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MT360 TRANSFORMATIVE TECHNOLOGIES SERIES

The Value of Augmented Reality in Manufacturing Technology



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This white paper is part of AMT's resource library on transformative technologies. There is enormous opportunity for learning, collaboration, and investment between the manufacturing and technology communities to accelerate innovative solutions and product development in the coming decade. Industry leaders agree that every part of the manufacturing value chain will be transformed by technology—R&D, the supply chain, factory operations, sales, and service. Digital connectivity among designers, managers, workers, customers, and physical industrial assets will unlock enormous value and change the manufacturing landscape.

AMT talked to leaders and innovators throughout the manufacturing and technology ecosystems to get their perspectives on transformative technologies and where they see the key opportunities and challenges in the coming decade.

Our purpose is not to reach definitive conclusions about the future of technology in the manufacturing ecosystem since there is no single technology or type of manufacturer, but to delineate patterns that industry leaders observe and, where relevant, point out similarities and parallels with past advancements to try to shed some light on future developments.

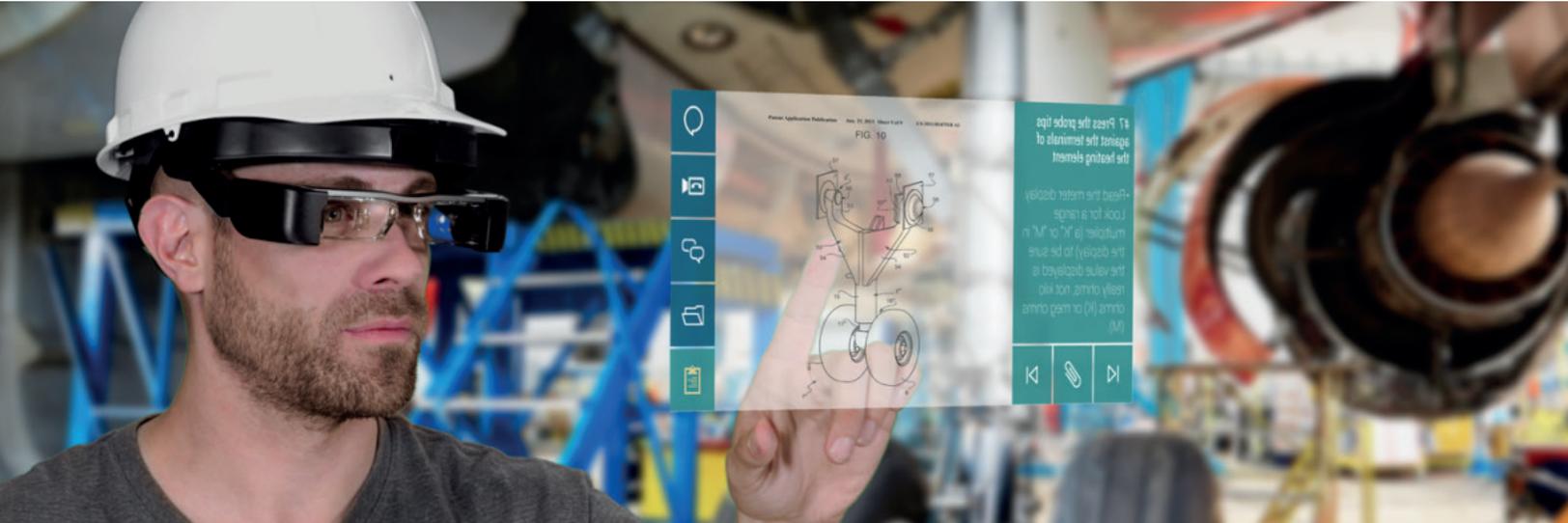
As technology continues to transform the manufacturing ecosystem, companies will use the new technologies to create new, more flexible, and higher quality products; increase

ROI; and create more efficient manufacturing processes. Those companies who are able to successfully leverage technology advancements to create new market opportunities, or to increase company productivity, are more likely to succeed in this transformation.

Technology advancements that are shaping the future of the manufacturing ecosystem will be featured and on display at MT360 on May 12 - 14, 2020 in Santa Clara, California. MT360 will be an opportunity to meet personally with MT innovators and leaders, as well as the VC community. Visit MT360 to learn how your company can strategically plan for the future and gain from advancements in thinking and technology.

We welcome hearing your opinions and experiences on this topic on our blog: www.mt360conference.com/blog.

