Nikola Motor harnesses the VR power of Radeon™ Pro GPUs

Faster visualization of alternative fuel truck designs using AMD Radeon Pro graphics

AMD RADEON PRO

CUSTOMER

NIKOLA™ MOTOR COMPANY

INDUSTRY

New energy truck design and manufacture

CHALLENGES

Improving productivity during design and simulation

SOLUTION

Deploy AMD Radeon™ Pro WX7100 and WX9100 graphics

RESULTS

Rapid design iteration thanks to powerful 3D acceleration of Radeon Pro graphics and easy visualization of designs in VR using AMD Radeon™ Pro software

AMD TECHNOLOGY AT A GLANCE

AMD Radeon Pro WX7100
AMD Radeon Pro WX9100

TECHNOLOGY PARTNER

HP

Designing the next generation of "alternative fuel" trucks takes vision, and Nikola Motor is at the forefront, pushing the boundaries of what is possible. The company has been visualizing the appearance and innovating the drivetrains of groundbreaking hybrid, hydrogen and electrically powered trucks since 2014, and is now drawing huge interest from those following new developments in the vehicle industry. When Nikola merged with VectolQ Acquisition Corporation in June 2020, the joint stock quickly reached a valuation of tens of billions of dollars.

With so much attention on Nikola's technical innovation, rapid design iteration and development are essential. One of the most time-consuming aspects of new vehicle creation is testing the look and feel of the exterior and interior for practicality and usability, because it traditionally involves milling physical mockups. When Nikola Motor discovered the easy integration of VR into its design workflow with AMD Radeon™ Pro graphics, it seemed like the perfect solution to take this process into the virtual world and accelerate production speed.

"The AMD Radeon Pro WX9100 is a pretty versatile card. I've been able to run renders and VR and Alias files all at the same time."

Alvaro Chavez, Senior Digital Sculptor, Nikola Motor

Visualizing truck designs in clay

"We try to do as much as possible as we can in-house," explains Alvaro Chavez, Senior Digital Sculptor, Nikola Motor. "On almost anything we do, we have to start from a concept stage to a final visualization, all the way into promotional renderings." To cope with all these activities, Nikola's workstations need to be versatile. "The really big demand for our computers is just being well rounded and able to tackle anything we can send their way."

Chavez's work for Nikola involves Autodesk Alias™, Autodesk® SketchBook®, Adobe® Photoshop®, Autodesk® VRED™, and even Autodesk® Maya®. Creating a design that's close to the real thing is fundamental. "I've been working with Adobe Substance Painter for custom textures and materials," continues Chavez. "Some of these materials we use aren't typical for the truck industry, so we've got to pull something from fashion or somewhere else. Then I've got to make a texture and throw that onto the model to see how it will look on the finished product."

In the traditional vehicle creation workflow, this process would involve producing a scale model or a full-sized one to get a clear sense of what the design might end up looking like. "Previously, all these 3D models would have to get sent to get milled out into clay, soft foam, or other materials," says Chavez. "You've got to get it melded, you've got to get the sculptors to clean it up and make it look good. If you want it painted a color or have a texture on it, make it look like leather, plastic or whatever, that takes time."

A model of this nature can take up to two weeks to create. This causes a significant delay to the process while it is being produced. Adding VR into the workflow promised to streamline the timeline considerably. "We were still trying to figure out a workflow," says Chavez. "We started using the AMD Radeon Pro WX 7100, and we liked the results we were getting with that card."

"The AMD Radeon Pro WX 7100 worked well with our Dassault Systèmes 3DEXPERIENCE platform," says Brian Gibbs, Senior Manager of IT, Nikola Motor. "The driver that comes with the AMD graphics cards ties well into Windows 10. We had more tools available. The cost was also very competitive compared to alternative brands available through our workstation partner, HP."

Gibbs found that introducing VR to the workflow was greatly simplified by VR Streaming using AMD Radeon™ ReLive for VR software[1]. This provides an integrated process to install SteamVR™ and connect this to the VR driver for Autodesk VRED. Then the VR representation can be sent to an HTC VIVE Focus™ Plus wireless VR headset[2] via 5 GHz 802.11ac Wi-Fi. VR is now employed at multiple stages in the Nikola design process. "We can get quick low fidelity-models with Gravity Sketch, which we can then bring into Alias and clean up before sending off to clay," says Chavez.

