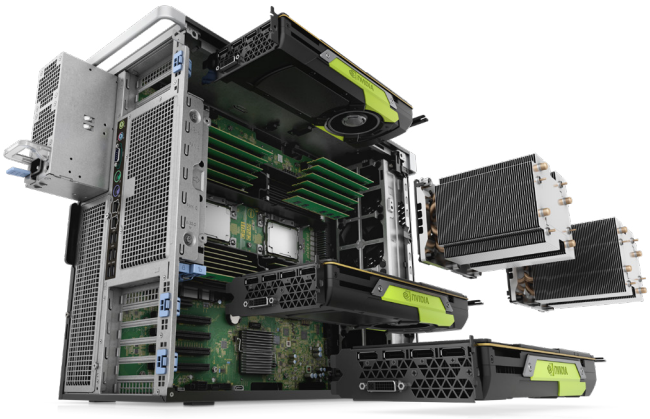
EXPLORING HOW DESIGN VISUALISATION WILL CHANGE IN THE AGE OF VIRTUAL AND AUGMENTED REALITY

So far we've discussed photorealistic visualisation tools and how there's a potential shift towards more immersive environments with the rebirth of interest in Virtual Reality (VR). With this boost in hype for VR, many are predicting that this will eventually segue into the world of Augmented Reality (AR).

But for those in the engineering and design industry, Even if you've come across this term before, it's worth taking a step back to look at the basics. While VR describes the process of creating an entirely digital world in which the user can be immersed, AR differs in that it combines the real world with virtual artefacts, objects or data.

Like VR, AR has also been talked about for many years, but has yet to make massive strides. This is partly because no one has found the killer application outside of the highly specialised, but mostly because the hardware required has been out of reach for the majority.

This has changed in recent years. The prevalence of high powered smart phones equipped with GPS, motion sensors and cameras has meant that consumers are now used to the idea that information (in whatever form) can be overlaid on a view of the real world through their device's camera.



While Augmented reality requires lightweight assets for deployment, there's still a heavy requirement for high-powered computing to prepare those assets.

While this is a core technology and kicked off the AR market in many respects, the facts are that, to truly achieve a more integrated and immersive AR environment, displays need to be overlaid over our best visual tools – our eyes – directly.

Most in the tech focused industry will be familiar with Google's Glass project which saw the convergence of high resolution display with standard-like spectacles; more recent initiatives have taken this to the next level.

Microsoft has gone big on AR with its Hololens initiative. These are head mounted displays that not only overlay information onto the real world view of the wearer, but also integrate motion capture, interaction and activity. Microsoft is not alone. Other vendors like OSTERHOUT DESIGN GROUP and METAVISION are also chasing the same market. And let's be clear, this isn't about games – AR has huge potential in the professional environment and none more so than in design, engineering and manufacturing.

AR'S POTENTIAL IN DESIGN & ENGINEERING

The potential for AR in design and engineering is huge. As described earlier, while VR allows users to immerse in an entirely virtual world, AR differs in that it allows work to be conducted in the context of the real world. While in some instances, design is often about a singular object, there are many more applications where a product needs to interact with the world around it and with its potential users.

This is where AR could provide huge benefit. At present, the use of physical prototypes is still prevalent and while that's unlikely to disappear any time soon, there are many use cases, where a digital product, shown in the context of its final use, will be more beneficial.

Consider products that have a human interaction or interface with surrounding products. The possibilities of being able to evaluate and interact with a full-scale, interactive, prototype – that's shown in context whether it's industrial machinery, architectural scale products, retrofitted systems and products – is endless.

What's interesting is that some vendors are already experimenting with augmented displays and manual interaction (using your hands, rather than a controller per se). When combined with the correct hardware, we could be on the brink of new methods of interaction with geometry, and simulations that step outside of the flat, high resolution display to provide something that's much more meaningful.

INTEGRATED ANALYTICS & DATA OVERLAY

Another area that's predicted to have heavy use of AR in the future is the overlay of data in a product manufacturing or service context. Consider the modern factory floor, while there's an effort to move to electronic data and display, this is once again restricted by today's decidedly flat displays.

With the rise of AR, there's potential to revolutionise this in several ways. The first is that it's now possible to overlay complex 3D instructions that are mapped directly to the physical object.

Imagine an assembly line worker being guided through the assembly of a product, with the headset showing not only what needs to be done, but showing it directly on the head mounted display – all supplemented with the additional information required. Installing a bolt? The display provides a torque value.
PTC is one vendor that is pushing ahead with this idea. With recent acquisitions relating to not only VR and AR (with the acquisition of AR specialists Vuforia), but also the Internet of Things infrastructure built under the ThingWorx brand, it has started to roll out products enabling these types of solutions to be created by the end user, rather than consultants.

The first of these, Vuforia Enterprise Studio, is going into a pilot programme now and looks to make the reuse of complex 3D geometry (one of the stumbling blocks of VR and AR) much more efficient.

Other vendors are also following suit – the rich environment of easier instrumentation and sensor connection combined with powerful ways to analyse and display information streaming from the field.

Then the ability to map that onto the actual product in front you, is going to be not only beneficial to many organisations, but will drive how this technology is adopted in the mainstream.

CONCLUSION

AR represents a different take when compared to VR. This is the mixing of both the real world with the virtual. As a result, its potential in design, engineering and manufacturing is different. While VR allows users to immerse themselves in a completely digital world, AR allows the potential to mix digital information with the real world to supplement and enhance it. It's the contextual nature of the beast that makes it so promising.

With the rise of the connected device, there'll soon be more information than we know what to do with – both during design and in the field. Solutions are becoming available that allow users to capture this information, analyse and filter it to provide meaningful content where it's needed. Many are predicting that AR will really kick into gear with the solutions that allow users to feed this information into the field – that work is already under way.

But before that, there's still huge potential during the development phase of a product's lifecycle. The ability to inspect a product as it would appear when manufactured, in situ, is potentially revolutionary. It's one thing to look at flat, rendered images of a production plant or assembly line but imagine being able to walk on an empty factory floor and see the assembly line in place, working. Then make changes when issues are found.

What's interesting here, is that the core requirement for accurate and realistic 3D data doesn't disappear – in fact, it becomes fundamental to the whole thing.

The skill sets that have been built up in the last two decades relating to product simulation, rendering and visualisation will apply and become even more powerful and while the AR headsets are clearly moving towards becoming self-contained devices, capable of operating without associated devices, there will also be the need for high-powered Dell Precision workstations featuring Intel® Xeon® processors to create the assets displayed and interacted with.