



SOLIDWORKS® 2020

VISUALIZATION AND VR



RADEON PRO

Image courtesy
of CGPdesign

FOUR WAYS TO VISUALIZE A SOLIDWORKS®

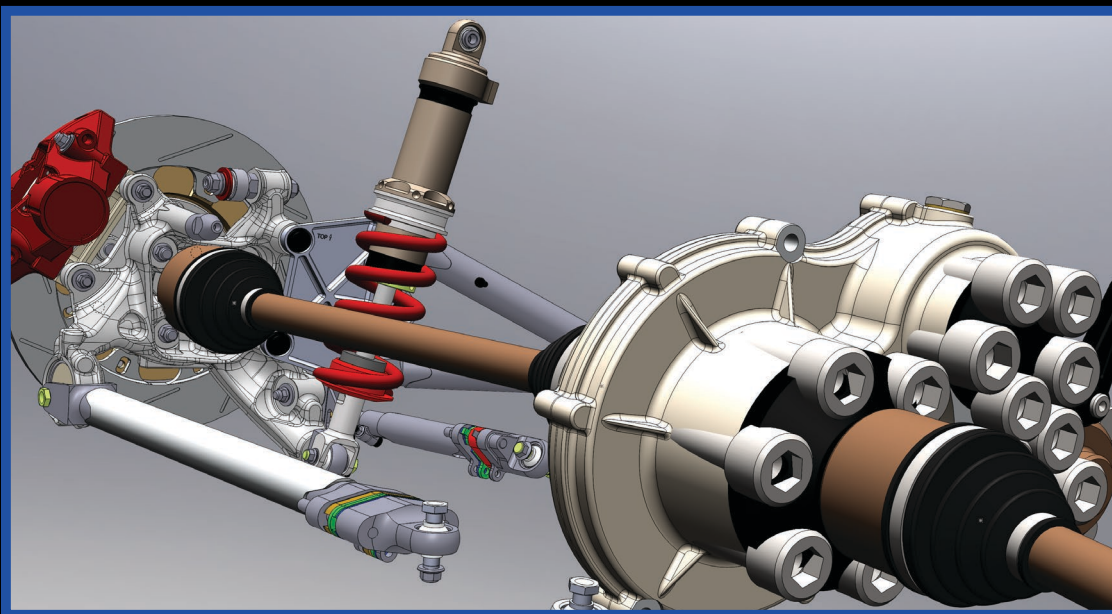
Designers and engineers have several options when it comes to visualizing SOLIDWORKS® designs – from enhanced realism in the viewport with RealView to photorealistic stills and animations with a physically-based renderer. Then, for a fully immersive experience, models can even be taken into Virtual Reality (VR)

SOLIDWORKS® VIEWPORT (shaded with edges)

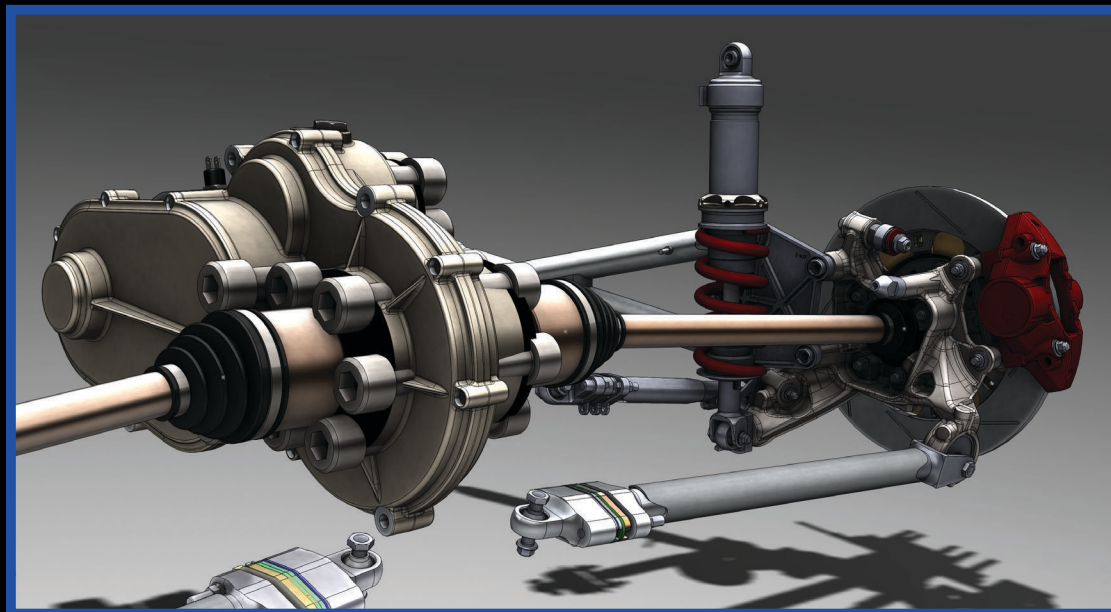
Shaded with edges is the most popular real-time viewport used in SOLIDWORKS®. It may not be the most visually attractive, but it does a great job of highlighting the topology of a model, clearly showing how parts interact with each other. This is illustrated by the disc brake and transmission in this drivetrain assembly.

Most modern professional graphics cards, including the AMD Radeon™ Pro WX 4100 and WX 5100, should deliver good 3D performance in this mode.

For particularly large assemblies, when the new Performance Pipeline in SOLIDWORKS® 2020 is enabled (see page 4), a more powerful graphics card such as the AMD Radeon™ Pro W5500 or WX 7100, should offer an even smoother interactive experience.



SOLIDWORKS® VIEWPORT (RealView + shadows + Ambient Occlusion)



RealView delivers much more realistic effects inside the viewport, which helps bring SOLIDWORKS® models to life in an interactive 3D environment.

This OpenGL®-accelerated viewing mode supports floor shadows, and environment reflections. In this drivetrain assembly, Ambient Occlusion (AO) is also enabled to enhance the shadows and add more depth and realism to the scene. This is particularly noticeable around the disc brake and transmission where darker shadows appear in more occluded (hidden) areas.

RealView is only supported on a professional graphics card such as AMD Radeon™ Pro. It puts much bigger demands on the GPU, so a higher-end card like the Radeon™ Pro W5500 or WX 7100 is recommended.

