A digitalized workforce: The fourth industrial revolution for the automotive industry

TeamViewer

As vehicles evolve and digitalize, so must the processes that bring them to market and keep them on the road. Across the automotive supply chain, suppliers are feeling the pressure to optimize, with the number of suppliers feeling some form of distress increasing to 42% in recent years.[1]

In particular, a few trends are putting considerable strain on the worldwide car industry. To begin with, the transition to electric vehicles (EVs) is creating unprecedented demand. For original equipment manufacturers (OEMs), manufacturing investments in EV will likely eclipse $500 billion by 2030. In the United States alone, EV market penetration is expected to jump to 30%.

Consumer interest in connected vehicles is on the rise, too. More than half of consumers in India, China, and Southeast Asia are willing to pay for connected vehicle services; in the United States, Republic of Korea, Japan, and Germany, that number is closer to 30%.[2] Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) technology introduces new considerations up and down the value chain.

Finally, at the dealership level, inventory has rebounded and Per Vehicle Retail (PVR) has levelled off after a period of sustained decline.[3] Due to this and other factors, dealership teams face renewed pressure to make their processes as efficient as possible and ensure customer satisfaction.

With evolving demand comes the need for better processes

For OEMs, suppliers, and dealers alike, sustaining profitability in these market conditions depends heavily on process efficiency. These rising complexities call for new solutions and the need for change impacts both upstream and downstream operations and necessitates a comprehensive reorientation and realignment of the entire value chain. This spans from existing manufacturing processes to enhancing collaboration among OEMs, suppliers, and dealers.

[1] PwC, Next in Auto 2024
[2] Deloitte, 2024 Global Automotive Consumer Study
[3] JM&A Group, Automotive Trends Report Q1 2024 Sales Performance Results

As the automotive sector grapples with increasing complexities, innovative technologies such as artificial intelligence (AI), augmented reality (AR), and remote connectivity offer the potential to optimize operational processes, enhance reliability, create resilient supply chains, and secure a competitive edge. Digitalization in the automotive industry is akin to refurbishing a classic car: it can be cumbersome and costly, but it's essential for progress. Many machines aren't IoT-capable, for example, infrastructure upgrades are challenging, and the costs and ROI are uncertain. AR offers a perfect-fit solution. Paired with smart glasses and mobile devices, AR revolutionizes production plants and warehouses, epitomizing the fourth industrial revolution.

According to Fortune Business Insights, the global augmented reality (AR) market size is projected to grow from US $93.67B in 2024 to US $1,869.40B by 2032, exhibiting a compound growth rate (CAGR) of 45.4% during the forecasted timeframe.

US $93.67B — 2024

US $1,869.40B — 2032
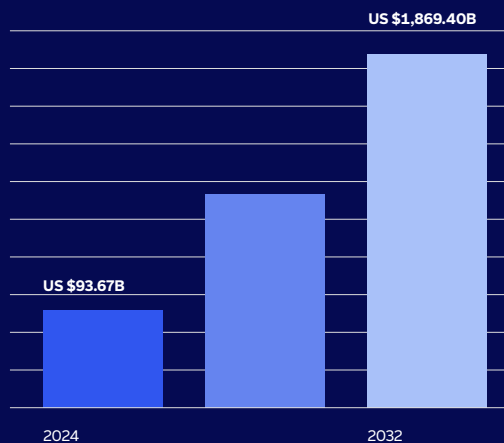
TeamViewer Frontline: Augmented reality (AR) for the automotive industry

Frontline digitalizes workplaces using a combination of AR and smart glasses or a mobile device to streamline processes across the value chain. It can connect and digitalize the frontline workers responsible for a variety of processes, from manufacturing and assembly to logistics and dealership operations.

Upstream and Downstream Use Cases with AR Applicability

(Source: ABI Research)

UNIVERSAL AR CASES

• Remote Assist
• Training
• Work Instruction

UPSTREAM

• Logistics
• Inspection
• Assembly

• After Sales Support
• Dealer Support
• Customer Experience

DOWNSTREAM

Remote-assist, training, and work instruction

A study by ABI Research found that worldwide automotive smart glasses shipments for AR and mixed reality (MR) will increase a combined $2 million by 2027.[4] Helping to drive this increase is the broad applicability of these technologies for assistance, training, and instruction. For remote assistance via smart glasses, an on-site technician can connect to a video conference via Wi-Fi or mobile hotspot, with one or more remote experts. The camera image of the glasses is transmitted as live video in HD quality, at which point connected experts can provide real-time guidance, helping to:

Reduce error rates in manual processes

Streamline complex maintenance workflows

Improve information transparency

On the training front, quick, easy-to-use remote collaboration and guided support tools enable employees to get familiar with new equipment and workflows faster and with less need for in-person visits. By reducing training costs and expanding access for new employees, automotive companies across the value chain:

✓ Reduction in number of training hours needed per new employee

✓ Mitigates risk of labor shortage by increasing productivity of employees

✓ Lowers cost per training hour per new employee

[4] ABI Research, Automotive Sector Complexities and the Role of Augmented Reality

Case Study: **BMW**

BMW North America deployed TeamViewer Frontline to its nearly 400 BMW and MINI dealers in the United States to take knowledge sharing to the next level. They now use Frontline to immediately connect with remote experts 1x1 or for group calls during vehicle service. Frontline enables hands-free, two-way communication and live annotations, pictures, and video with offsite experts, for:

- ✓ Faster technician and expert collaboration
- ✓ Improved first-time fix rate
- ✓ Improved technician and customer satisfaction

"This is a great example of how we are applying new technologies to help our technicians work more efficiently and further our commitment to offer the best possible service experience for BMW customers. By solving issues faster, BMW dealers can get customers back into their cars sooner."

