

Aerospace: Digitalizing the frontline worker with TeamViewer Frontline

Whitepaper



By 2034, aerospace manufacturers will be spending more than US\$54 billion on digital technologies globally to support their operations. That's up from US\$30 billion globally in 2022.¹ Why? Because as process-heavy as aerospace manufacturing and aviation is, frontline operations and production still suffer from insufficient digitalization.

This substantial reliance on manual processes and human labor is to the

detriment of operational efficiency, product quality, and safety standards. In a highly competitive, high-cost industry like aerospace, even the smallest error can have far reaching impact. In 2023, for example, supply chain missteps caused a shortage of Honeywell turbo fans that eventually delayed the delivery of Gulfstream G280 jets.²

80%

of >2M aerospace jobs in North America are deskless

\$27.4B

aerospace manufacturers' spending on digitalization in North America by 2034¹



Why TeamViewer Frontline?

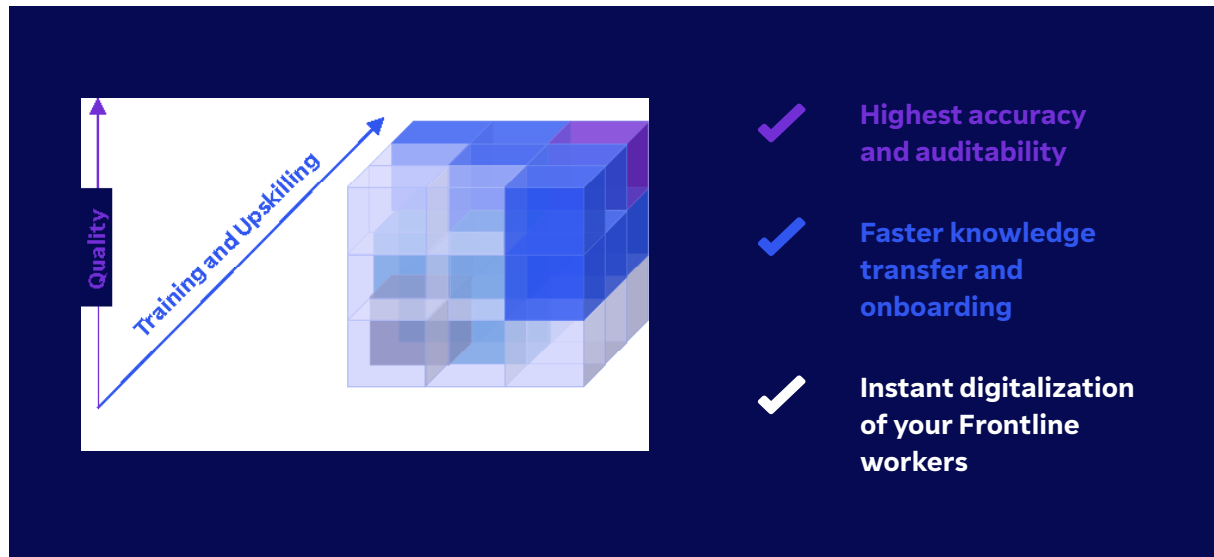
The aerospace industry is a key source of advancements and innovation in our modern world. For this sector's high-complexity procedures, accuracy is a top priority—especially when it comes to crucial assembly and inspection routines.

TeamViewer Frontline is a workflow solution that helps to connect and digitalize the frontline worker responsible for these processes. It brings augmented reality (AR) to your workforce, showing each team member the when, where, and how of every task. From assembling parts or inspecting machines with precision, to solving problems with real-time expert input, Frontline turns work into a visually intuitive experience.

¹ ABI Research, Digitalization and the Aerospace Industry, QTR 1 2024

² Supply-chain Woes Weigh on Jet Deliveries at Gulfstream Aerospace | Aviation International News

In an industry struggling to address fragmented enterprise digitalization, Frontline provides the real-time data, knowledge transfer, and scalability needed to unify workers and processes across distances—with confidence and ease. The solution with its 3D models and guided training workflows is uniquely positioned to help the industry overcome the demographic challenge with 29% of industry’s workforce retiring the next years and the need to onboard more than 3.5 million workers by 2026.³



Our full-service approach

We act as a one-stop-shop by not only offering our enterprise software solutions but providing you with partner hardware—wearables, smart glasses, even mobile devices—and comprehensive services. The starting point for a Frontline project is a thorough consultation and situation analysis to get an overview of your use case and specific requirements. From there, we can customize a solution to meet your needs, using only the Frontline components and features that will deliver the most return.