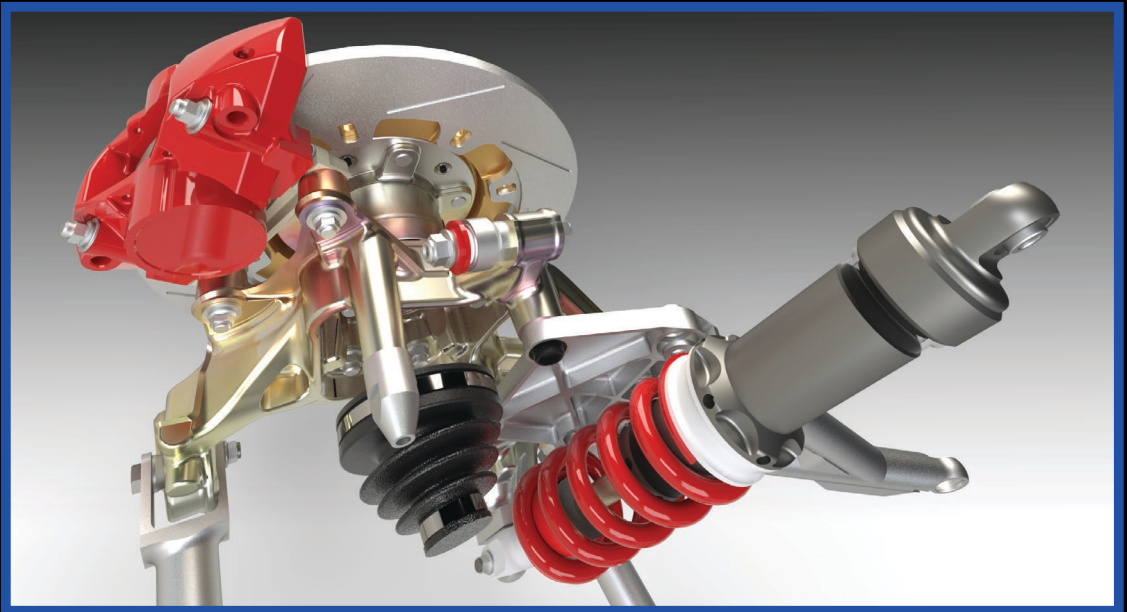
MODEL

SOLIDWORKS® VISUALIZE (Radeon™ ProRender)

SOLIDWORKS® Visualize is a powerful physically-based renderer that lets designers and engineers produce stunning photorealistic images and animations with a few simple mouse clicks. The 2020 release features Radeon™ ProRender, a raytracing engine that is designed specifically to run on AMD GPUs.

In this drivetrain assembly, metals and powder-coated materials, together with shadows and reflections, are much more realistic than when displayed in the native viewport.

Physically-based rendering is computationally intensive so can take minutes or tens of minutes to render a scene at high resolutions. Radeon™ ProRender works with a range of GPUs but will benefit most from high-end GPUs such as the AMD Radeon™ W5700 or WX 9100.



SOLIDWORKS® eDRAWINGS PROFESSIONAL (VR)



SOLIDWORKS® eDrawings Professional

allows designers and engineers to take their SOLIDWORKS® designs into VR in just a few clicks. Immersive VR can give a completely different perspective to a 2D display. Models can be inspected from any angle at 1:1 scale. It is very useful for design validation, design review or for customer communication.

Inside VR, users can walk around or teleport, view metadata, move objects, explode assemblies or take them apart one component at a time.

To deliver results in real-time, the software can place a big demand on the GPU. A "VR Ready Creator[®]" graphics card such as the AMD Radeon™ Pro W5700, WX 8200 or WX 9100 is recommended.

See page 11 for more info.

LARGE ASSEMBLIES, BIG PERFORMANCE

SOLIDWORKS® 2020 features the Performance Pipeline. This brand-new graphics engine can deliver huge 3D performance benefits for those working with large assemblies on a workstation with a powerful professional GPU

SOLIDWORKS® design and engineering models have grown in size dramatically over the years. Today, it is not unheard of for assemblies to feature 10,000+ parts, a combination of solids, surfaces, and mechanical and electrical components. However, while datasets have increased in complexity, the graphics engine that powers the SOLIDWORKS® viewport has remained largely the same. Some of the core code dates back 15 years when SOLIDWORKS® was still relatively new and graphics cards were completely different beasts to the powerful parallel processors they are today.

To take full advantage of the power of modern professional graphics cards, SOLIDWORKS® 2020 features the Performance Pipeline, a new graphics engine that can significantly increase the 3D performance of large assemblies.

Previously, when assemblies reached a certain size and complexity, the workstation's Central Processing Unit (CPU) would become the 3D performance bottleneck. No matter how powerful the workstation's professional Graphics Processing Unit (GPU) was, 3D performance would not increase.

To the designer, this could have a dramatic impact on productivity by taking significantly longer to re-position the 3D model on screen. Very basic view operations such as zoom, pan and rotate could become choppy, as the GPU could only render at a few frames per second. And, as the assembly did not respond instantly to the movement of the mouse, the user had a tendency



to overcompensate, in much the same way one does when steering a boat for the first time.

To help improve 3D performance and user experience when working with large models, SOLIDWORKS® has traditionally fallen back on 'large assembly mode'. This automatically disables RealView and shadows thus compromising the level of realism in the viewport. It also sets the level of detail to low, so faces disappear while rotating or moving the model.

LARGE ASSEMBLY CONTROL

With the new graphics engine in SOLIDWORKS® 2020, trade-offs in 3D performance or visual

fidelity could become a thing of the past. With more of the graphics calculations now done on the GPU, rather than the CPU, provided the right graphics hardware is in place, users should experience significantly better 3D performance when working with large assemblies, even when large assembly mode is turned off.

To put this in perspective, the graph to the right shows the average frame rate for manually rotating a complex snow bike assembly with 49 million triangles and 2,400 components. The improvement in this case was rather staggering – it was the difference between having a smooth interactive viewport

AMD Radeon™ Pro - the professional GPU for SOLIDWORKS®

AMD has a long-standing technology partnership and product alignment with Dassault Systèmes, and its Radeon™ Pro workstation graphics cards are currently being certified for SOLIDWORKS® 2020 on both Microsoft® Windows® 10.

Graphics-level certification is a critical part of building a productive CAD pipeline, as it ensures that the user's workstation is rock

solid and compatible with new features and optimizations as new SOLIDWORKS® versions come to market. Examples include Order Independent Transparency (OIT) that uses the GPU to render semi-transparent objects faster and more accurately, and Ambient Occlusion (AO), a real-time lighting effect that sits on top of RealView and is designed to simulate the way light radiates in the real world

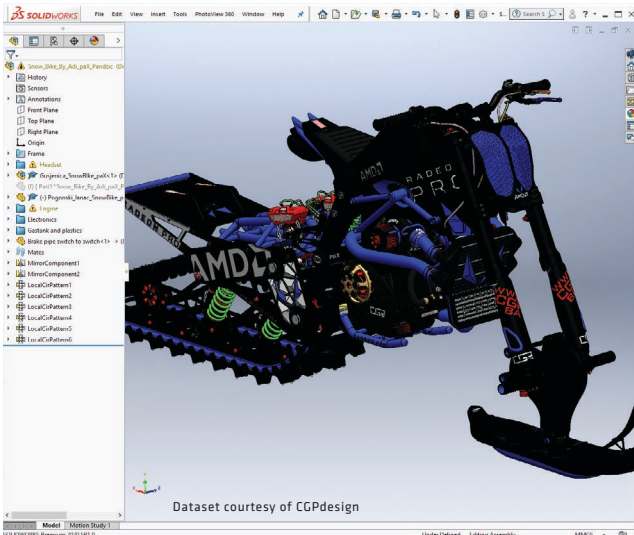
more accurately.

