



RADEON

PRORENDER

with





Welcome

AMD is all about open standards. And to move the development of 3D forward, we realised that we had to develop technology in the form of APIs that worked across multiple hardware platforms.

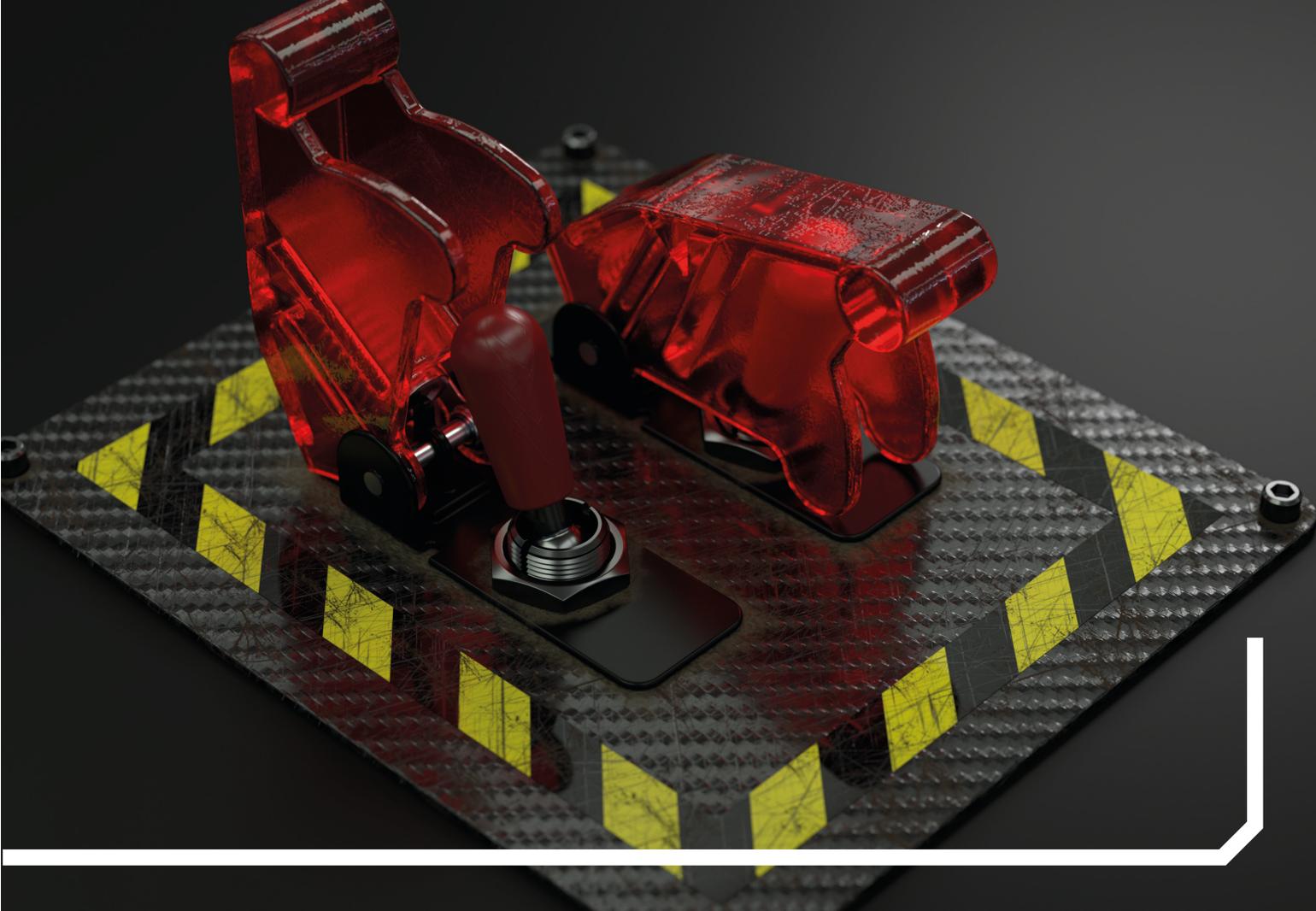
Radeon™ ProRender started as a project to see what a GPU was capable of in the next five years—in real-time. And when we examined performances in testing it became clear that the algorithms were really fast on the compute attributes of modern GPUs, and it worked well on CPUs, too. This technology had more uses beyond that of a real-time graphics engine, and we started getting requests from software companies to provide an open source ray tracer. One of the first