The leaders in aerospace understand that industrial AR applications are no longer innovative pilot projects; they’re critical solutions ready for at-scale deployment to support your most critical business processes.



³ On the radar: Evolving workforce and aerospace and defense firm needs

How we **deliver value** along the aerospace value chain

You'll find TeamViewer Frontline at work in a variety of aerospace use cases, from OEM supplier process guidance to airport check-in kiosks:

Value Chain	Use Cases		Vision Assist Product Fit
Airports	On-the Job Training	Equipment Maintenance	
MRO	Line/Base Maintenance	Overhauls	  
Carrier BPO	Safety Inspections	Cockpit Tech Support	  
Carrier	On-Board Operations	Hub-and-Spoke Processes	
OEM	Quality Control	Final Assembly	  
Component Supplier	Avionics Assembly	Avionics Testing	 
			   High   Medium  Low

Globally, aerospace contributes significantly to economic growth and employment. It is an industry characterized by high levels of technological advances, significant investments in research and development, and strict regulatory environments due to the sensitive nature of its products and services and the corresponding hyper-focus on safety.

An integrated AR solution reinforces the fragile supply chain for the aerospace industry. Whether it's connecting high-value, low-capacity engineers to technicians in the field, or supporting the design and maintenance of advanced avionics systems, leveraging AR improves speed, reduces errors, and adds much needed flexibility into the process.

Helping aerospace overcome its most pressing challenges

Given its deeply embedded utility across geographic boundaries, the aerospace industry is influenced by macro trends of all kinds. Navigating these headwinds will require unprecedented innovation throughout the supply chain.



Political

Aerospace remains a highly regulated industry with a heavy focus on quality assurance. One faulty part or nefarious vendor can spark broad scope, showstopping regulatory action.⁴ What's more, national interests and the strong influence of governmental bodies can severely limit transformative action and disruptive innovation. What's needed is tangible change—a documentation tool for audit trails and quality control that can be deployed at scale within a short time to market.



Economic

Air transport alone generates approximately 2.4% of global GDP and 5% of the U.S. GDP.⁵ When even a single player from the aerospace supply chain experiences a failure or outage, the ripple effects can be devastating. A glitch stemming from a software update caused outages that drove down United Airlines stock prices 2.5%—in a single day.⁷

Airlines operate small-margin businesses and are exposed to significant downside risks. The Federal Aviation Administration's recent decision to ground 171 Boeing 737-9 MAX airplanes promises to have far-reaching consequences.⁸ Carriers can quite literally live or die by their ability to reduce risk, minimize recalls, and lower aircraft on ground (AOG). TeamViewer Frontline is specifically designed to minimize the maintenance and production issues that lead to AOG. In addition, the solution also supports efficiency gains and continuous improvements that boost competitive advantage.



Labor

Most companies in the aerospace industry maintain geographically dispersed operations (OEMs and airline operations, in particular. Paired with the high cost of logistics and travel, an aging workforce, and the need for onboarding and upskilling new people, labor is always top of mind. TeamViewer Frontline helps address labor issues by providing instant remote expert support between locations to bridge physical distances. The solution offers upskilling and training support based on 3D models that shortens onboarding and facilitates knowledge transfer effectively.

⁴ Hunt for suspect jet engine parts spurs call for regulation | Reuters

⁵ The economic & social benefits of air transport

⁶ Impact | Airlines For America

⁷ United Airlines Says the Outage That Held up Departing Flights Was Not a Cybersecurity Issue

⁸ Updates on Grounding of Boeing 737-9 MAX Aircraft



Operational

Even in such a process-heavy space, information technology is still seen as an enabler, not as a business driver. Digitalized production remains behind that of other comparable industries, underscored by prevalent E2E dependencies on the supply chain.