AMD's engineering teams work very closely with Dassault Systèmes throughout the application development and certification processes to address potential performance optimizations and bugs long before products ship to customers.

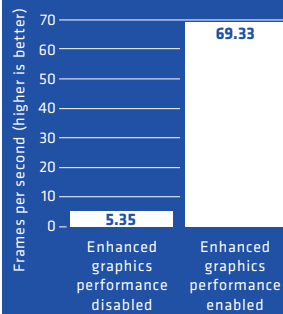
Performance optimizations in SOLIDWORKS® focus on the tasks that designers and

engineers carry out in their day-to-day work. To learn more about how AMD Radeon™ Pro can accelerate solid modeling workflows turn to page 7.





▲ Large assembly model rotation in SOLIDWORKS® 2020



Complex Snow Bike assembly with 49 million triangles and 2,400 components. Tested with Radeon™ Pro WX 8200 graphics card¹

versus one that was very choppy and not responsive. This can translate directly to user productivity and can revolutionize workflows by allowing designers to work with increasingly complex assemblies that were simply unpleasant to work with in the past.

By reducing the CPU bottleneck, SOLIDWORKS® is also able to scale better with graphics hardware, meaning users can further accelerate dynamic performance with a higher end graphics card, such as the AMD Radeon™ Pro W5500, W5700, WX 7100 or WX 8200. For smaller SOLIDWORKS® assemblies, the AMD Radeon™ Pro WX 4100 or WX 5100 is a good choice.

▲ Enabling the Performance Pipeline in SOLIDWORKS® 2020

In SOLIDWORKS® 2020, users can choose between the legacy graphics engine and the new 'Performance Pipeline' graphics engine.

To enable the Performance Pipeline, simply go to Tools > Options > Performance and tick the checkbox at the bottom of the dialogue box. SOLIDWORKS® will then need to be restarted.

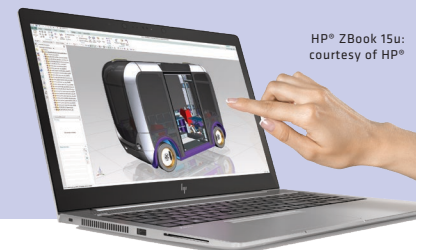
▲ Touch, gesture and digital pens for design and markup

SOLIDWORKS® 2020 includes several touch and gesture sketching capabilities to help users get the most out of touch-enabled mobile workstations, such as the Dell Precision™ 5530 2-in-1 and HP® ZBook 15u G6.

SOLIDWORKS® can automatically convert hand sketches into editable splines to be used as a starting point for 3D modeling. Object recognition also extends to shapes, with hand drawn slot shapes automatically converting into SOLIDWORKS® slot sketch entities.

To help minimize mouse and keyboard input, users can also hand write dimensions on the screen, with SOLIDWORKS® converting them into fully associative driving dimensions. Sketching also extends to design review, allowing markups and notes to be added directly to the 3D model.

In addition to fingers and pens, designers can now use the Microsoft® Surface Dial to pan, zoom, rotate and cycle through different commands on any Windows® 10 device.



HP® ZBook 15u: courtesy of HP®

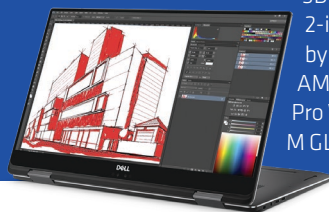
▲ Workstations for modeling and viewport visualization

The HP® Z2 Mini G4 is a tiny workstation with an elegant design that offers plenty of power for mainstream SOLIDWORKS® workflows. It features an AMD Radeon™ Pro WX 4150 GPU (4GB) and a 6 core CPU.

For larger SOLIDWORKS® assemblies or better 3D performance with RealView, consider the HP® Z4 G4 or Dell Precision™ 5820 with the AMD Radeon™ Pro WX 7100 (8GB).

The Dell Precision™ 5530 2-in-1 is a new generation mobile workstation, designed for precision pen and touch interaction. It features a 360-degree hinge, so it can function as a laptop or a tablet, and a next generation 15.6-inch 4K Infinity display. For 3D modeling, the 2-in-1 is powered by professional AMD Radeon™ Pro WX Vega M GL graphics.

The HP® ZBook 14u and 15u G6 are very thin and light mobile workstations with a premium metallic finish. They feature 14-inch and 15.6-inch displays respectively with optional 4K touch. For 3D modeling, both laptops are powered by a professional AMD Radeon™ Pro WX 3200 GPU (4GB), which is recommended for part and small assembly modeling.



WAVE GOODBYE TO LEVEL OF DETAIL

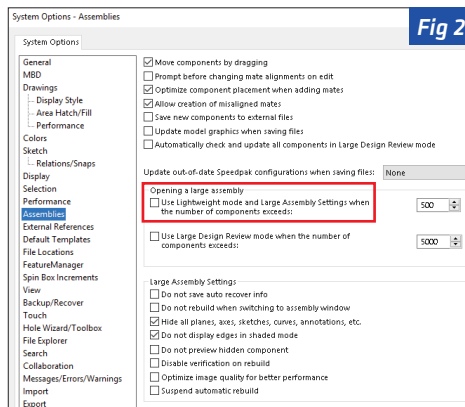
In order to maintain good 3D performance when working with large models, SOLIDWORKS® automatically reduces the level of detail. Now with the new Performance Pipeline you no longer have to accept this compromise

When SOLIDWORKS® models reach a certain number of components, Large Assembly mode is automatically invoked. This helps maintain all-important 3D performance but comes at the expense of visual quality.

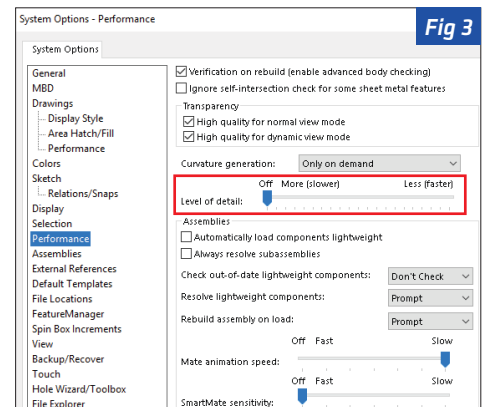
In Large Assembly mode, RealView, shadows, Ambient Occlusion and anti-aliasing are all disabled. Furthermore, Level of Detail is set to low, which means faces can disappear while moving the model. This can have a huge impact on productivity as key aspects of the design are temporarily hidden from view, only becoming visible seconds after the model stops moving.

