

RENDERMAN | VERSION 24

Overview

RenderMan version 24 delivers a suite of exceptional tools for advancing look-development workflows for feature film animation and VFX. First, there is the debut of Pixar's highly anticipated RenderMan XPU™ which allows artists to harness the power of the GPU for incredibly intuitive material creation. Then collaboration with Industrial Light & Magic brings a new modular shading technology for creating photorealistic surfaces of the highest quality. In addition, RenderMan Stylized Looks™ allows the creation of entirely new looks, including illustration and anime. Lastly, version 24 delivers many more features, making it one of the most significant releases of RenderMan to date.

Release highlights:

XPU™ — Pixar's hybrid CPU + GPU rendering technology is a next-generation rendering engine, rewritten for speed and efficiency on film production assets. This first phase of XPU is focused on accelerating look development for shading artists.

Lama — A state-of-the-art material layering system developed at Industrial Light & Magic introduces a modular approach to building material networks and includes new developments on dispersion and energy conservation.

Stylized Looks™ — Move beyond physically based shading and lighting into a world where you can easily create a variety of styles for your projects. You can non-destructively control outlines, create sketch patterns, and develop a wide range of unique looks, including Anime, by using the same familiar toolset. Stylized Looks is available only in the Commercial version of RenderMan.

OpenColorIO — Robust support for the industry standard ACES color management system and other color spaces in all bridge products, including the interactive RenderMan Image Tool.

Live Statistics — Watch your rendering resource usage live, thanks to a completely redesigned statistics system that prioritizes interactivity and extensibility.

New Patterns — We are continually working to provide more artistic options for your look development. New with this release are production-proven technologies Hex Tiling Manifold and Phasor Noise.

Light Baking — Greatly enhance your real-time and VR rendering needs by baking lighting to 2D texture maps or Point Clouds.

OSL Patterns — We have converted the great majority of C++ patterns to OSL. This conversion allows the sharing of code between RIS and XPU, which provides confidence that the renders from RenderMan XPU are representative of what you will see in RenderMan RIS. C++ patterns are still supported, but they will only work in RIS.

Better Sampling — Blue noise dithering results in a perceptually cleaner image sooner

Updates to Artist Tools — Support for Autodesk's Maya, Foundry's Katana, and SideFX's Houdini and Solaris (including support for LPEs and AOVs in Solaris).

Preset Browser — Now supports Presets for Lama and Stylized Looks and expect to see libraries for both shipping soon.

RenderMan for Blender — And last but not least, a new plugin for cutting edge RenderMan features in the open source content creation tool. Rewritten to take full advantage of the architecture of version 24.

XPU™

Pixar's hybrid solution for CPU + GPU rendering combines available computing resources to accelerate production path-tracing. Starting from a system architecture that can leverage the latest developments in multi-core CPU and GPU hardware, separately or in combination, XPU has been developed to handle the scale and complexity of Pixar's feature animation projects. Its first use in the studio has been focused on detailed look development, with more capabilities coming in future releases. The plan is for XPU to eventually replace RIS as a full production renderer. Similarly in version 24, this initial phase of XPU is also positioned for look development, and the renderer is fully featured for material creation. However, this limited feature set may still have roles in layout, animation, or even final frames depending on the scope and size of a project.

Enhancing The Artist Experience

RenderMan version 24 provides major upgrades to Look Development, with many tools that improve artist workflows and complement the creative process. Here are some of the key features for improved material creation:

XPU

With a feature set focused on production look development, XPU is engineered for fast and fluid material creation, whether it's for hard surfaces, skin, or hair. Shade objects in the context of their scenes, get approval, and send to RenderMan RIS for a perceptually identical final frame.

Physically based materials have never been easier, especially in combination with the new Color Management support for ACES in look development workflows.

Lama

Lama is a modular layered material system offering world-class features for physically-based look development. Coming from a close collaboration with Industrial Light & Magic, the advanced system for material creation has been battle-tested in some of the most ambitious feature film VFX.

Stylized Looks

The innovative Stylized Looks toolset allows RenderMan to deliver images beyond photorealism. Artists can render images that look like cartoons and illustration. This flexible system allows the creation of unique looks and is limited only by imagination.

Other new features for lookdev include:

- **Dispersion** — The new layered materials system supports a sophisticated prismatic fringing effect for refractive objects.
- **USD** — hdPrman includes dynamic rendering of LPEs and AOVs in all compatible Hydra viewers, such as Houdini's Solaris and USDView.
- **Bump Roughness** — An innovative system developed at Pixar Animation for rendering micro details such as scratches efficiently.
- **Bloom** — Add gleams and blooms directly to your live renders with this physically-based tool for RenderMan's Image Tool (IT).
- **Live Statistics** — Look development is now complemented by real-time statistics, for keeping scenes efficient and fast by with immediate feedback on how shader edits impact performance.

Additional Support:

RenderMan version 24 also includes:

- **OpenVDB** — Support for OpenVDB 6.2.1.
- **OpenEXR** — Updated to version 2.3.
- **Updated API** — Changes to plug-in APIs and developer resources.
- **VFX Reference Platform 2019** — All plug-ins are now updated to the new standard.
- **Maya 2022** — Initial support, with full support for Maya 2022 specific features (like USD) coming.