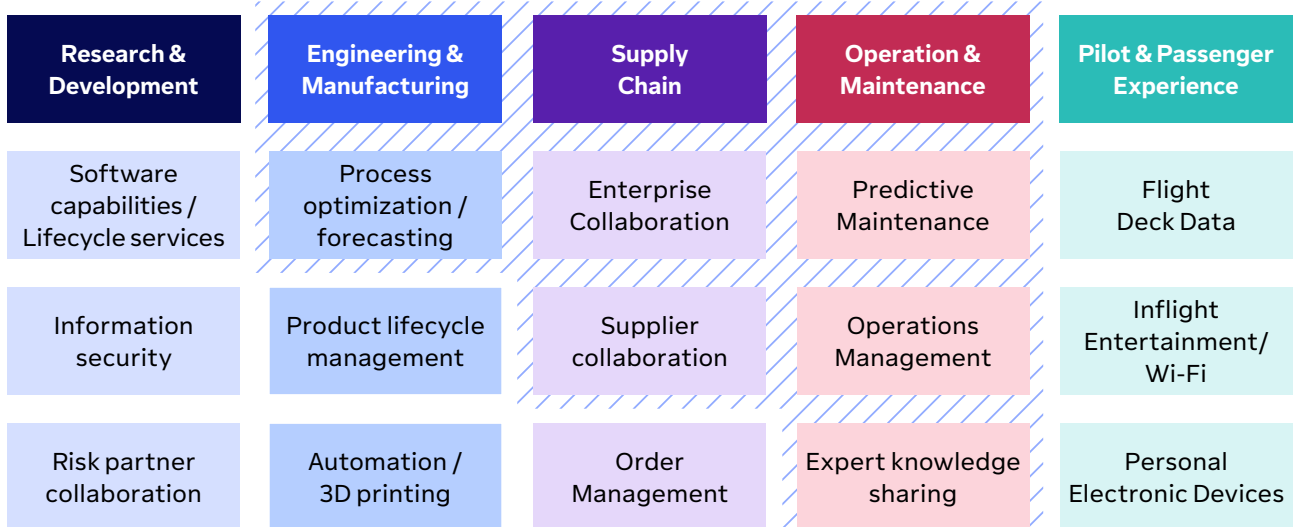
A solution like TeamViewer Frontline can digitalize the frontline worker and focus on single processes that are complex and error prone. Across the board, Frontline replaces paper instructions with digital tools that are deeply integrated with SAP and Siemens.



Technological

Overall, there's a dire need within the industry to address the innovation backlog and enable more data-driven decision making. One specific area stands apart: the traceability of parts and tools. Without the digitalization of workflows, tracking down suspect engine parts, or finding root cause for a widespread issue, remains quite cost and resource intensive.

AR, spatial, and 3D solutions comprise the forefront of this necessary innovation. Frontline provides data for every process step with 100% visibility, leading to better traceability and, in many cases, instant decision making.



From engineering and manufacturing, to supply chain and ops/maintenance, Frontline offers comprehensive coverage

Frontline enables remote support, the training and transfer of expert knowledge, and impeccable quality assurance—in a **single platform**

Based on extensive research and development, alongside close work with industry-relevant brands, Frontline is architected to meet the digital needs of the aerospace industry around the globe:

1 Remote Expert Support

Frontline is ideal for accidental support, in scenarios when a remote expert is needed for troubleshooting. It also supports recurring and ongoing remote assistance for complex MRO to increase task completion ratio. Customer value is realized along numerous dimensions:



Quicken time to resolution: Connects on-site workers with experts immediately for live assistance, making problem solving location- and time-independent.

Free up your experts: Assist prevents experts from having to take on unproductive or tedious tasks, giving them more time to solve complex issues.

Solve complex issues: Make knowledge sharing more straightforward, letting experts lead anyone through troubleshooting procedures.

Streamline documentation: Integrated reporting and Assist's capability to integrate into your backend keeps documentation workloads low and makes case analysis easier.

