

5 Key Uses for Virtual and Augmented Reality in Electronics Manufacturing



In the rapidly evolving world of electronics, staying ahead of the curve is imperative. That's why many electronics and original equipment manufacturers (OEMs) are investing more and more in new technologies, particularly in virtual reality (VR) and augmented reality (AR).

Far from being merely futuristic concepts, these technologies are transforming the industry today, enhancing efficiency, accuracy and productivity across various stages of the manufacturing process.

In fact, the global AR and VR market in manufacturing is projected to reach \$88.4 billion by 2026, growing at a compound annual growth rate (CAGR) of 31.5% from 2023. This surge in adoption is driven by the benefits these technologies bring to the table — from improving quality control and maintenance to enhancing training, design and prototyping.

Let's delve into five significant applications of VR and AR in manufacturing, exploring their benefits and considerations...

1. Better prototyping and design

AR and VR are transforming the design and prototyping stages by allowing engineers and designers to visualise products in 3D before they are built. VR can be used to create virtual prototypes that can be tested and modified in a virtual space, whereas AR can project design iterations onto physical objects — providing a hybrid view that combines the new designs with existing physical components.

Benefits:

- Augmented and virtual reality technologies significantly reduce the time required to develop and refine prototypes.
- Cost savings. Electronics manufacturers and OEMs can cut down on the material costs associated with physical prototypes.
- These technologies facilitate better communication and collaboration amongst design teams, regardless of their location.

Considerations:

- Technical skills. Before employees can start realising the full benefits of AR and VR for prototyping and design, they first need to be taught how to use these specialist design tools.
- Software integration. Ensuring compatibility with existing design and engineering software can be challenging.

2. Streamlined maintenance and repair

Both augmented and virtual reality technologies can provide real-time, hands-free guidance for maintenance and repair tasks. Technicians can wear AR glasses that overlay instructions and diagrams directly onto the machinery they are working on. This can include step-by-step guides, real-time data from sensors and remote assistance from experts.

Benefits:

- These technologies reduce human error by providing precise, real-time instructions.

- AR and VR speed up repair processes by providing instant access to information.
- Knowledge transfer. Less experienced workers can perform complex tasks with expert guidance from AR and VR rather than taking up the time of more experienced team members.

Considerations:

- Data security. Electronics manufacturers and OEMs need to be mindful of ensuring the security of sensitive data displayed via AR or VR.
- Dependence on technology. As with any tech, there is the potential for over-reliance on AR or VR systems, which can be problematic if the technology fails.

3. Improved quality control

AR and VR can enhance quality control processes by allowing inspectors to compare products against digital benchmarks in real time. For example, AR can highlight deviations from the standard directly on the product, whilst VR can simulate and analyse production processes to identify potential quality issues before they occur.

Benefits:

- AR and VR improve the accuracy of inspections.
- These technologies can identify issues before they lead to defects, reducing waste and rework.
- Electronics manufacturers and OEMs can simplify the documentation process by automatically recording inspection data through AR or VR.

Considerations:

- Implementation complexity. Integrating AR and VR with existing quality control systems can be complex.

- Inspectors need training to effectively use AR and VR tools.

4. Enhanced training programmes

Manufacturers are employing VR and AR to create immersive training modules for their employees. Instead of traditional methods, new hires can now engage in interactive simulations that mimic real-world scenarios. Both VR and AR enable trainees to practise operating machinery, performing complex tasks and responding to emergency situations in a risk-free environment.

Benefits:

- Training via VR or AR reduces the risk of accidents during the learning phase.
- Cost-effective. These technologies lower costs associated with ongoing training materials and potential equipment damage due to mistakes.
- With AR and VR, electronics manufacturers and OEMs can accelerate the learning curve by providing hands-on experience without interrupting actual production.

Considerations:

- Initial setup cost. Developing VR and AR training modules can be expensive.
- Equipment needs. Training using VR and AR requires investment in headsets and compatible software.

5. Increased remote collaboration

Remote collaboration amongst teams is becoming increasingly important across a range of industries, including electronics manufacturing. AR and VR enable teams to work together on complex projects regardless of physical location. For instance, VR meetings can simulate face-to-face interactions, whilst AR can enable remote experts to provide

real-time support and guidance.

Benefits:

- Global connectivity. AR and VR facilitate collaboration between teams across different locations.
- Time efficiency. A reduced need for travel helps electronics manufacturers and OEMs to save both time and costs.
- Enhanced communication. Improved understanding through visual and interactive elements helps bring teams up to speed quickly and ensures everyone is on the same page.

Considerations:

- Connectivity requirements. Reliable high-speed internet is crucial for seamless AR or VR.
- Adoption barriers. Resistance to adopting new technologies can be a challenge.

Driving innovation and maintaining a competitive edge

The integration of virtual and augmented reality in electronics manufacturing offers numerous benefits, from enhanced training and efficient prototyping to improved maintenance, quality control and remote collaboration. However, these technologies also come with considerations that manufacturers must address, such as initial costs, technical requirements and the need for adequate training.

But as the electronics manufacturing industry continues to evolve, the strategic use of VR and AR will be pivotal in driving innovation and maintaining a competitive edge. Around 61% of manufacturing companies are already using or planning to implement AR within the next year, so if they want to remain competitive, it will be vital for other manufacturers to follow suit.