companies we demoed this technology to was Maxon (also looking at developing similar technology themselves). But what AMD offered was more complete. So Maxon has now implemented Radeon ProRender into the viewport. It works on multiple platforms and hardware*, gives good performance and is integrated into Cinema 4D's workflow. I hope this guide will encourage you to join us in our bid to revolutionise rendering.



Rob Jamieson
ISV Manager, AMD

* Not all hardware or platforms are supported



Rendering in Cinema 4D

With the integration of Radeon™ ProRender, Cinema 4D will be the first commercial 3D application with an integrated GPU renderer

Pathtracing renderers became more and more popular over the last years. Instant previews, combined with photorealistic render quality, changed the workflows of many professional artists. This made pathtracing renderers a must-have in many professional studios all around the world.

AMD developed Radeon ProRender as a modern uni-directional pathtracing renderer, which provides unbiased rendering, and features GPU-acceleration. Being based on OpenCL™, it allows users to render on

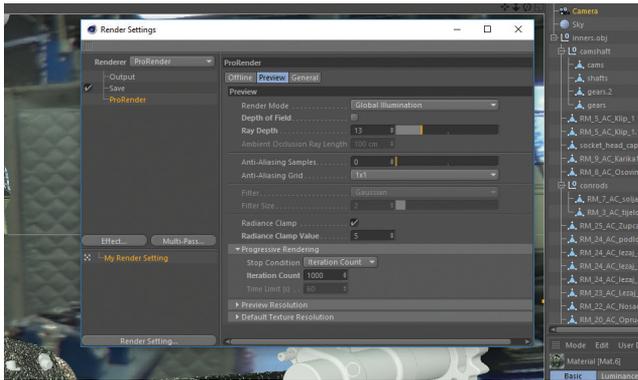
graphics cards produced by different manufacturers. This flexibility was one of the reasons for AMD and MAXON to team up and integrate Radeon ProRender natively into Cinema 4D, which will begin with the upcoming launch of Release 19.

For Cinema 4D users, who already create materials completely reflectance-based, there will be no difference regarding workflow, so they immediately benefit from the huge speed boosts Radeon ProRender enables in render time. For other users, it is important to understand what the physically-based workflow

is, and how to use it.

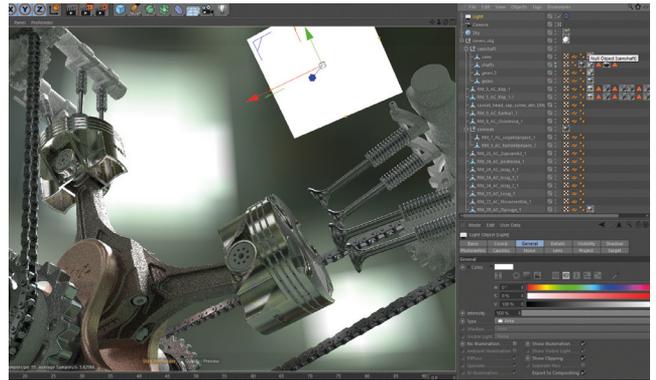
The central idea of the physically-based workflow is to only use those lighting set-ups, materials and camera configurations which could exist in the real world. This also involves the use of real-world measurements. The goal is to bring the rendering of a physical simulation of light and matter as close as possible. While this may bring limitations on artistic freedom, the trade-off is a rendering which matches reality, and becomes virtually indistinguishable from a photograph.

