VR Is Everywhere, But Who Is Using It for PLM, Manufacturing and Engineering?

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If you're like me, it's hard to know where to begin when it comes to virtual reality (VR) and augmented reality (AR). With the release of two prominent headsets, the Oculus Rift and HTC Vive, the hype in the VR news cycle is at an all-time high. Although most of the coverage revolves around gaming, the applications for VR and AR are seemingly limitless. You can pick any one of a variety of new VR media experiences and visualizations that have obvious educational benefits.

First 360-degree YouTube video of open surgery available for VR viewing. (Image courtesy of Medical Realities.)

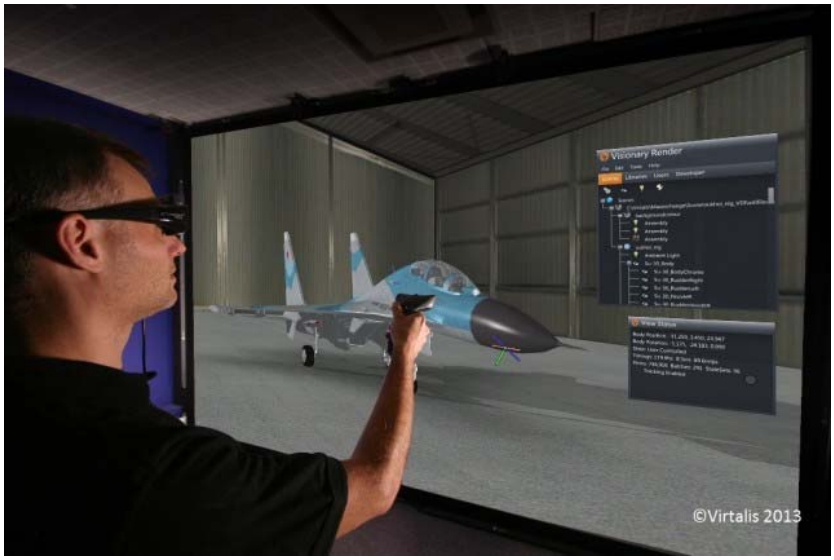
For example, on April 14, anyone who had a VR headset (including Google Cardboard and Samsung Gear VR), could watch as two 360-degree cameras transmitted an open surgery performed by Dr. Shafi Ahmed at the Royal London NHS Hospital in London. After downloading an app called VRinOR from Apple or Google Play, users could watch Dr. Ahmed perform surgery on a 70-year-old patient with cancer of the colon. If you are currently without VR and missed today's event, you can scroll through the highlights on the 360-

degree YouTube video post by Medical Realities, the company behind the VRinOR app. What a phenomenal tool for medical students and those who have the interest and are not squeamish.

Transmitting this data enabled anyone with a VR headset to feel as though they were in the operating room with the doctors, who were wearing what appeared to be Google Glass headsets.

Engineering, Not Medicine

But what about using VR for concept to design, design for manufacturing, design for maintenance or design for operations. Where is VR being used in a practical way in the product design lifecycle? This kind of virtual visualization lends itself to greater visual communication and allows for a new level of communication along the lifecycle.



Visionary Render software user experiencing a real-time, interactive and immersive VR environment made from massive amounts of 3D model data. (Image courtesy of Virtalis.)

One such application may be Visionary Render fromVirtalis. It renders massive and complex VR models in real-time stereoscopic 3D. The update rates are very high, and the latency is low. This is according to the company, which stated the following about Visionary Render: “It allows users to create dynamic, interactive VR environments and simulations that can be deployed in a multitude of immersive visualization systems or be ‘published’ and distributed to third parties. It is a collaborative, sharable sandbox that brings true 3D experimentation throughout the product lifecycle.” That statement reads well, but can it really manage

massive CAD data sources seamlessly in its user interface?

VR for Product Lifecycle Management (PLM)

Here are the touted benefits:

1. Interactive and immersive capability which enhances understanding
2. Unique 3D semitransparent user interface which reinforces the 3D immersion
3. Handle and manage huge and complex CAD data sources seamlessly
4. Collaborate in a single VR environment—globally
5. Reduces load times significantly
6. Cluster aware for increased performance
7. Collision detection for the entire model enhances realism and improves understanding

I haven't used Visionary Render, but knowing how crucial visualization is as a tool when it comes to design and engineering, it's easy to understand the need for clarity and synchronization in what sometimes has to be a geographically splintered group collaboration.