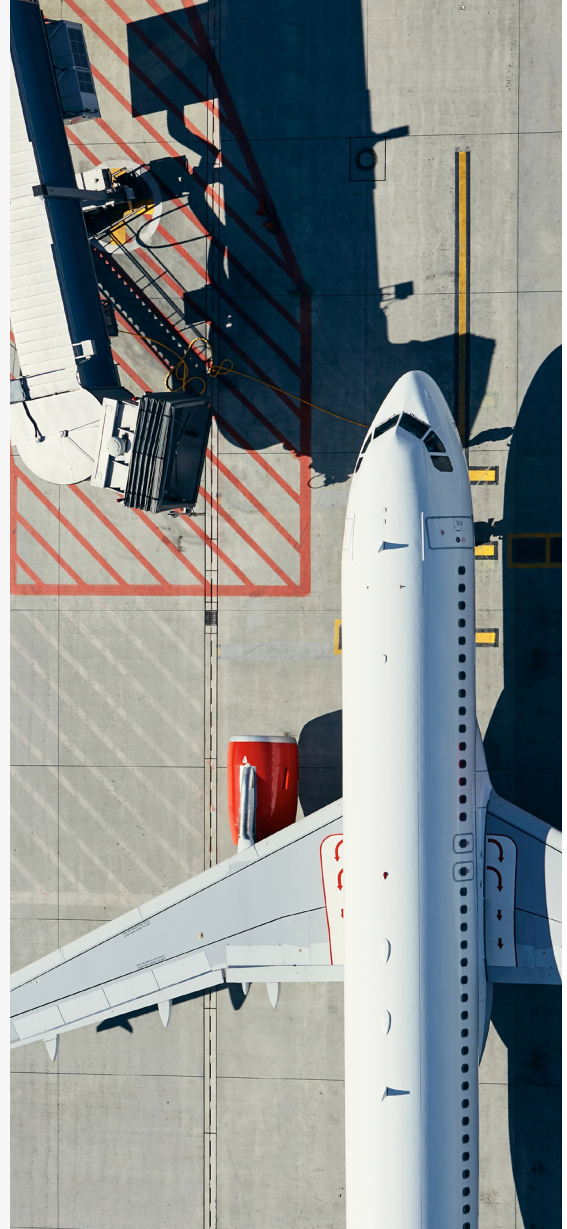
Share knowledge: In the face of increasing labor shortages, on-site workers can directly learn from existing experts, continuously improving their skills.

Reduce travel: By using remote support, traveling becomes less necessary, saving time and reducing costs and CO₂ emissions.

Virtual ground staff assistance helped Vueling to avoid takeoff delays

At Vueling Airlines, ground staff often require assistance during plane inspections at the gates. To address this, Frontline was implemented as the remote assistance solution, not the least to replace Whatsapp and other undocumented field-conversations via mobile devices. It significantly enhanced the support process with timely guidance from remote experts as ground staff can provide immediate assistance from their back office. This eliminates the need for experts to travel to the plane's location, a journey that typically takes 15-20 minutes and that could delay takeoffs.

Frontline not only accelerates problem resolution but also integrates seamlessly into the system of record, to ensure a clear audit trail and thorough documentation, and offers the possibility to integrate into external sensors and IoT-enabled devices.



North American airline equipped its hangar floor technicians with a live feed to remote engineers to avoid process interruptions

A major airline in North America was facing delays and inaccuracies during routine maintenance due to technicians having to leave aircraft to communicate issues. These frequent trips resulted in delays and inaccurate descriptions of technical issues.

By adopting Frontline to revolutionize its maintenance process, the airline was able to connect hangar floor technicians with engineers in remote locations through a live feed, allowing for real-time guidance on repairs. Not only does this streamline communication, but it also enables technicians to work hands-free and receive instructions directly, significantly improving efficiency and accuracy in addressing technical issues.

Airports using remote monitoring and access to avoid downtime of essential IT equipment like check-in kiosks

Airports represent one of the largest opportunities for operational streamlining in aerospace. Frontline enables the pre-installation of software into non-standard IT equipment, such as airline check-in kiosks, as well as remote monitoring and access. This allows for seamless remote monitoring of kiosks, updating and troubleshooting, without the need for onsite visits. The goal is to minimize downtime for these critical machines when issues do arise and a high customer satisfaction in the end. And they are critical: at Chicago O'Hare International Airport alone, some 33 million passengers pass through every year, many of which use kiosks to check in, print boarding passes, and handle luggage check.⁹

2

Quality Assurance



Achieve higher accuracy: Provide clear instructions that are easy to understand and without interruptions to reduce human error.



Assure the highest standards: Guarantee thorough, compliant inspections.



Save time: Prove your staff exactly the information and tools they need.



Guarantee auditability and traceability: Fulfill company and industry regulations.