Figure 1 illustrates what can happen when Level of Detail is set to low. The image on the left shows what the model looks like when it is being moved. Several parts are simplified into blocks, hiding important detail and other objects from view. This makes it hard to orient the model precisely. The image on the right shows what the model looks like seconds after it has stopped moving. It is only now that it is fully rendered, revealing important details around the handlebars, brakes and engine.

With the new Performance Pipeline and a fast AMD Radeon Pro GPU it is possible to disable Large Assembly Mode and turn off Level of Detail completely without it negatively impacting performance. It means users can quickly and precisely move a fully detailed model into any desired position. What's more, this can be done with RealView, shadows and Ambient Occlusion enabled which is great for presentations.



To temporarily disable Large Assembly Mode, go to Tools and uncheck Large Assembly Settings. To permanently disable it, go to Tools > Options > Assemblies and uncheck the box



highlighted in Figure 2. Once Large Assembly Mode has been disabled, Level of Detail can be set to off. Go to Tools > Options > Performance and move the slider to the left (see Figure 3).

▲ The power of transparency

There are many ways that transparency can be applied to a model to help bring clarity to the design process. It can be used to accurately represent glass and plastics, to reduce the visibility of objects intended for reference only, to view internal components, or to make it easier to edit a part in the context of an assembly.

To help render semi-transparent objects faster and more accurately, SOLIDWORKS® uses

a display technology called Order Independent Transparency (OIT).

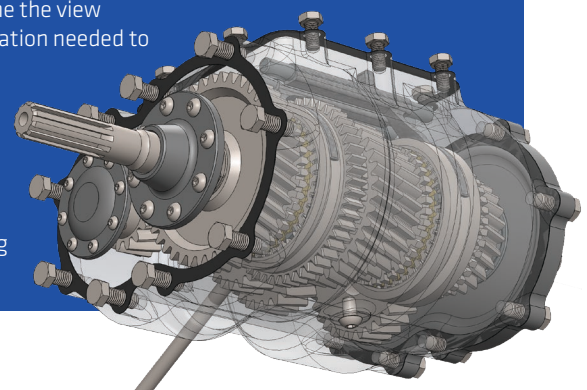
OIT exploits the power of the GPU to help ensure that overlapping transparent faces blend properly, resulting in a much more accurate rendering of the model. As everything happens in real time inside the SOLIDWORKS® environment it can help support better decision-making throughout the design process.

Prior to OIT, SOLIDWORKS®

relied on the CPU to sort transparent objects into order, but this could be slow and prone to errors. Every time the view changed the calculation needed to be re-done.

With OIT, objects don't need to be sorted before they are rendered and, because everything is done on the GPU

and less information needs to pass between CPU and GPU, the performance is much better.



RETHINKING PERFORMANCE

AMD leads the competition in its internal SOLIDWORKS® performance testing⁷ that realistically reflects the 3D modeling steps that users of SOLIDWORKS® take - instead of simply rotating, panning, and zooming

SOLIDWORKS® users spend a significant amount of time solid modeling – sketching, extruding, applying fillets and chamfers, cutting away material, mirroring, adding holes and more. While this is going on, as and when required, the designer will rotate, pan or zoom the model to get right perspective.

Today, most benchmarks take a model and spin it around. After spinning, you get a score. But who sits at their desk spinning models?

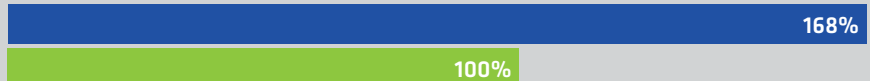
AMD has always been focused on what end users do in the real world. In SOLIDWORKS®, as the emphasis is on solid modeling, that is where AMD has concentrated its performance tuning. The challenge is highlighting these benefits with today's benchmarks. That's why AMD has written its own.

Model Mania is a friendly competition at SOLIDWORKS® World where users see how fast and accurately they can model information from a 2D drawing. The models are not overly complicated but do take advantage of the most commonly used SOLIDWORKS® design steps. AMD uses these same models for its internal benchmarking, but takes things one step further, automating the design, taking out the time a user spends thinking.

In the benchmark, which uses 20 modeling steps, including sketching, combining, extruding, and cutting, the AMD Radeon™ Pro WX 7100 completes the Model Mania test faster than the NVIDIA® Quadro® RTX 4000. It is 28% faster overall⁷ and significantly faster

▲ SOLIDWORKS® performance in five individual design steps

Revolve Boss/Base²



Combine³



Hole Wizard⁴



Extrude cut⁵



Sketch⁶



AMD Radeon™ Pro WX 7100 NVIDIA® Quadro® RTX 4000

in certain operations. But AMD doesn't stop there. It uses the benchmark data to focus on areas where it can do further performance optimizations to give users real world workflow benefits.



▲ The importance of GPU memory

Both SOLIDWORKS® 2020 and SOLIDWORKS® Visualize 2020 should benefit from more powerful GPUs. But it's not just the processing power of an AMD Radeon™ Pro graphics card that's important. GPU memory also plays a critical role.

In SOLIDWORKS® 2020, the new Performance Pipeline graphics engine is built around OpenGL's 'retained rendering' mode, where more data is stored on the GPU

than in the previous graphics engine's 'immediate' mode.

Many key algorithms in the Performance Pipeline rely heavily on the GPU. These include Ambient Occlusion, for more realistic shadows; Anti-Aliasing, for smoother edges; Order Independent Transparency (OIT), for faster and more accurate transparent objects; and Occlusion Culling, which means objects that are obscured by others are not rendered.

Buffering more information on the GPU means less time spent waiting for the CPU to feed in data, resulting in better performance. This is one of the major reasons why the previous graphics engine was bottlenecked by the CPU.

When using the Performance Pipeline in SOLIDWORKS® 2020, 4GB of GPU memory should be considered a minimum.

SOLIDWORKS® Visualize is even more demanding, as large volumes

of data need to be loaded into GPU memory in order to carry out the ray trace rendering calculations. This is particularly critical when using complex HDR images and textures, as well as when rendering at high resolutions.

8GB should be considered an absolute minimum, with 16GB for very large scenes. Memory bandwidth is also important as this governs how quickly data can be loaded into GPU memory.

THE IMPACT OF PHOTOREALISM

To take visualization to the next level with ray traced rendering, SOLIDWORKS® users have several options for creating stunning photorealistic stills and animations

Designers and engineers can get great results in the viewport with SOLIDWORKS® RealView and Ambient Occlusion. The results are instant and fully interactive, giving real-time feedback on new design iterations and the ability to explore new forms and materials in tandem.

The one trade off with viewport visualization is visual fidelity, however. Lighting is approximated, so materials, shadows and reflections are a best guess of how a product will look when manufactured. To take visualization to the next level, designers and engineers should consider photorealistic ray trace rendering.

