DELL Technologies

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Vehicle Development Is Shifting Up a Gear Thanks to Virtual Reality

Volke Entwicklungsring SE is using high-performance Dell Precision Workstations equipped with the latest generation of NVIDIA graphics solutions for its Cloud-modelling solution.

VOLKE ENTWICKLUNGSRING SE | Automotive | Germany

Challenge

Volke Entwicklungsring SE develops vehicles from the initial idea to series production. In the future, this process will move to virtual reality. The specially developed Cloudmodelling solution will make vehicle development significantly faster and more cost effective. Dell Precision Workstations equipped with the latest generation of NVIDIA graphics cards provide the program with the computing power it needs to process the high data loads required to monitor numerous components simultaneously.

The solutions

- Dell Precision Workstations 7920
- Dell Precision Mobile Workstations 7530
- NVIDIA Quadro RTX 8000 graphics cards (2X)

The results

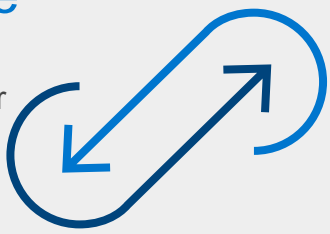
- Dell Workstations equipped with NVIDIA graphics cards provide the computing power required to handle high data requirements.
- The Cloudmodelling solution is implemented quickly and efficiently with the latest generation of Dell Precision Workstations.
- The NVIDIA Quadro RTX graphics cards help to generate realistic images faster.
- AI-based software optimizes performance to adjust the hardware to the specific computing load.

The basis

Dell Precision Workstations with NVIDIA Quadro RTX

AI-based software

Performance improvements with Dell Precision Optimizer



The automotive industry has long made use of a wide variety of different digital tools. Volke Entwicklungsring SE in Wolfsburg, northeast Germany, a part of the Volke group of companies, has now gone one step further. The specialists for vehicle concepts – from initial idea to series production – will move the process to virtual reality. The solution, which Volke developed in-house, is called Cloudmodelling. It is based on a virtual environment in which three-dimensional CAD data can be created and modified. “Cloudmodelling is a VR software program that allows you to model, design, engineer, plan, and simulate within virtual reality,” explains Daniel Volke, Head of the VR Software Development division. Every user, whether they are a designer, modeler, or constructor, wears a VR headset and uses two hand-held controllers to interact with the program while they are Cloudmodelling.

Much like traditional modeling, the user uses both hands to model in the virtual space, either using their visual judgement to do it free-hand or by inputting exact information such as coordinates. The resulting curves and planes are CAD data that corresponds to the standard. However, the experts do not just assess a new model’s overall visual impression; they can coordinate the exterior, the interior, and the shell, clarify ergonomic, engineering, manufacturing, and cost-related issues, and correct potential weak points in the design immediately: Is the driver’s view obstructed? Do the chassis and the interior fit onto the platform and the floor assembly? Do all the components such as the heater or MMI (multi-media interface) fit into the vehicle in all configurations? Will the B column withstand an accident?

With Cloudmodelling exterior, interior and the shell can be coordinated. (source: Dell Technologies)

“The virtual model generated by the software is not only clearer than a CAD model, the solution is also easy to use. Even users with zero CAD experience have no issues thanks to the intuitive tools and being able to work in the space with 3D controllers

“Several different departments are involved at the design stage of a vehicle in particular; there are a lot of interfaces. In Cloudmodelling, these interfaces are moved into virtual reality, making them available everywhere.”

Daniel Volke
Head of VR Software Development Division

instead of having to use a keyboard and mouse at a computer screen," emphasizes Volke. "Several different departments are involved at the design stage of a vehicle in particular; there are a lot of interfaces. In Cloudmodelling, these interfaces are moved into virtual reality, making them available everywhere." Volke's solution allows up to ten people to walk around the car, create new areas, and make real-time changes to the model at the same time, regardless of where they are.

NVIDIA Quadro RTX 8000 graphic cards generate realistic images faster. (source: NVIDIA)

A client solution places great demand on the hardware

Cloudmodelling is a client solution; each headset requires a computer with the program installed on it. "The challenge facing our program comes in the form of the physical limitations. The program must always run at 90 frames per second because otherwise you run the risk of "simulator sickness," which is much like motion sickness. Special programming methods are needed to be able to process the large quantities of data and achieve the required framerate."

The demand on the hardware was equally high. Volke opted for the Precision 7920 Workstation from Dell equipped with the latest Quadro graphics cards from NVIDIA. The Precision 7920 has been specially designed for applications. The configuration at Volke sees the Workstation running on the latest Intel Xeon processors and two NVIDIA Quadro RTX 8000 graphics cards that are connected via NVLink, ensuring a higher framerate. The Quadro RTX 8000 is designed for work with the most memory consuming of workloads.

> *"Dell Technologies and NVIDIA have supported us in the development of Cloudmodelling right from the very start. The high degree of flexibility offered by the Precision Workstations and the high performance of the Quadro graphics cards makes performant work in virtual reality possible in the first place"*
>
> Daniel Volke
> Head of VR Software Development Division

Sufficient performance, or to put it another way, speed is absolutely critical when it comes to virtual vehicle development, as it is with every development process. That said, objects generated in Cloudmodelling render at 90 frames per second – and depending on the application, different perspectives are often required: "There are already VR headsets with very high resolutions on the market. Some even use one screen per eye. The higher the pixel count of the headset, the better the images in the VR space can be; the computing power of the graphics cards must then also be able to keep up. If a monitor also displays these images with a camera in the virtual space, then the computing load increa-

Precision Workstations 7920 are especially designed for VR applications. (source: Dell Technologies)

ses. This means that the images have to be generated simultaneously at 90 frames per second three or four times over.” If the user turns their head too quickly, the virtual image lags behind. The computer has to update the perspective and generate new images. That costs time and this latency confuses the senses.

A virtual image allows to assess the overall visual impression. (source: Dell Technologies)

The Precision Workstation comes installed with the Dell Precision Optimizer, an AI-based software program that optimizes performance, allowing Volke to also adjust the hardware to the specific computing load. In addition, the Dell Precision 7530 Mobile Workstation ensures flexibility at the workplace.

Faster and more efficient: Cloudmodelling sets a new milestone

Cloudmodelling software allows Volke to reduce the amount of manual modeling and the subsequent obligatory geometry feedback in the CAD program and replace it with virtual modeling. The solution makes the process significantly faster and more cost efficient.“Dell Technologies and NVIDIA have supported us in the development of Cloudmodelling right from the very start. The high degree of flexibility offered by the Precision Workstations and the high performance of the Quadro graphics cards makes performant work in virtual reality possible in the first place,”

Volke-Unternehmensgruppe in Wolfsburg, Germany (source: Volke SE)

says an impressed Volke. “Both companies have delivered optimal support, and a lot of things – such as programming the graphics cards directly – would have been impossible otherwise. Together with Dell Technologies and NVIDIA, we have succeeded in setting another milestone in digital vehicles development.”