Virtual Reality for Manufacturing

The future is here

Virtual Reality (VR) started in the gaming industry and is now taking over the business of manufacturing. Software editor **ESI Group** has been applying Virtual Reality to industrial uses for years to guarantee safety within assembly and production. To get a better understanding of this evolution, ESI asked **Jeremy Dalton,** Virtual Reality/Augmented Reality Lead at **Pricewaterhouse Coopers UK** (PwC), **Jason Lovell**, Founder of **Captivate VR** & Director of Brand Partnerships, EMEA for **Jaunt VR**, and **Eric Kam,** Product Marketing at ESI Group, to share their advice and best practices for the integration of Virtual Reality.

"*Although Virtual Reality is perceived as only having applications in video gaming and entertainment, the resurgence of the industry has shown VR's diversity of applications, from healthcare to education or manufacturing*." Virtual Reality expert Jeremy Dalton at PwC keeps track of the ever-changing landscape and monitors VR/AR (Augmented Reality) activity from a company, investment, and growth perspective. PwC and Zpryme **recently conducted a survey** of manufacturers and their use of VR/AR.

ESI: Jeremy, how can the Manufacturing Industry benefit from VR?

Jeremy: "*There are a number of ways that the manufacturing industry can benefit from VR. A few of the most interesting are Product Design and Development, Process Definition or Workflow evaluation, Data visualization, Local and Remote Collaboration, and even Training.*

Product design and development
Product design is the most popular application for Virtual Reality, with 39% of respondents to our recent **survey** *indicating that their company is using either VR or AR for this purpose. Moving the design of a product from the physical to the virtual world allows companies to speed up the development stage. Without having to continually produce physical prototypes, unnecessary waste of time and expense can be avoided.*

Image: Survey results of PwC and Zpryme

Using a virtual environment, designers can easily gather feedback during product development from multiple teams and even customers. As a result, they can flag any issues and assess feasibility at an early stage, thus enabling speedy product iterations.
The product can be visualized through virtual reality in a way that is not possible with other media. Viewing models on a 2D screen does not convey the true sense of scale necessary to assess a product to the highest accuracy possible.

Process and workflow simulation
By simulating different assembly lines and production processes, bottlenecks can be assessed and configurations can be optimized to produce the highest efficiencies. Any hazards can be flagged in advance and mitigated before production begins.
Interaction is another strength of VR. Development teams can test a proposed human machine interface system or workflow by simulating the process in virtual reality, allowing users to test it from an ergonomics, time management, and health and safety perspective.