Ray trace rendering works by simulating how light behaves in the real world by tracing rays of light as they reflect and refract off objects within a scene. The technique is very computationally intensive as it is based on real world physics, so it typically takes minutes to deliver one rendered image. However, results are significantly more realistic, providing

much greater insight into the look and feel of a product, as well as the exact choice of materials.

Users of SOLIDWORKS® Professional or Premium have two included options for ray trace rendering: PhotoView360™ and SOLIDWORKS® Visualize Standard.

PhotoView 360 is completely embedded within SOLIDWORKS®, so any changes made to the SOLIDWORKS® model will update automatically in PhotoView 360. Scenes are then rendered with multi-core CPUs.

SOLIDWORKS® Visualize Standard is a standalone application for photorealistic rendering that uses a “Live CAD Update” to update

▲ Design and render at the same time

One of the challenges of ray traced rendering is its large computational demand. With CPU-based renderers, unless the workstation is manually tuned, and CPU cores are ring fenced, it can grind to a halt. This can make it hard to do any other work on the same workstation until the render has finished.

This problem doesn't exist when rendering with AMD Radeon™ Pro GPUs. The GPU's asynchronous compute engine allows compute and graphics tasks to be performed at the same time. Even when the GPU is crunching through a render in SOLIDWORKS® Visualize, it will remain snappy and responsive when the designer needs to move the 3D CAD model in the SOLIDWORKS® viewport.

SOLIDWORKS® models. Scenes are rendered using GPUs or CPUs, but the software works most efficiently with GPUs.

Prior to the 2020 release, SOLIDWORKS® Visualize worked only with NVIDIA® GPUs. But now the rendering software also supports AMD Radeon™ ProRender, a raytracing engine that is designed specifically to run on AMD's high-performance Radeon™ Pro graphics cards.

Image courtesy of CGPdesign



▲ Workstations for GPU-accelerated photorealistic visualization (SOLIDWORKS® Visualize)

The AMD Radeon™ Pro W5700 (8GB), WX 7100 (8GB) and WX 9100 (16GB) are all good choices for GPU rendering in SOLIDWORKS® Visualize.

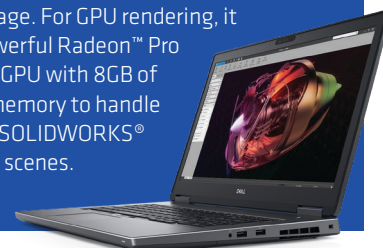
These powerful graphics cards not only deliver the computational performance needed to render scenes quickly but have plenty of GPU memory to store data for large scenes. This is particularly important when using complex HDR images and textures, as well as when

rendering at high resolutions.

For the highest level of rendering performance, the BOXX APEXX T3 (pictured left) is offered with the 3rd Gen AMD Ryzen Threadripper CPU, which delivers 88 lanes of PCIe Gen 4 and is ideal for hosting multiple GPUs (including the Radeon Pro W5700, which is the first professional PCIe Gen 4 GPU) as well as the fastest PCIe Gen 4 NVMe drives.

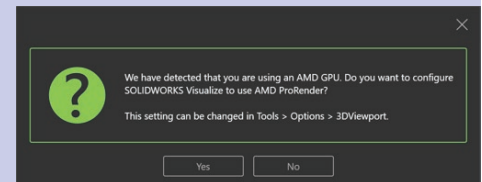
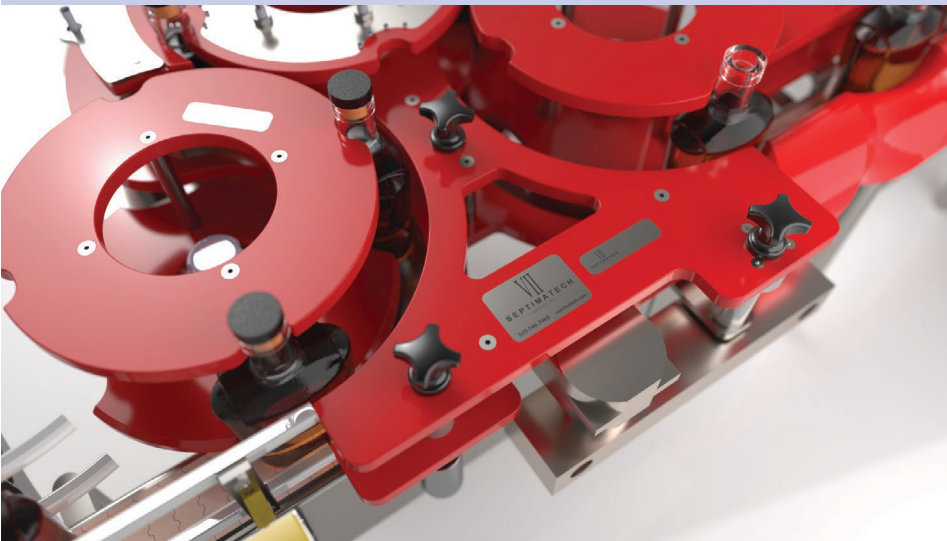


The Dell Precision™ 7740 is a premium 17-inch mobile workstation that combines impressive performance with a lightweight design. It features a powerful CPU with up to 8 cores, up to 128GB of memory, and up to 8TB of PCIe SSD storage. For GPU rendering, it has a powerful Radeon™ Pro WX 7130 GPU with 8GB of GDDR5 memory to handle complex SOLIDWORKS® Visualize scenes.



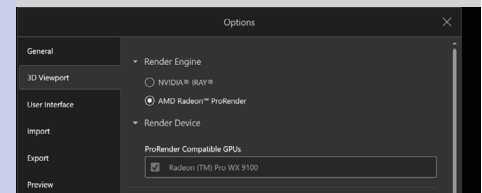
PHYSICALLY-BASED GPU RENDERING MADE EASY

Included with SOLIDWORKS® Professional or Premium, SOLIDWORKS® Visualize 2020 is an advanced, but easy-to-use physically-based renderer that can now be accelerated by powerful AMD GPUs



(Above) On launch, SOLIDWORKS® Visualize automatically detects what GPU hardware is in your workstation

(Below) Navigate to Tools > Options > 3D Viewport to select compatible render devices from a pick list. Radeon ProRender supports multiple GPUs



SOLIDWORKS® Visualize is a design-focused physically-based renderer that works with SOLIDWORKS® and other 3D CAD tools.

Unlike most physically-based renderers, which rely on the workstation's Central Processing Unit (CPU) to crunch through the complex ray tracing calculations, SOLIDWORKS® Visualize is optimized for Graphics Processing Unit (GPUs).

For the 2020 release, users can now choose between two render engines: AMD Radeon™ ProRender, which is designed to run on any high-performance GPU that supports OpenCL 1.2, and NVIDIA® IRAY®, which is designed to run on CUDA-enabled NVIDIA®

GPUs and high-performance CPUs.