RIS vs XPU | Feature Matrix

The first phase of XPU delivers a complete feature set for look development. However, some features are not supported yet, but will be as XPU matures to replace RIS. Here is a high-level summary of those features. Please see the documentation for a comprehensive list of comparative features between XPU and RIS. The documentation will be continually updated as new features are added.

	RIS	XPU
BxDFs and Patterns		
PxrSurface	✓	✓ (some subsurface modes not available)
PxrLayerSurface	✓	✓
PxrDisneyBsdF	✓	✓
PxrMarschnerHair	✓	✓
PxrConstant	✓	✓
Lama	✓	✗
Volumes	✓	✗
OSL Patterns	✓	✓ (PxrDirt and PxrCurvature not supported)
C++ Patterns	✓	✗
Baking	✓	✗
Point Clouds	✓	✗

Geometry		
Subdivision Surfaces	✓	✓ (Catmull-Clark only)
Polygonal Surfaces	✓	✓
NURBS	✓	✗
Curves	✓	✓
Points	✓	✓ (some features not available)
Quadrics and Blobbies	✓	✗
Nested Instancing	✓	✗
Lighting		
Analytic Lights	✓	✓ (PxrEnvDaylight, PxrCylinderLight not available; some light parameters not available)
Mesh Lights	✓	✗
Light Filters	✓	✗
Light Linking	✓	✗
Scalability to many lights	✓	✗
Integration & Ray Tracing		
PxrPathTracer	✓	✓ (some features not available)
PxrUnified	✓	✗

PxrVisualizer	✓	✓ (some features not available)
Trace Sets	✓	✗
Post Processing		
Sample and Display Filters	✓	✗
Pipeline		
AOVs and LPEs	✓	✗
EXR, TIFF	✓	✓
Deep Output	✓	✗
Holdouts	✓	✗

Learning

The RenderMan team is working on better ways to deliver RenderMan and provide improved community engagement and support for all users, experienced and new.

- **New Art Challenge Announced** — Pixar's RenderMan is teaming up with Adobe on a new challenge, featuring the most beloved mascots in the industry, Substance's MeetMat and Pixar's RenderMan Walking Teapot.
- **RenderMan Fundamentals** — Pixar has recently released a new series of training New training partners and internal efforts will allow artists to learn RenderMan in-depth from working professionals. <https://renderman.pixar.com/renderman-fundamentals>

Application Compatibility and Requirements

RenderMan requires CPUs capable of running the full SSE4.2 instruction set. A minimum of 8GB of RAM is recommended.

RenderMan is compatible with the following 64-bit operating systems:

- Linux CentOS/RHEL 7.2+
- Windows 10
- macOS 10.14 and 10.15.

RenderMan is also compatible with the following DCCs:

- Houdini 17.5, 18.0, and 18.5
- Katana 3.2, 3.5, 3.6, and 4.0
- Maya 2019, 2020, and 2022
- Blender 2.83+

RenderMan XPU is compatible with the following 64-bit operating systems:

- Linux CentOS/RHEL 7.2+
- Windows 10

RenderMan XPU is compatible with the following for its GPU accelerated mode:

- NVIDIA “Maxwell” architectures and above.

Additional References

Additional information on features in version 24.

- **2020 RenderMan Art & Science Fair** — Watch hours of in depth presentations from the RenderMan Team about all the features of version 24, from last year’s RenderMan online event: <https://renderman.pixar.com/news/renderman-art-and-science-fair-2020>
- **ACES Color Management** — Here is the official page of the The Academy Color Encoding System (ACES): <https://www.oscars.org/science-technology/sci-tech-projects/aces>
- **Bump Roughness** — Read how it was used on Cars 3 to capture microfacet details in metal and paints: <https://renderman.pixar.com/stories/cars-3>
- **Phasor Noise** — The original presentation at ACM: <https://dl.acm.org/doi/10.1145/3306346.3322990>
- **RenderMan Fundamentals** — Pixar’s acclaimed educational resource for RenderMan will be hosting more lessons about features in version 24. Watch this space: <https://renderman.pixar.com/renderman-fundamentals>

About RenderMan

RenderMan is an Academy Award-winning rendering solution, excelling at producing stunning imagery for feature film animation, VFX, and projects of all kinds. RenderMan is constantly evolving to meet new creative and technical challenges and to take advantage of the latest advances in computer technology.

About Pixar Animation Studios

Pixar Animation Studios, a wholly owned subsidiary of The Walt Disney Company, is an Academy Award®-winning film studio with world-renowned technical, creative and production capabilities in the art of computer animation. The Northern California studio has created some of the most successful and beloved animated films of all time, including “Toy Story,” “Monsters, Inc.,” “Cars,” “The Incredibles,” “Ratatouille,” “WALL•E,” “Up,” “Toy Story 3,” “Brave,” “Inside Out,” and “Coco.” Its movies and technology have won 40 Academy Awards® and the films have grossed more than \$14 billion at the worldwide box office. “Soul,” Pixar’s 23rd feature, is currently streaming on Disney+. Pixar’s upcoming feature film “Luca,” releases June 18, 2021.