"I never received any calls about the VR environment, because AMD seamlessly works really well with Autodesk VRED."

Brian Gibbs, Senior Manager of IT, Nikola Motor

This has significant benefits for how fast a new design can be delivered. "When I worked at General Motors, we would have to do that all in clay," explains Chavez. "You'd have to build as many as 12 different models. With VR, using Alias we can build a scale model in a day or two. It'll get us to a starting point much quicker." Compared to two weeks for a clay model, VR can be more than ten times faster per iteration. With each clay model costing in excess of $1,000 to produce, there's also a huge saving of thousands of dollars across the entire process from using VR instead.

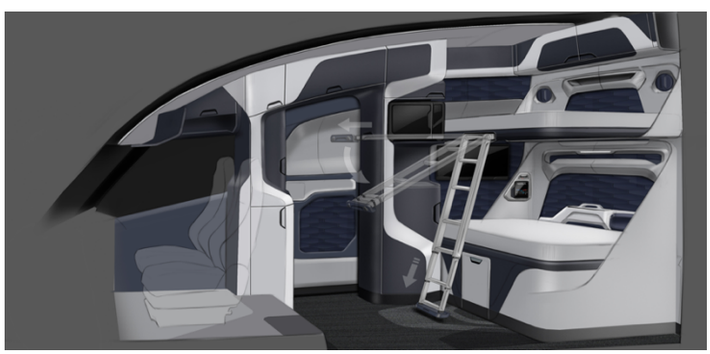
Faultless VR with AMD Radeon Pro

Nikola has now upgraded workstations with AMD Radeon Pro WX 9100 graphics, further accelerating results. "That's a pretty versatile card," says Chavez. "I've been able to run renders and VR and Alias files all at the same time." Using the WX 9100, VR visualization is now making the latter stages of the design process particularly efficient. "Towards the end when we get the final design, I will put our CEO in a pair of glasses to look at a model with full textures. I've gotten up to four people into a scene."

"With these big trucks, we heavily rely on VR, just because of the scale," explains Chavez. "If it's something big and somebody wants to look underneath, you can't lift a giant piece of clay. With VR, someone can grab it in their hand, look underneath it, walk around it, whatever they want. If they don't like the texture and want to change it, I just push a couple of buttons, and we've got a new texture for them to look at."

This is also essential for testing the ergonomics of an interior layout, alongside a "buck" (a physical mockup of seating arrangements). "I create a quick low-poly VR scene, so they can make sure every line of sight is good and everything is comfortable sitting in the buck." The AMD Radeon Pro VR capabilities enhance remote collaboration as well. For example, the Nikola Motor Tre, an all-electric truck, was designed in Europe, but Chavez was able to set up a VR preview in the US for CEO of Nikola Motor, Trevor Milton, to look at.

AMD Radeon Pro graphics have been entirely reliable for VR. "I never received any calls about the VR environment, because AMD seamlessly works really well with Autodesk software," says Gibbs. "The big advantage is just how quick we can get results," concludes Chavez. "With all our machines on AMD I can put the program on, push the ReLive button, make sure the headset's connected and go on with my day. Being able to see a final product like this keeps the spark alive. It's a big thing with the creative process, just keeping that fire going."



About Nikola Motor Company

Nikola Motor Company designs and manufactures electric components, drivetrains and vehicles including the Nikola One, Nikola Two and Nikola Tre electric semi-trucks. The company designs hybrid, electric and hydrogen-powered trucks. It is based in Phoenix, Arizona, where it also has its research and development operations. It was founded in 2014 in Salt Lake City, Utah. The company is named after inventor Nikola Tesla. Its merger with VectolQ Acquisition Corporation led to a June 2020 valuation of $34 billion for the combined company. For more information, visit nikolamotor.com.

About AMD

For 50 years AMD has driven innovation in high-performance computing, graphics, and visualization technologies—the building blocks for gaming, immersive platforms, and the data center. Hundreds of millions of consumers, leading Fortune 500 businesses, and cutting-edge scientific research facilities around the world rely on AMD technology daily to improve how they live, work, and play. AMD employees around the world are focused on building great products that push the boundaries of what is possible. For more information about how AMD is enabling today and inspiring tomorrow, visit amd.com/RadeonPRO.

1. A VR-capable GPU 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

2. 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