On-the-Job Training For a New Generation



“Augmented Reality offers the promise of providing every member of the **industrial workforce with relevant, contextual, and customized information and guidance from** across the enterprise into their field of view in a seamless, **hands-free, intuitive manner that transforms the way they work.”**

—Amar Dhaliwal, CEO, Atheer, Inc.

Over the past three decades, billions of dollars have been spent by companies on technology to increase the productivity of knowledge workers through process automation, communication, and other enablers, and these have increased productivity throughout the economy. There has been much less focus on enhancing the productivity of industrial and technical workers through technology investments. Now, advancements in technology—the confluence of greater

bandwidth, imaging technologies, and digitized information—have led the way in creating a powerful new tool to increase the productivity of the industrial workforce including assemblers, operators, and technicians in manufacturing.

By augmenting the information, data, images, skills, or experience that workers can access in real time through smartphones, tablets, or smart glasses, manufacturers can increase worker productivity by an order of magnitude.

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Manufacturing production lines are complex and varied, and a piece of equipment can require dozens of maintenance procedures that involve hundreds of components and complex steps. Augmenting the skills of the workforce with remote expert assistance and equipment diagnostics through augmented reality (AR) brings benefits on many fronts.

With remote support through an AR device, a technician can access engineering data and digital annotations to guide them through a procedure. Vast digital libraries of recorded procedures can be accessed in real time on site by an AR-equipped technician. Additionally, a repair technician can “broadcast” what they are viewing to an expert off site who views the video or images and can diagnose an issue, meaning technical experts are no longer needed in every

location. Often, AR may pay for itself in travel costs saved alone. AR can also help stem the loss of tribal knowledge as experienced, technically skilled workers continue to retire.

“We have found that the manufacturing market still has a few misconceptions about AR, but when customers see that the applications of AR are extremely practical and straightforward, they understand how it can potentially benefit them. They often look for opportunities where the technology is likely to provide a step level change in their business, something with a 10-20 percent impact on ROI,” said Amar Dhaliwal, CEO, Atheer.

The capabilities and benefits of AR-based information and instruction go beyond those of static, hard copy instruction manuals. AR information can be delivered step-by-step in real time and in context; it can be presented as any combination of simple 2D and complex 3D digital assets; and it can be viewed without shifting attention away from a workpiece. Digital instructions can be remotely updated a single time to reflect changes in product design or new best practices and distributed widely to a remote workforce.

Five main categories of use cases for AR:

1. MAINTENANCE AND REPAIR

These operations benefit from AR for diagnostics, maintenance, and repair of production equipment. A common use case is manufacturers with foreign plants where workers are not fluent in English or technically skilled. Any scenario of remotely distributed plants where it is cost prohibitive to have an on-premises technical expert for every possible production stoppage is a strong use case for AR.

2. TECHNICAL FIELD SUPPORT

AR is particularly valuable in servicing complicated pieces of equipment or facilities with few experienced personnel. It can be used to deliver expert support remotely from the original equipment manufacturer (OEM) without needing to physically bring in specialists. For example, the aviation industry uses AR for maintenance and repair operations given the high level of technical expertise that is required. Service technicians can tap into databases of knowledge and technical information to access the information when they need it. Volkswagen Group and Porsche are currently large Ather customers.

USE CASE: Porsche Cars North America (PCNA) is using “Tech Live Look” at its 189 dealerships in the U.S. to remotely diagnose and service its cars. The system combines computerized eyewear and Ather’s AR platform to connect dealership technicians to remote experts via smartglasses for a live interaction that can shorten service resolution times by up to 40 percent. By solving issues faster, dealer partners can get their customers back into cars with less

disruption and overall service quality increases as expertise is shared more efficiently between Porsche experts and dealer technicians.

A service technician at a dealership puts on smartglasses and connects through the software with the Atlanta-based Porsche technical support team. Via high-definition live video from the glasses, the support team sees exactly what the technician is seeing. The expert in turn can project step-by-step technical bulletins and schematic drawings onto the display inside the technician’s glasses, as well as take screen shots and enlarge images for better visibility. The technician can open and view documents while working hands-free on the car. This information exchange is far more efficient than sending electronic forms and photos or explaining complex technical issues over the phone.

Until Porsche began using AR, a complex or unusual technical issue could go back and forth repeatedly between a dealership and the PCNA technical support team. It could take multiple electronic messages, phone calls, photos, and even on-site visits by Porsche’s field technical managers to identify and diagnose the issue for repair.

In April 2018, Tech Live Look won a Best-in-Class Award from the annual Field Service USA conference, a major conference which focuses on improving efficiency and effectiveness of field teams across many industries.