That said, let's see how to convert this knowledge to Radeon ProRender



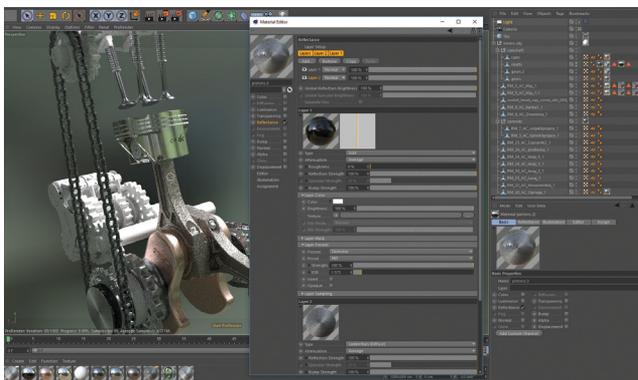
1. Starting Radeon ProRender

After choosing Radeon ProRender from the render settings of Cinema 4D you can activate the interactive preview directly in the viewport. Use the Min Resolution parameter to undersample the preview in the beginning of the rendering, in order to increase interactivity while editing, keep in mind that you need to increase the ray depth, if your scene contains glass materials.



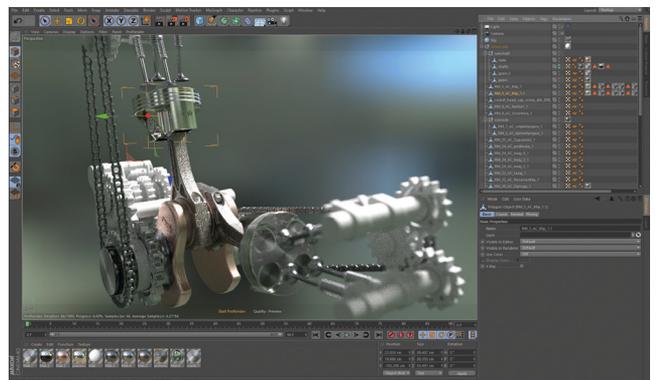
2. Lighting

It's common to light a scene and make clay renderings before adjusting materials. This enables you to see the distribution and mood of light in your scene. Lighting with an HDRI leads to instant photorealistic results. And you can improve the look by using additional sources. Keep in mind that the size of the light source will affect its intensity in a PBR workflow. The bigger, the brighter.



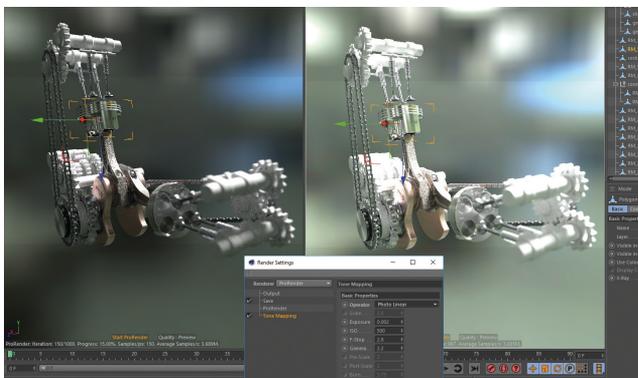
3. Materials

It is important to stick to the physically-based workflow. That's the reason for a new reflectance-based material inside of Cinema 4D Release 19. The color channel is replaced by a 100% rough Lambertion, or Oren-Nayar diffuse reflection, as the base layer. Always use a value of 1-3% as a minimum for roughness in reflectance layers, as there are no perfect reflections in reality.