When SOLIDWORKS® Visualize 2020 loads up for the first time, it automatically detects which GPU or GPUs are inside the workstation and then prompts the user to select the most appropriate rendering engine.

Users can then go to Tools > Options > 3D Viewport to select compatible render devices from a pick list. Using more than one GPU will significantly reduce the render time.

Multiple GPUs are available in some desktop workstations (see bottom of page 8).

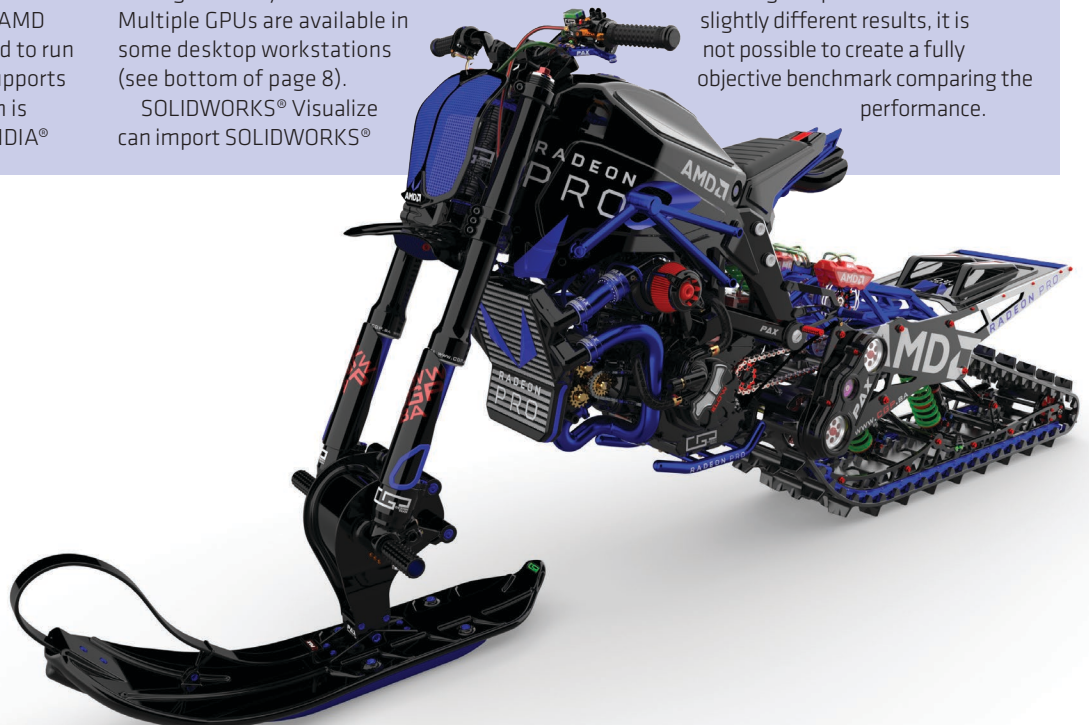
SOLIDWORKS® Visualize can import SOLIDWORKS®

files directly and automatically maps SOLIDWORKS® appearances to the materials in SOLIDWORKS® Visualize. The software includes an extensive material library and materials can be dragged and dropped directly onto objects.

Render times vary from minutes to several hours, depending on the desired quality, output resolution, model complexity and the performance of the workstation's GPU(s).

As all render engines produce

slightly different results, it is not possible to create a fully objective benchmark comparing the performance.



BRING PRODUCTS TO LIFE IN VR

Viewing a 3D CAD model on a 2D display is an essential part of design, but VR can take things to the next level, allowing everyone to experience virtual prototypes as if they were real



Virtual Reality (VR) is starting to have a huge impact across all areas of design, engineering and manufacturing. For years it was very costly, making it the preserve of large automotive and aerospace firms. Now, with affordable Head Mounted Displays (HMDs) like the HTC VIVE Pro or Oculus Rift, firms of all sizes can benefit.

With VR, virtual prototypes can be experienced at a real-world scale, giving the feeling of a physical connection. There are obvious benefits for large products, such as heavy machinery or manufacturing production lines, where physical prototyping is costly and not always practical. However, VR can also aid development of smaller products which can be experienced in the context of where they will be used.

Identifying and resolving issues early on in the development process, digitally, can save money and reduce time to market.

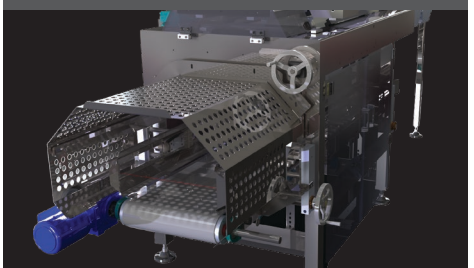
VR allows designers to assess how a product

will perform and then validate the design. This can be done solo or through collaborative design review, even with distributed teams. Products can be tested for ergonomics, manufacturability and serviceability early on in the development process with virtual mannequins. In-field engineers can be trained on products before they even exist.

VR can also be a powerful communication tool, allowing those from non-technical backgrounds, such as customers and clients, to better understand how a product will work and the actual size it will be. This can also offer huge benefits for marketing and sales.

VR is very graphics-intensive and requires a powerful GPU to deliver the 90 frames per second needed for a smooth VR experience. The "VR Ready Creator[®]" AMD Radeon™ Pro W5700 or WX 9100 are good choices for professional workflows as they are certified for SOLIDWORKS[®] and deliver great VR performance in eDrawings[®] Professional.

▲ Power to manufacturers



BluePrint Automation (BPA) designs and manufactures machinery for packing and palletizing products such as frozen foods.

Building prototypes of these large and complex machines for its customers to test can be a painstaking process. Visualizing and evaluating designs on 2D displays also has its limitations, as BPA's VP of engineering Chung-Chee Tai explains. "Last year, we had a customer come look at one of the machines, and they said, 'Wow, that's much bigger than I thought it would be!' That's when I thought that if we had VR, there wouldn't be surprises like that."

BPA implemented an AMD CAD-to-VR solution using the Radeon™ ProRender Game Engine Importer powered by an AMD Radeon™ Pro WX 9100 graphics card. Now, it is able to visualize the complex designs in VR, animating mechanisms, testing ergonomics; catching mistakes before assembling and manufacturing products. "It's good for safety analysis, too," adds BPA mechanical engineering clerk Katie Hildebrandt, "such as showing areas where it wouldn't be safe to put your hands."

BPA's next step for VR is back in the design studio, where its engineers are looking to use it to optimize key features, such as operability and serviceability, packing even more insight into the early design phase.

▲ Workstations for Virtual Reality (VR)

The AMD Radeon™ Pro WX 7100 is a good choice for entry-level VR, while the Radeon™ Pro W5700, WX 8200 and WX 9100 are better suited to more demanding VR workflows.