OEM Supplier: Visual process guidance for complex manual assembly

Airbus Helicopters Inc. in Dallas, Texas puts passenger and public safety first. Through a meticulous documentation process during helicopter assembly and maintenance, Airbus Helicopters identified a significant hurdle in their process. Workers maintaining and overhauling gearboxes, at times numbering 300 parts per gearbox, struggled with the cumbersome task of taking pictures, uploading images to a computer, and documenting each step, affecting both efficiency and accuracy. In response, Airbus Helicopters introduced the Frontline solution alongside RealWear head-mounted devices to reinvent their workflow. This modernization not only improved work quality but also slashed gearbox inspection times by 40%. Furthermore, integrating with the SAP backend system ensured 100% data reliability, eliminating the risk of manual input errors with digitized data, enhancing safety and operational efficiency.

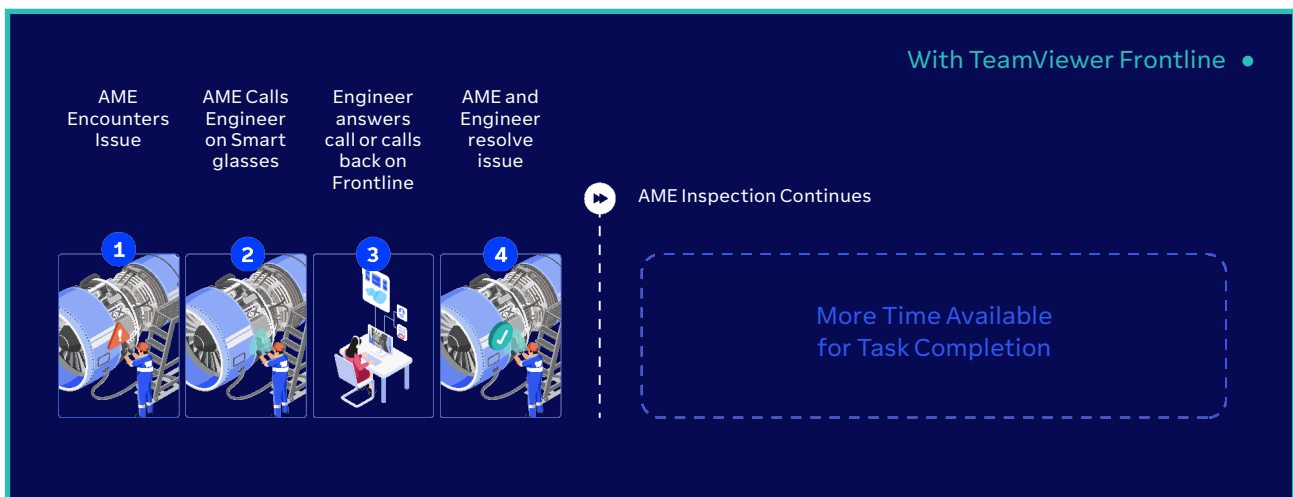
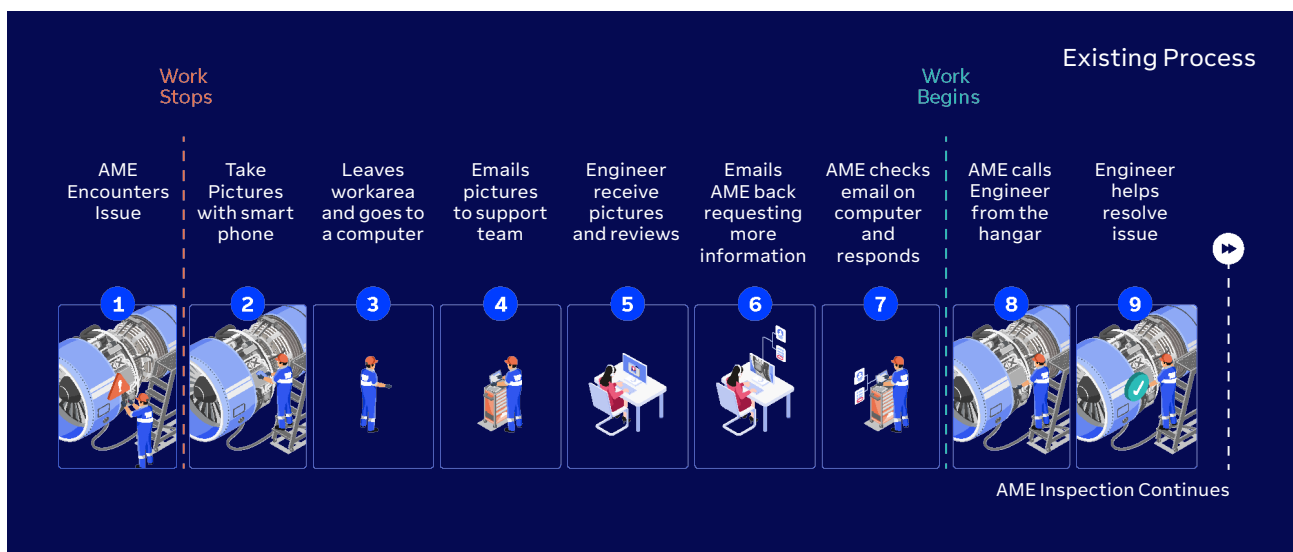
⁹ Chicago O'Hare Airport Facts & Figures