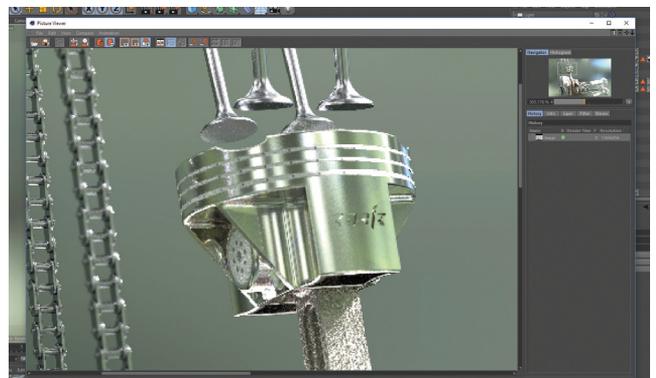
4. Depth of field

Adding depth of field is just one click in the render settings. If the whole image is getting blurry, adjust the Focal Distance parameter in the camera by adding a focus object to the scene. As in the real world, the strength of DOF is controlled by the F-stop setting in the camera, but also by the distance between camera and object, so always work in real world scales!



5. Tone Mapping

Tone Mapping is an essential effect when it comes to rendering Global Illumination images. Activate it in Cinema 4D's render settings by choosing 'Tone Mapping' from the 'Effects' dropdown. Now you can choose from different algorithms and correct colors based on exposure, ISO, F-stop, gamma and many more.



6. Final touches & offline rendering

For final touches switch the Radeon ProRender viewport quality from preview to offline. This can raise the quality, but may also result in longer render times. Play with the firefly filter threshold to get rid of hot pixels, common to pathtracers. For the final rendering, just click 'Render to Picture Viewer'. Enable bucket rendering if you want to render high resolution images, that won't fit into the vRAM.



in Cinema 4D. You can use Cinema 4D's material editor with Radeon ProRender exactly the same way as before. But as Radeon ProRender is a physically-based renderer, you won't get the best out of it. That's why MAXON has introduced a new PBR workflow, which consists of a new PBR light object and a new PBR material. Instead of the color channel, this preset uses Cinema 4D's reflectance channel, with one of the physically accurate diffuse surface models as the base layer.

The first iteration of Radeon ProRender in Cinema 4D shows how seamlessly a renderer can be integrated into an app. Radeon ProRender natively works with Cinema 4D's default materials, lights and cameras – completely without the need for additional tags. Render settings for both preview and offline rendering offer an incredibly fast workflow when setting up scenes for final rendering. Depth of field, firefly filtering, tone-mapping and bucket rendering are just a few more features of this deeper integration.

With Cinema 4D Release 19, the integration of Radeon ProRender could make it the perfect solution for product viz. AMD and Maxon will keep improving the integration, whilst adding more features to upcoming Cinema 4D releases. Watch this space!

EXPERT TIP

In the lighting and shading phases you can speed up the interactive preview in heavy scenes by deactivating updates for geometry.

Multi-GPU efficiency

This comparison shows the benefit of rendering with multiple GPUs. This office test by Maxon using two Radeon Pro Duos, rendering a scene with one GPU enabled, then two, then three, and finally four. The most significant speedup came with the second GPU, but even a fourth GPU brings quite a big speedup.

This comparison also shows that you can further push GPU utilization by using anti-aliasing samples as a multiplier for iterations: Rendering the image above with just 25 iterations, but with four anti-aliasing samples (brown graph), will be faster than rendering with 100 iterations and just 1 anti-aliasing sample (blue graph). Although render quality stays the same.

Render time



Speedup



■ Sample A: 100 iterations, 1 AA sample ■ Sample B: 25 iterations, 4 AA samples
Sample B → higher GPU utilisation



CASE STUDY

Bomper Studio

This studio in south Wales explains why it's turned its attention to Radeon™ ProRender and Ryzen™ processor-based workstations