The Dell Precision™ 5820 (pictured right) and the **HP® Z4** (pictured far right) are ideal for professional VR content creation. These high-performance desktop workstations offer a range of high



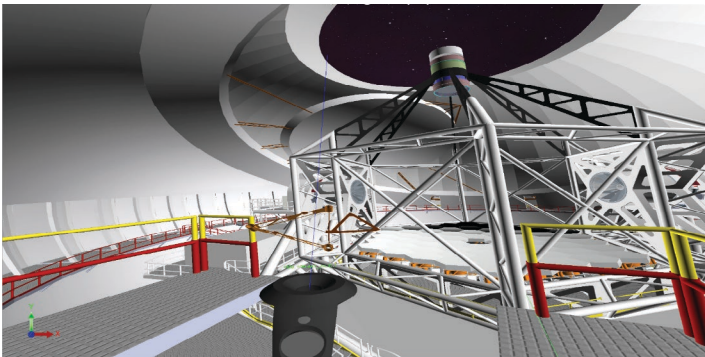
frequency CPUs, lots of memory for complex models and plenty of USB ports on the front and rear to plug in VR headsets and base stations / sensors.

They both support multiple high-end professional GPUs, including the Radeon™ Pro WX 7100 and WX 9100, although not all VR applications are able to make use of multiple GPUs.



eDRAWINGS - THE GATEWAY INTO VR

With eDrawings Professional 2020, bringing SOLIDWORKS® models into Virtual Reality (VR) has never been easier. At the push of a button, designs can be experienced in an immersive environment at a real-world scale



eDrawings® Professional 2020 allows design, engineering and manufacturing professionals to take their SOLIDWORKS® models into a fully immersive VR environment in just a few clicks. The software can be used for quick design validation or for design review.

In eDrawings® Professional, simply open a SOLIDWORKS® assembly 'in VR', then choose an environment in which to place the model. This could be a factory hall or sunset scene, with floor materials including concrete, wood or glass. Users can add also custom sky environments and floors.

To enter VR, simply click the 'play' button, then put on the VR headset. Using the VR controllers, users can teleport around the scene, create an exploded view of the model, click on components to view metadata or place, scale and rotate parts within the assembly.

In eDrawings Professional 2020, image quality in VR has been significantly improved.

It now includes full screen anti-aliasing (to smooth the jagged edges of diagonals) as well as realistic reflections and transparencies. Models can be displayed with Ambient Occlusion, dynamic shadows and non RealView appearances.

By increasing image quality, it may mean you need a more powerful GPU. The AMD Radeon™ Pro W5700, WX 8200 and WX 9100 are good options, although the W5500 and WX 7100 should work fine with smaller assemblies.

eDrawings® Professional is not limited to SOLIDWORKS® models. The software can also open a variety of CAD files directly, including PTC Creo®, Siemens Solid Edge®, CATIA®, Siemens NX™ as well as many neutral 3D formats. eDrawings® Publishers are also available for other CAD tools.

eDrawings® Professional currently works with the HTC VIVE and HTC VIVE Pro, but there are plans to add support for other VR headsets. AMD has also tested the software with the wireless enterprise-focused HTC VIVE Focus Plus (see box out below).

eDrawings® Professional is included with SOLIDWORKS® Professional and SOLIDWORKS® Premium Editions.



HTC VIVE Focus Plus offers a high quality, fully wireless, untethered VR experience.

▲ Cut the cable with AMD Radeon™ ReLive for VR

First generation Head Mounted Displays (HMDs) like the HTC VIVE can offer an incredible VR experience for design, engineering and manufacturing. However, because they need to be connected to a workstation via a long cable, mobility can be restricted, and this can break the feeling of immersion.

The good news is, high quality, fully wireless, untethered VR experiences are now a reality, thanks to new generation HMDs like the enterprise-focused HTC VIVE Focus Plus and AMD Radeon™ ReLive for VR9 technology.

Users are able to explore large manufacturing assemblies at 1:1 scale, from any angle, without having to worry about cable length restrictions or getting tied up in knots.

Wireless VR also lends itself to collaborative design review with multiple participants able to explore the same virtual model in the same space.

The HTC VIVE Focus Plus features inside out tracking and 6 degrees of freedom controllers. It fully emulates the wired HTC VIVE headset, but does not require

lighthouses for tracking the position of the headset or the controllers.

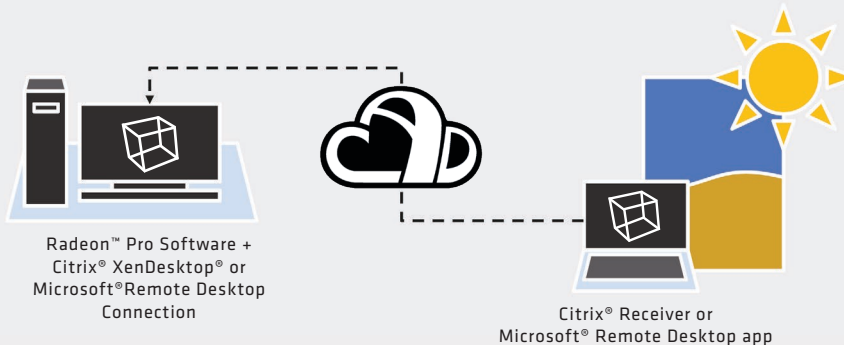
Rendering of the VR experience takes place on the graphics card, such as the high-end professional AMD Radeon™ Pro W5700 or AMD Radeon™ Pro WX 9100. Data is then streamed over standard Wi-Fi 5 (formerly 802.11ac) into the self-contained headset.

AMD Radeon™ ReLive for VR capability is built into the AMD Radeon™ Pro driver. Simply go into the ReLive section of the driver and turn on its capabilities.

USE SOLIDWORKS® FROM ANYWHERE

Designers and engineers are no longer tied to their desks. AMD Remote Workstation gives the flexibility that modern product development demands

AMD Remote Workstation deployment



Design or engineering is no longer the 9 to 5, Monday to Friday job it used to be. Global teams and increased time to market pressures mean 24/7 access to 3D CAD is becoming increasingly important. Designers and engineers never know when that moment of inspiration might strike or when a change order or approval will need an instant response.

There are many ways to connect to an office

PC remotely, but a 3D CAD workstation presents a completely different challenge. SOLIDWORKS® users need full 3D graphics acceleration and no lag when working with large assemblies.

AMD Remote Workstation offers an easy way for designers to access their physical workstation from almost anywhere, from almost any device and get the same workstation experience they would expect to get in the design office.

AMD Remote Workstation works with any workstation with a Radeon™ Pro WX 3200, WX 4100, WX 5100, WX 7100, WX 8200, WX 9100, W5500 or W5700 GPU and the latest version of AMD Radeon™ Pro Software.

AMD does not charge an end-user license fee for this technology and provides all the software components you need to work remotely once you have acquired, installed and set-up Citrix® Virtual Apps and Desktops or Microsoft® Remote Desktop Connection.