Lanner, which creates predictive simulation and optimization technology, partnered with Virtalis in 2014 to integrate VR collaboration systems to its array of services for its clients all over the world. Visionary Render was also beta tested by Raytheon, AMRC, Vestas, Rolls-Royce and BAE. Creating training programs, maintenance programs and design reviews for networked designers and engineers around the world sounds great. But how does Visionary Render work exactly?

Raytheon beta tested Visionary Render and used the VR system extensively on end-to-end projects. (Image courtesy of Virtalis.)

According to Andrew Connel, technical director at Virtalis, “We’ve put all our VR know-how into Visionary Render. It’s a system that can cope with the most complex data and render it in 3D stereo, then adds tracking for human-in-the-loop immersion and networking for interactive, multidisciplinary design reviews or training exercises.”

The benefits of being able to immerse individuals and small groups who may be working on the same project in many different locations in the details of complex and large amounts of CAD data are easy to see. Understanding different accomplishments and expectations of collaborative CAD-oriented data is one thing, but can VR systems like Visionary Render help global design and engineering teams work through and pass along partial solutions to complex design and engineering problems? If so, it would seem to be the best benefit for employing a system like Visionary Render.

Beta tested by industry heavyweights like Raytheon, AMRC, Vestas, Rolls-Royce and BAE, Visionary Render is also used by organizations like Lawrence Livermore National Laboratory to push into new areas of nuclear fusion research. Interested parties can create training programs, maintenance programs and design reviews, which is great. But what about the more practical uses like reducing or eliminating the need for some early-stage physical prototypes during the product lifecycle? And, how can VR systems like Visionary Render be used to help streamline manufacturing?

VR for Manufacturing

Hypothetically speaking, if you are involved with planning, modeling and simulating a factory or other manufacturing facility, the first thing you’d want to do is test and simulate as much as you can before asking or receiving capital investment for physical production. In fact, you’d probably want to spend as much time as possible interacting effectively between departments and different physical sites by importing, using and networking CAD design data as well as visualizing point cloud data to understand on-site challenges through the use of captured reality data in the form of as-built models.

Who is using VR systems for manufacturing and engineering?

Geoff Tantum, engineering group leader for simulation at Airbus UK, said the following about using VR for engineering:

Technologiewerkstatt has recently installed a fully tracked Virtalis ActiveWall with Virtalis' VR software, Visionary Render. (Image courtesy of Virtalis.)

The overall modus operandi that Virtalis is pursuing seems to be this: By connecting the powerful visualization and graphics tools in use by various media and entertainment sectors (read gaming and film VFX) and putting them in the hands of engineers, the potential ROI for design, manufacturing and engineering may be worth the investment.

Doug Holmes, lead engineer at Leyland Trucks, said the following about VR's effect on the productivity of their manufacturing engineers: "With Virtalis' help, we were able to build up the entire manufacturing process stage by stage. They installed a VR system, which allowed us to carry out design reviews with our manufacturing colleagues weekly. As we were able to work on how the design was to be built at the same time as the design itself, the manufacturing engineers quickly realized the advantages to them and their team on the production line."

Leyland Trucks' prototypes rolling off a production line designed entirely with the use of advanced simulation and VR. (Image courtesy of Virtalis.)

Of course given the clientele of a company like Virtalis, the technology is certainly cost prohibitive for many individuals and smaller firms. But the fact that a VR/visualization system is yielding rewards like reduced design time, easier collaboration with a noncontiguous group of networked engineers for factory planning and reducing the size of prototyping iterative cycles in PLM projects is an interesting niche goal for developers. Especially developers who are focused creating visualization systems from more affordable consumer headsets like the HTC Vive, Oculus Rift, Google Cardboard, Samsung Gear VR, Microsoft HoloLens, DAQRI Smart Helmet and M2 headsets.

DAQRI's AR Smart Helmet is due to hit the market any day now, leading to an overproduction of saliva from many engineers. (Image courtesy of DAQRI.)

There's a path to bring VR engineering apps down to the consumer level, but I'm still on the lookout for an accessible and affordable killer app. Right now, the cost of a home VR station is still enough to deter most, and the unpredictability and fogginess of VR hype give me a sense that I should wait until the next generation of consumer headsets and see what develops.