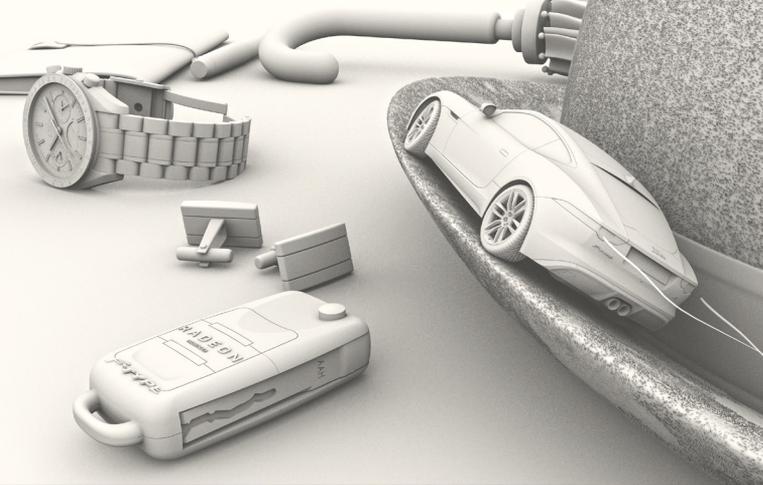
The world of modern visual effects is one that moves at a tremendous pace, with studios almost chasing their own tails in the race to develop powerful new tools, while also trying to find the hardware that allows them to be used in production, with as few bottlenecks as possible.

Bomper Studio (bomperstudio.com), an award winning shop based in Caerphilly, Wales, understands these pressures. The company has worked

on award-winning CGI animation and stills for clients such as Carlsberg, Jack Daniels, Nestle, GlaxoSmithKline, and Cadbury—working within the advertising and FMCG industry. Predominantly a Cinema 4D house, Bomper already has access to a wide range of rendering solutions, including the recent addition of Radeon ProRender. Here we ask them about their experiences with AMD and Radeon ProRender.

“Radeon ProRender is great, and it

integrates so well in to cinema 4D; along with the new PBR workflow it gives amazing viewport feedback on lights, materials and DOF in realtime - all wonderful things to speed up the production workflow,” explains Emlyn Davies, at Bomper Studio. “At Bomper we have invested in a lot of hardware of late; our most recent purchase has been an amazing water-cooled render rig, which has pushed our network rendering capabilities to 16x GPU cards. Also, upgrading our network to



IPR RENDERING ON TAP

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You can see a clay rendering (above left), which enables you to measure the light distribution for a finished scene (above right)

Interactive Photorealistic Rendering (IPR) is now at your fingertips

The Radeon ProRender engine features a native physically-based material and camera system to enable true design (left)

“THE ENGINE OFFERS REALISTIC END RESULTS ALMOST OUT OF THE BOX.”

10GB has enhanced our pipeline and reduced bottlenecks speeding up rendering and large datasets.”

Maxon’s implementation of Radeon ProRender is a tightly-knit one, and its simplicity is a big selling point. However, it doesn’t matter how easy it is to use; if software doesn’t provide the necessary results, then it’s not worth anything. But it’s self-evident from Bomper’s experiences that this isn’t the case.

“We also have an AMD machine with the latest Ryzen 8 core CPU and

Radeon Pro Duo card, which has worked well with Radeon ProRender,” says Emlyn. “And the speed of GPU rendering means we’re able to work almost like a photographic studio, seeing as the engine offers realistic end results almost out of the box, meaning that our artists can concentrate on being creative.”

For Bomper Studio, the new machine has highlighted the benefit of GPU rendering. Improved scalability and the fact you can now get seven cards in a single machine makes it a

shrewd investment.

“The same power in CPU form would effectively mean 7x workstations or a large, loud server solution, which is not ideal for a small studio such as ours,” explains Emlyn. “Also there’s the comparison in price; not just the extra components, cases—compared to a single unit GPU rig—but also in the number of render node licenses required. A single for the GPU, and potentially seven for a CPU route means the GPU system is considerably cheaper.”

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Radeon™ ProRender is a powerful and versatile new ray tracer, based on OpenCL™. It is designed to unleash the full power of multiple GPUs and even uses CPUs as a fallback. This flexibility led MAXON to integrate Radeon ProRender natively into the next generation of their award-winning 3D solution Cinema 4D.

The AMD Radeon™ Pro WX 9100 graphics card, based on AMD's new "Vega" architecture with 16GB of high bandwidth memory, is the perfect partner for Radeon ProRender in Cinema 4D. You can use more than one card if you want to go really fast



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