Citrix® XenDesktop® Virtual Delivery Agent (VDA) or Microsoft® Remote Desktop Connection needs to be installed on the workstation and Citrix® Receiver or Microsoft® Remote Desktop app on the client device, which could be a standard home PC, laptop or tablet.

The quality of the connection is also important, so to optimize for high-latency environments, AMD Remote Workstation allows the remote visualization application to securely access rendered frames directly from the AMD Radeon™ Pro GPU's framebuffer, which cuts out a layer of latency observed with other remoting applications.

FOOTNOTES

- 1) Testing conducted by DEVELOP3D Magazine as of January 24, 2020 on a test system comprising an Intel® Xeon® W-2125 CPU @ 4.00 GHz, 16 GB RAM, Windows® 10 Pro using Radeon™ Pro Software for Enterprise 19.Q4 running on the Radeon™ Pro WX 8200. The test was conducted in SOLIDWORKS® 2020 SP1 in shaded mode with Enhanced Graphics Performance enabled and disabled, using the Spin500 benchmark, which records a Frames Per Second score.
- 2) The Radeon™ Pro WX 7100 running Radeon™ Pro Software for Enterprise 19.Q2 is up to 68% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world benchmark for SOLIDWORKS® 2019 "Revolve Boss/Base" design step. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world benchmark for SOLIDWORKS® 2019 where the total time taken for the "Revolve Boss/Base" design feature was recorded for both AMD and the competition. Using this configuration, the Radeon™ Pro WX 7100 had a total time of 6.4 seconds for all instances of the "Revolve Boss/Base" design feature through the test while the competition took a total time of 10.8 seconds. Making the Radeon™ Pro WX 7100 up to 68% faster than the NVIDIA® Quadro® RTX 4000 in this feature. Performance Differential: 10.8-6.4 (seconds) = -68.0%. RPS-66
- 3) The Radeon™ Pro WX 7100 running Radeon™ Pro Software for Enterprise 19.Q2 is up to 57% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world benchmark for SOLIDWORKS® 2019 "Combine" design step. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world benchmark for SOLIDWORKS® 2019 where the total time taken for the "Combine" design feature was recorded for both AMD and the competition. Using this configuration, the Radeon™ Pro WX 7100 had a total time of 11.59 seconds for all instances of the "Combine" design feature through the test while the competition took a total time of 11.3 seconds. Making the Radeon™ Pro WX 7100 up to 57% faster than the NVIDIA® Quadro® RTX 4000 in this feature. Performance Differential: 11.3-10.7 (seconds) = -57.0%. RPS-62
- 4) The Radeon™ Pro WX 7100 running Radeon™ Pro Software for Enterprise 19.Q2 is up to 51% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world benchmark for SOLIDWORKS® 2019 "Hole Wizard" design step. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world benchmark for SOLIDWORKS® 2019 where the total time taken for the "Hole Wizard" design feature was recorded for both AMD and the competition. Using this configuration, the Radeon™ Pro WX 7100 had a total time of 17.55 seconds for all instances of the "Hole Wizard" design feature through the test while the competition took a total time of 17.55 seconds. Making the Radeon™ Pro WX 7100 up to 51% faster than the NVIDIA® Quadro® RTX 4000 in this feature. Performance Differential: 17.55-11.59 (seconds) = -51%. RPS-68
- 5) The Radeon™ Pro WX 7100 running Radeon™ Pro Software for Enterprise 19.Q2 is up to 42% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world benchmark for SOLIDWORKS® 2019 "Extrude Cut" design step. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world benchmark for SOLIDWORKS® 2019 where the total time taken for the "Extrude Cut" design feature was recorded for both AMD and the competition. Using this configuration, the Radeon™ Pro WX 7100 had a total time of 33.3 seconds for all instances of the "Extrude Cut" design feature through the test while the competition took a total time of 47.4 seconds. Making the Radeon™ Pro WX 7100 up to 42% faster than the NVIDIA® Quadro® RTX 4000 in this feature. Performance Differential: 47.4-33.3 (seconds) = -42.0%. RPS-65
- 6) The Radeon™ Pro WX 7100 running Radeon™ Pro Software for Enterprise 19.Q2 is up to 21% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world benchmark for SOLIDWORKS® 2019 "Sketch" design step. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world benchmark for SOLIDWORKS® 2019 where the total time taken for the "Sketch" design feature was recorded for both AMD and the competition. Using this configuration, the Radeon™ Pro WX 7100 had a total time of 224.4 seconds for all instances of the "Sketch" design features through the test while the competition took a total time of 272.6 seconds. Making the Radeon™ Pro WX 7100 up to 21% faster than the NVIDIA® Quadro® RTX 4000 in this feature. Performance Differential: 272.6-224.4 (seconds) = -21%. RPS-75
- 7) The Radeon™ Pro WX 7100 running on Radeon™ Pro Software for Enterprise 19.Q2 is up to 28% faster than the NVIDIA® Quadro® RTX 4000 running on the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver in the AMD internal real-world SOLIDWORKS® 2019 design steps benchmark. Testing conducted by AMD labs as of April 22nd, 2019 on a test system comprising of HP® Z8 Workstation platform, Intel® Xeon® Gold 5122 CPU @ 3.60 GHz, 16 GB RAM, Windows® 10 Pro October 2018 Update using Radeon™ Pro Software for Enterprise 19.Q2 running on the Radeon™ Pro WX 7100 and the NVIDIA® Quadro® Optimal Driver for Enterprise (ODE) R418 U4 (425.31) driver running on the NVIDIA® Quadro® RTX 4000. The test was conducted using the AMD internal real-world SOLIDWORKS® 2019 design steps benchmark. Using this configuration, the Radeon™ Pro WX 7100 took 145.4 seconds to finish the test while the competition took 186.2 seconds. Making the Radeon™ Pro WX 7100 up to 28% faster than the NVIDIA® Quadro® RTX 4000. Performance Differential: 186.2-145.4 (seconds) = -28.0%. RPS-59
- 8) A VR-capable CPU is required for VR. AMD Radeon™ VR Ready Creator products are select AMD Radeon™ Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice. PC/System manufacturers may vary configurations, yielding different VR results/performance. Check with your PC or system manufacturer to confirm VR capabilities. GD-101.
- 9) Radeon™ ReLive for VR for workstation wireless VR use requires the HTC VIVE Focus™ Plus headset, internet access, a VIVEPORT™ store account, and a Steam™ account. For VR connectivity, a Wi-Fi 5 (formerly 802.11ac) and higher router or access point is required with a gigabit Ethernet (GbE) wired LAN connection from the router to workstation PC. Compatible with AMD Radeon™ VR Ready Creator products (learn more at <https://www.amd.com/en/technologies/vr-ready-creator>). Supports: Windows® 10. RPS-108.

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