#).

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