– **Claus Eberhart,**
   VP Aftersales at BMW of North America

Upstream: Logistics, inspection, assembly

Automotive operators must maintain complicated supply chains that span the globe. As such, every facet of their value chain must be optimal to maintain production. For example, if a parts supplier experiences unexpected downtime, the consequences can reverberate through the entire value chain, all the way up to OEM.

These disruptions can be very costly. The need to perform in-person software updates because of faulty software costs U.S. auto makers $500 million in recalls—annually.[5] Just by shifting to "over-the-air" software updates, automakers could save $1.5 billion by 2028, which a scalable AR remote connectivity platform can help facilitate.

[5] State of the Global Workplace

Other benefits include:

✓ **Streamlining your logistics processes:** Vision picking supports more efficient order picking, kitting, sequencing, and more. With Frontline, you can visually guide workers through processes for faster fulfillment and lower error rates, while supporting just-in-time and just-in-sequence delivery to the production line.

✓ **Speeding up inspection quality and accuracy:** Manual quality checks can slow down production and increase the risk of human error. With AR, your inspections will become far more efficient, helping teams identify the root cause of serial damage faster to reduce the likelihood of recalls.

✓ **Improving complex manual assembly:** Since its inception, the automotive industry has relied on efficient assembly lines. Among other assembly line applications, AR solutions enable the real-time delivery of digital assembly instructions that help improve accuracy.

Case study: **Audi**

Audi uses Frontline's AR capability to increase the efficiency of processes in quality assurance. AR is used to train their QA staff and thanks to the Frontline Spatial Editor, AR inspection plans are created without programming knowledge. Contents can be positioned and edited by placing pins on the virtual 3D vehicle. The test plan, created with just a few clicks and drag-and-drop functionality, has led to significant progress in quality assurance at Audi.

"Our goal is to simplify complexity with digital tools. Mixed Reality supports an interactive learning process without impairing the human senses. This facilitates the understanding of complex work processes and shows how digitalization can support us."

– **Peter Mück,**
Head of Quality Assurance, Audi AG

Downstream: After-sales support, dealership support, customer experience

Both service partners and car dealers need to offer user-oriented innovations for the manual workforce. Due to shorter innovation and product cycles, more models and variants must be mastered by post-sale teams. Newer built-in technologies are becoming increasingly complex and require special care during maintenance. All the while, customers still expect the shortest service times possible.

AR can significantly speed up time-to-resolution by offering technicians the option to call a remote expert directly with their smart glasses, share what they see, and discuss any issue directly—all while keeping their hands free to test out instructions directly.

This capability alone leads to several benefits:

✓ **Exceed customer expectations** with fast case resolution, first-time-right repairs, and superior service levels and quality.

✓ **Attract and retain talent** by improving communication between technicians and manufacturers, reducing written communication, and helping techs take on difficult repairs.

✓ **Scale growth** by improving equipment and yard utilization, discovering and documenting best practices on-the-job, and improving the productivity of each frontline worker.

✓ **Streamline warranty processing:** With a pair of smart glasses and TeamViewer Frontline, your technicians can easily take a photo of a part that needs replacing and automatically send it for review or share with an expert in real-time.

Case study: **Ford**

Using TeamViewer Frontline's augmented reality software, aptly named by Ford as SWIS (see-what-I-see), technicians have increased first-time-fix rates and reduced time-to-resolution to as little as 40 minutes—just by digitizing processes and gaining access to instant knowledge from remote experts.

They are also fixing problems specific to EVs, troubleshooting and diagnosing from afar, significantly reducing the need for field engineers to visit the dealership. This means less travel costs and a reduced carbon footprint, supporting their global sustainability goal of becoming carbon neutral by 2050.

A track record of excellence in the automotive industry

Leading automotive companies like BMW, Ford, Hyundai, and Toyota rely on TeamViewer Frontline to enhance customer satisfaction and streamline vehicle servicing. Our dedicated

sales and solution engineers specialize in the automotive industry, leveraging their expertise alongside our robust platform. Recognized by research institutes and partners as a market leader, TeamViewer Frontline received the Best Automotive Solution award in 2023, from the XR Awards hosted by industry news leader XR Today.

Our impact extends beyond the product itself. With features such as remote assistance, 3D spatial visualization, and step-by-step instructions, TeamViewer Frontline drives efficiency, productivity, and performance. These benefits resonate with OEMs, dealers, and customers alike. Backed by a team of experienced experts with more than 50 years of combined automotive knowledge, we offer comprehensive services, enterprise software solutions, and partner hardware—including wearables, smart glasses, and mobile devices. Let us understand your priorities and challenges to tailor a solution that delivers maximum value.

In addition, TeamViewer partners with two of the automotive's most trusted providers of automation and digitalization.

Siemens

In many ways, TeamViewer Frontline acts as an extension of Siemens Teamcenter. Frontline integrates directly into Teamcenter, enabling businesses to leverage their existing data for AR, 3D, and other applications. It also enables a streamlined user experience that provides an adaptable technical authoring process and the intuitive reuse of existing content within Teamcenter.

SAP

Thanks to our partnership with SAP, TeamViewer Endorsed App solutions are well suited to enhance SAP solutions from Design-to-Operate. TeamViewer is deeply embedded with SAP S/4 HANA and other modules for smooth processes and time to deployment.

SAP° Endorsed App
Premium Certified

Get started with TeamViewer

Every Frontline project kicks off with a collaborative consultation so we can understand your specific needs and use cases. This enables us to craft a high-value, customized solution designed to solve your key challenges and deliver the highest return.

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