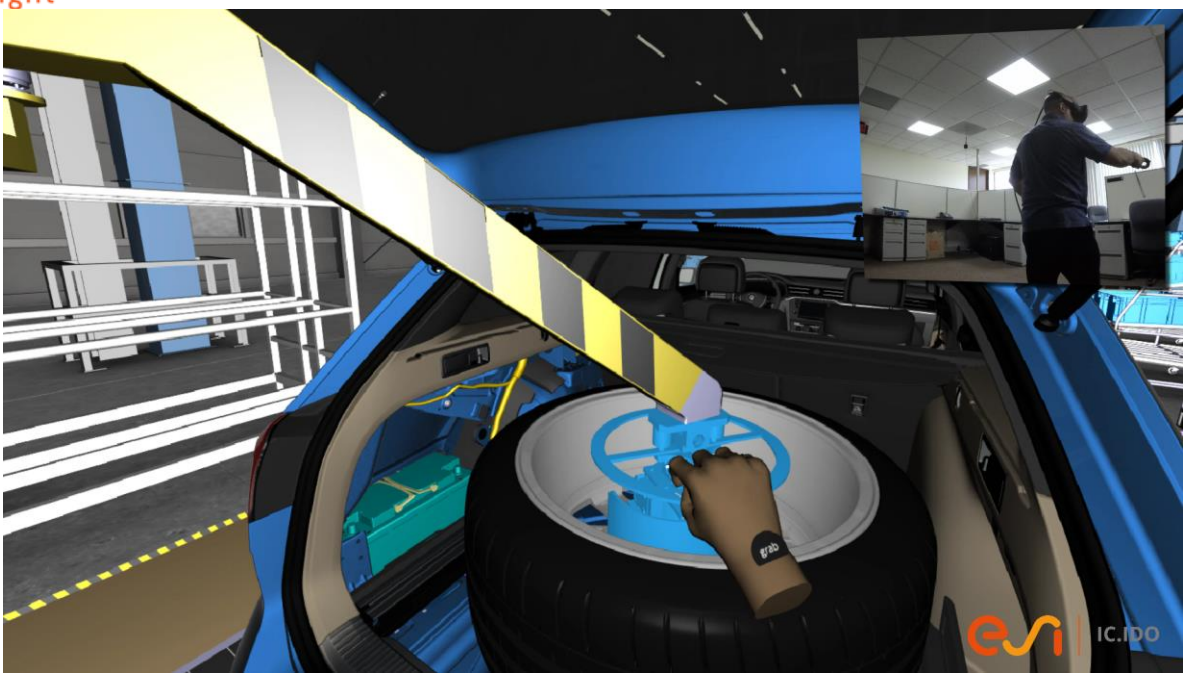

Image: Tire load in Virtual Reality using a head mounted display or HMD (image courtesy of ESI Group)

Data visualization

Data from production lines has provided managers with insight into their operations, drawing out potential errors, periods of high productivity, and other key events.

Traditional forms of visualizing this data (i.e., on a 2D medium such as a computer screen or a printed report) can be adequate if the data is not overly complex. As more machinery and even employee-related data is uploaded, this increasingly connected world will benefit from visualization in Virtual Reality. A head mounted display (HMD) for instance provides a distraction-less environment, a full 360-degree view, and the ability to communicate multi-dimensional data points more intuitively.

Local and remote collaboration

In today's global world, stakeholders in different countries are regularly required to review, provide feedback, or sign off on designs, processes, and prototypes. This often involves travel. In VR, stakeholders can come together from anywhere in the world in a virtual environment that provides the right scale to truly understand and interact accurately with a product under development. Remote collaboration in VR enables stakeholders to provide feedback more quickly on designs, which ultimately results in faster product iterations.

Workforce training

Training in Virtual Reality is particularly powerful for hands-on tasks, making it especially relevant for the manufacturing industry.

In virtual reality, entire scenarios can be built, including all necessary tools and machinery. Once a training application is built, it can be deployed to the workforce globally and run simultaneously with any number of workers. Because the training is immersive and interactive in a way that mimics the real-world environment - workers can use their hands to interact with machinery as they would in real life - more information is retained. They can then apply their skills to maintain, repair or operate physical equipment, or even learn how to use new machinery.

Training sites do not have to be prepared or travelled to. Training materials and tools do not need to be bought, stored or maintained. Therefore, an incredible amount of time and cost can be saved thanks to VR training.

Virtual reality can also be used to prepare employees for crisis scenarios - events with low probability but high impact - which are difficult or resource intensive to simulate in the real world.

This gives employees the confidence to know how to act during these events, helping the company as a whole respond more effectively if and when such an event occurs.

To sum up, a number of manufacturing companies already use VR effectively and we expect it to be deployed more widely within the industry as the technology progresses. From the production line to the management suite, virtual reality has the potential to accelerate product development, improve worker training, and increase productivity across the entire enterprise."

Also, supporting Virtual Reality for manufacturing is **Jason Lovell.** With **Captivate**, he aims to provide a comprehensive, holistic and impartial service that enables all types of businesses to truly comprehend the incredible opportunities offered by immersive technologies such as virtual and augmented reality.
A former Samsung product manager for wearable devices, Jason believes that the manufacturing industry is in a prime position to derive real, tangible benefits from VR: *"I'm aware of companies that are looking at the technology as a method of improving everything from basic worker safety to actual design and process efficiencies, so its potential utilizations are broad. Fundamentally, if VR enables engineers to design better products in a shorter timeframe than was previously possible, this will precipitate savings in both time and money which could be hugely important for a business."*

ESI: Jason, how do you think manufacturing companies will benefit from the implementation of VR in the future?

Jason: *"In terms of safety, the potential benefits are pretty clear. By allowing businesses to model & simulate a whole raft of assembly line activities and/or production processes, they're able to spot any potentially hazardous activities at an early stage, and hence remove them at the pre-production stage.*
In my opinion, it's clear that those companies that really embrace VR in this manner will see remarkable benefits in the future. Moreover, the benefits of these use cases will only improve over time as the technology continues to evolve and other immersive experiences arrive via AR & MR [Mixed Reality]."

The ability with VR of identifying errors in a product before manufacturing has a crucial impact on time, cost, and as Jason mentions above safety. What is the outcome of an error in a product? Does the error rise safety concerns? To investigate every single aspect of a product's design and quality is essential and will determine its commercial success.

Virtual Reality is approaching more engineers across more industries. Traditionally used to drive projection system Powerwalls or CAVEs, the latest release of Virtual Reality solution ESI IC.IDO is now available on Head Mounted Displays (HMDs).

"*ESI's adoption of Vive Business Edition with their industry leading IC.IDO 3D simulation is testimony to how quickly virtual reality immersive display technology is being adopted by leading engineering and manufacturing companies*," said ***Dan O'Brien***, GM HTC VIVE at HTC. "*They have been pioneering precision engineering simulation technology for decades in support of accelerating time to market, product quality, and cost efficiencies across large segments of the manufacturing industry. We are proud to be a virtual reality solution of choice for their product offering*."

The new "Immersive Desktop" application in ESI IC.IDO 11.0 delivers "Virtual Reality for Engineering". With this HMD bundle, IC.IDO users are able to conduct immersive simulation of the assembly, disassembly, serviceability, and accessibility of their products at full scale-not just as a 2-D projection on their desktop monitor. Eric Kam, Product Marketing for IC.IDO, tells us more about their latest release.

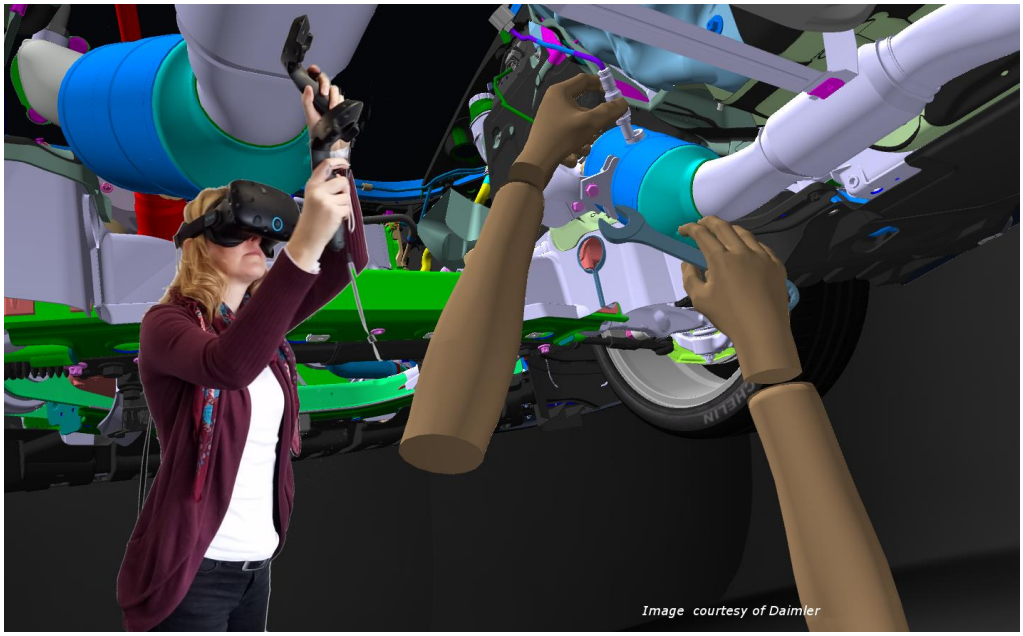

Image: Sensor C-Class with IC.IDO (courtesy of Daimler)

ESI: Eric, where do you think lies the greatest benefits of HMDs for Virtual Reality?

Eric*: "Engineers now have the power to immersively review their geometry and experience their models using real time physics and simulated solid mechanics. They can interact with their models naturally with their arms and hands — not just through mouse and keyboard interactions.*
Head Mounted Displays make VR more accessible to the engineer for everyday work. ESI believes that the addition of HMDs into the engineering workflow will not mean the end of previously available devices (such as CAVEs or Powerwall), but instead make them even more relevant. As more engineering decisions are made on the individual level, there will remain larger more comprehensive issues where groups of stakeholders will also expect to be able to collaborate personally as well as immersively.
ESI IC.IDO is to gamers probably not very exciting, but it is a very powerful VR solution for engineering. IC.IDO is the most advanced engineering VR solution within the industry. Running our software on HMD provides individual engineers with the opportunity to have interactive immersive reviews and understand integration issues from the beginning.
The emergence of the HMD as a tool for engineers means that specialty tools, which can only be learned or operated by visualization specialists, will have to give way to engineering tools which happen to also provide VR capabilities. What distinguishes ESI IC.IDO, from more game-like applications, is the requirement to rapidly take geometry into the immersive environment and give it realistic behaviors. Engineering groups using IC.IDO often create their virtual environments to be used only a handful of times. Any extra time requirement to script or custom code for virtual reality diminishes the impact that VR would provide the engineer. Our users tell us often how they complete a great deal of their evaluation using the desktop monitor with a smaller subset of tricky jobs requiring them to use the HMD or transfer to working in the CAVE."

Collaboration between workgroups using conventional desktop displays, HMDs, and projected immersive environments is something ESI has paid attention to supporting. This level of scalability between the range of 3D environments will be essential to assure successful implementation, across all common engineering work environments.

For more information, please visit:
ESI Group: http://virtualreality.esi-group.com/ & https://virtualreality.esi-group.com/head-mounted-displays-virtual-engineering/work-meets-play-virtual-reality-engineering

PwC: https://www.pwc.co.uk/issues/innovation-and-technology/tech-at-pwc-virtual-reality-jeremy-dalton.html

Captivate: http://captivatevr.com/why-vr/
Jaunt VR: https://www.jauntvr.com/

ESI Group – Media Relations
Delphine Avomo Evouna
+33 1 41 73 58 46

About ESI Group

ESI Group is a leading innovator in Virtual Prototyping software and services. Specialist in material physics, ESI has developed a unique proficiency in helping industrial manufacturers replace physical prototypes by virtual prototypes, allowing them to virtually manufacture, assemble, test and pre-certify their future products. Coupled with the latest technologies, Virtual Prototyping is now anchored in the wider concept of the *Product Performance Lifecycle*, which addresses the operational performance of a product during its entire lifecycle, from launch to disposal. The creation of *Hybrid Virtual Twins*, leveraging simulation, physics and data analytics, enables manufacturers to deliver smarter and connected products, to predict product performance and to anticipate maintenance needs.
ESI is a French company listed in compartment B of NYSE Euronext Paris. Present in more than 40 countries, and addressing every major industrial sector, ESI Group employs about 1200 high-level specialists around the world and reported annual sales of €141 million in 2016. For more information, please visit www.esi-group.com.

Follow ESI