3. INSPECTION AND SURVEYING

Remote inspection and surveying reduces



transportation costs. Detailed visual information can easily be transmitted directly to technicians who can evaluate it and determine the status or safety of equipment, materials, or infrastructure. This is often carried out by exploiting the remote nature of drones and other unattended vehicles and platforms.

4. CARGO AND WAREHOUSE OPERATIONS

Cargo workers can efficiently be directed to specific locations and actions through an AR application and headset instead of using paper printouts. An instructive use case is the International Air Transport Association (IATA), which represents 290 airlines in the air travel and air cargo industries, with member airlines carrying about 82 percent of the world's air traffic. In 2018, IATA began to pilot an Ather AR platform and reported that it achieved greatly increased performance in cargo handling operations—a 30 percent improvement in the speed of cargo handling and an incredible 90 percent reduction in errors.

It is clear that AR can have a major impact on speed and accuracy of moving cargo through air cargo warehouses. The Ather AR platform delivered digital work instruction that provided air cargo operators instant access to clear, consistent, and unambiguous work instructions for key tasks such as accepting

cargo as ready for air carriage. The work instructions were delivered directly into the field of view of warehouse cargo handlers through the use of smart glasses, tablets or smartphones and updated quickly and accurately via wireless connections from the mobile devices used by the warehouse.

5. TRAINING AND COMPLIANCE

AR can guide a technician remotely through learning a new process with greater levels of learning over classroom instruction. It has been widely demonstrated that guiding someone through a task and showing them how to do it visually—thus experientially—has a greater impact on learning than classroom learning. Training a remote workforce is a strong use case for AR.

AR is growing in the manufacturing technology ecosystem in the use cases discussed above, although it still faces some challenges. Industrial workers typically have low tolerance for new technology or new processes that appear to get in the way of completing their work or impacting their quotas. They need to get value from it in short order, or they will not use it. Any technology-based addition to the workload of industrial workers will only gain acceptance and traction if it is genuinely easy to use.

“We fully understand this challenge in industrial workforces, and we usually

recommend customers start with a couple of small pilots in their manufacturing operations before they make a larger investment. We have built what we call a low-code platform, which is in effect a no-code platform so that people with no programming experience whatsoever can create step-by-step guides on operating

procedures, processes, and workflows. This has proven very successful,” said Dhaliwal.

AR is projected to continue to grow rapidly as use cases become more widely communicated. Forrester Research estimates that more than 14 million workers will wear smart glasses by 2025, up from 400,000 in 2016.

THE BOTTOM LINE

There are five main categories of use cases for AR: maintenance and repair, technical field support, inspection and surveying, cargo and warehouse operations, and training and compliance. Across all categories, these are a few ways AR technology will improve efficiency and increase worker productivity by an order of magnitude:

- Workers can access information, data, images, skills, or experience in real time through smartphones, tablets, or smart glasses.
- A repair technician may “broadcast” what they are viewing to an expert off site who views the video or images and can diagnose an issue. This means technical experts are no longer needed at every location.
- Vast digital libraries of recorded procedures can be accessed in real time on site by an AR-equipped technician to guide them through a procedure.
- AR can help stem the loss of tribal knowledge as experienced, technically skilled workers continue to retire.

Advancements in technology—the confluence of greater bandwidth, imaging technologies, and digitized information—have led the way in creating augmented reality as a powerful new tool to increase the productivity of the manufacturing workforce. As a result, manufacturers will experience healthier business operations, a reduction in downtime, and an increase in resources which may be used to improve other areas of their business.

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About AMT

AMT - The Association For Manufacturing Technology (AMT) represents and promotes U.S.-based manufacturing technology and its members—those who design, build, sell, and service the evolving technology that lies at the heart of manufacturing. AMT also owns and manages the International Manufacturing Technology Show (IMTS), the premier manufacturing technology event in North America. AMT acts as the industry’s voice to speed the pace of innovation, increase global competitiveness, and develop manufacturing’s advanced workforce of tomorrow. AMT was founded in 1902 and is headquartered in McLean, Virginia. For more information, visit www.AMTonline.org.



About MT360

MT360 will be held May 12-14, 2020 at the Hyatt Regency in Santa Clara, California. The unique AMT event brings together the technology, manufacturing, start-up, and VC communities to discuss and demonstrate the role of transformative technologies in the future of manufacturing. A two-and-a-half-day immersion in the world of transformative technologies, MT360 will showcase and demonstrate the integration of additive manufacturing, augmented reality, cognitive automation, and the digital thread into manufacturing operations.

Visit www.MT360conference.com for more information. Follow us on social media:

