



Successfully using AR and automation to create efficiencies

Micron Technology invests in manufacturing and operational excellence to fuel product delivery today and innovation tomorrow. It starts with deep investment in manufacturing innovation to meet rising memory and storage demands, and then expands to a keen focus on operational excellence to navigate marketplace volatility.

The pandemic is transforming how factories operate — where remote operations enabled by smart manufacturing technologies have become the new normal for improved productivity and quality. With Lenovo ThinkReality and hololone augmented reality (AR) technology, Micron engineers can collaborate remotely and develop critical instructions and information within their AR environment in real time to carry out essential maintenance and repair of manufacturing equipment, optimizing equipment operating time. Looking to the future, Micron plans to enhance its ThinkReality remote assistance solution with 3D overlays and machine-vision, deviation-detection capability to empower engineers to work even more productively.

Micron is an industry leader in innovative memory and storage solutions, transforming how the world uses information to enrich life for all. Founded in 1978 in the basement of a dental office, Micron has grown to become one of the largest semiconductor manufacturers in the world, with a revenue of US\$27.7 billion in fiscal 2021. Its rich portfolio of high-performance DRAM, NAND based memory and storage products fuel the data economy, enabling advances in artificial intelligence (AI) and 5G applications that unleash opportunities — from the data center to the intelligent edge, and across the client and mobile user experience. Headquartered in Boise, Idaho, Micron employs more than 43,000 people in 17 countries.



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**Smarter
technology
for all**

Lenovo

Ramping up production

Demand in the semiconductor industry is driven largely by new technologies, such as the huge increase in popularity of PCs in the late 1990s and early 2000s, and the widespread adoption of smartphones in the early 2010s. Today, advances in AI, big data analytics, and the internet of things (IoT) are fueling data growth that is increasing the demand for memory technology. Furthermore, the COVID-19 pandemic has quickened digital transformation and driven accelerating demand for semiconductors.

Ning Khang Lee, Director of Smart Manufacturing & AI at Micron, comments “For Micron, Industry 4.0 technology as a staple in our operations is the next evolution, allowing us to produce highly complex products with the highest quality and to accelerate time-to-market while maximizing energy efficiency, reducing waste, and maintaining an efficient end-to-end supply chain. We have identified augmented reality/virtual reality technology as one of the solutions to make a step change in workforce productivity.”

Co-creating the ideal solution

In early 2019, Micron began exploring AR solutions for remote assistance to connect engineers on the shop floor with experts in a shared virtual environment. “Our plan was to use AR technology to enable technicians across different sites to work remotely together with subject matter



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experts in real time to carry out new equipment installations, machine troubleshooting, and maintenance,” says Lee.

After evaluating hardware and software solutions from a wide range of vendors, from industry leaders to innovative startups, Micron selected the Lenovo ThinkReality platform integrated with holo|one to be used with Microsoft HoloLens 2 wearables.

“holo|one is a leader in the AR/VR space, and we were very impressed by the intuitive user interface of the holo|one software,” Lee notes. “Lenovo was an easy choice for the underlying platform. The Lenovo ThinkReality platform is specifically optimized for the holo|one suite of mixed reality software applications, enabling us to take advantage of the agility and flexibility of a disruptive startup like holo|one with the guarantees and excellent services from a tech giant like Lenovo.”

When news of the COVID-19 outbreak in China began to circulate in 2020, Micron quickly accelerated the program roadmap and launched a proof-of-concept exercise. Micron worked closely with Lenovo and holo|one to integrate ThinkReality with

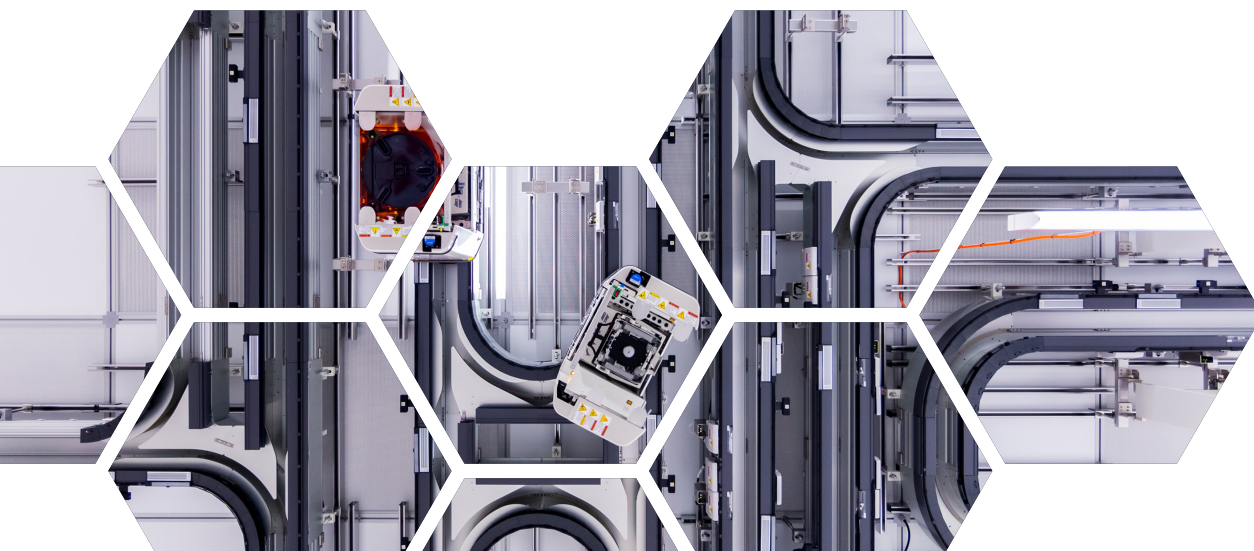
its internal systems and meet stringent security requirements.

According to Lee, “To protect our intellectual property, we need to ensure that data streaming between on-site engineers and external experts is completely secure. Both the Lenovo and holo|one teams put in a lot of development hours to help us achieve the right balance of openness, ease of use, and security.”

Connecting people in real time

With support from Lenovo and holo|one, Micron implemented the ThinkReality solution in just a few months, putting the company in a strong position to deal with the disruption caused by the COVID-19 pandemic.

“We brought forward the first phase of our remote expert initiative because of COVID-19, and it is now fully operational,” says Lee. “With hands-free video calling, engineers on the shop floor receive detailed guidance from colleagues at a sister site or experts from the manufacturing equipment producer who have full visibility of the issue in real time as if they were on-site. Although people were unable to travel due to COVID-19 restrictions,



the Lenovo ThinkReality solution helped us keep new equipment installation schedules and routine maintenance on track and carry out repairs in a timely manner, reducing downtime and maximizing use of our manufacturing assets.”

Looking to the future

Impressed with the results of the first phase of the project, Micron is now finalizing phase two of its AR program — the phase to enable AR standard operating procedures (SOPs) at the point of demand. The company is working with Lenovo, relying on its xR services offering to convert SOPs into AR format, so that engineers will have step-by-step guidance in their peripheral visions with the wearables on.

Lee elaborates, “Our goal is to integrate AR workflows with Blueprint, our central depository for digital SOPs. If a machine goes down, engineers get an alert via Blueprint and are given

instructions for repair and a checklist for bringing it back to an operational state. By making these SOPs available via the ThinkReality platform and holo|one, engineers can work more efficiently and productively to get machines up and running again. We’re working closely with Lenovo’s xR service team to integrate Blueprint with the ThinkReality platform via custom APIs. We expect to bring the solution online in early 2022.”

Phase three of the project will expand on the SOP solution, including 3D overlays and deviation detection via machine vision. “Particularly for complex repairs and SOPs with higher possibilities for human error, 3D overlays will act as an extra helping hand, and the visual AI will alert engineers if any mismatch is detected,” says Chong Ee Low, Manager of Smart Manufacturing & AI at Micron. “This will also help when training newly qualified engineers. Phase three is still at an early stage, but we are very excited

about the ongoing evolution of our remote assistance solutions.”

“We believe that AR/VR technology has a vital role to play in the future of manufacturing,” Lee concludes. “With the Lenovo ThinkReality solution powered by holo|one software, engineers can work more efficiently to keep production facilities running smoothly, helping us to meet the growing demand for our products.”

The Smarter Solution



Agility built on reliability

ThinkReality works as an underlying platform for the newest advancements in AR/VR, empowering Micron to leverage cutting-edge tech while trusting in the tried-and-true reputation that comes with a Lenovo product.



Smooth operations

Micron is working closely with Lenovo’s xR service team to convert their standard operating procedures into AR format, enabling Micron’s engineers to quickly troubleshoot machinery and keep production moving.



Swift, sophisticated set-up

With end-to-end deployment services from Lenovo, Micron implemented the ThinkReality solution in just a few months, putting the company in a strong position to deal with the disruption caused by the COVID-19 pandemic.