Boeing enabled technicians to access steps and work instructions

Boeing was challenged with improving production efficiency without compromising accuracy. By integrating Frontline into their manufacturing process, they created a transformative “step change.” This strategic move enabled technicians to access steps and work instructions seamlessly, without interrupting their tasks, resulting in a substantial 25% increase in efficiency while maintaining error rates. This approach not only optimized production time, but also ensured high-quality outcomes, demonstrating the power of innovative solutions in addressing critical manufacturing challenges.

Airline Operations & MRO: Complex recurring maintenance tasks

Airlines have an opportunity to implement AR-based work instructions for complex recurring maintenance tasks. For example, AR can help ensure that a maintenance technician at Northrop Grumman properly tests, calibrates, adjusts, and mechanical parts and instrumentation on an airplane. AR can reduce the instance of human error, ensuring that every step is properly completed.



3

Training and Upskilling

TeamViewer Frontline as AR/VR-based training solution using augmented reality and 3D technology covers various training scenarios across all departments – from onboarding to technical upskilling, from security drills to product launches and service instructions.

Improve training effectiveness vs. classroom setup: Save productive time and training resources by visually onboarding and training your workforce on-the-job vs. on-site in classroom.

Shorten time to market as training workflows are easy-to-implement. The self-service solution offers immediate added value, by enabling you to create, adjust, and deploy interactive training content in no time.

Replicate real-life scenarios at scale, such as critical systems maintenance, engine repair and procedure training, without the real-life risks and damages.



Boeing enabled technicians to access steps and work instructions

While immersive virtual reality training can be an excellent way to acquire or practice skills, AR and mixed-reality devices like Frontline Spatial offer useful real-world applications. These solutions can act as training wheels for professionals. A global aerospace company was faced with the industry-wide challenge of declining experience levels among workers. They turned to spatial computing to transform training for employees and its service network. By utilizing Frontline Spatial to create immersive and interactive training programs from 3D models generated during product design, the company has markedly improved learning experiences. The result is an authentic and safe training experience, without the risks and damage that might occur from a real-life mistake. This strategy not only shortens training durations, but also boosts trainee engagement, effectively addressing the skill gap in a rapidly evolving sector.

Simplified task card completion to help upskill inexperienced aircraft engineers at a premium airline

A leading airline in North America had the growing challenge of completing basic line maintenance tasks due to an influx of inexperienced technicians. By adopting Frontline, the airline was able to offer tailored training content that simplified task card completion and provided technicians with instant access to engineers for real-time troubleshooting. Utilizing voice-operated, head-mounted displays, Frontline enabled technicians to receive guidance directly on the job, markedly improving both the quality and speed of maintenance work. This innovative approach ensures that even with a less experienced workforce, the airline can maintain high standards of operation and efficiency.

The Frontline platform elevates the workplace experience for frontline workers by delivering immersive, customized solutions across a broad spectrum of applications, delivering efficiency and increasing productivity across the value chain. Additional value is provided by the wider TeamViewer product portfolio.



Value Realization: Frontline's ROI

It doesn't take long to see the tremendous opportunity for measurable success. For one, the demand for skilled frontline workers will only continue to grow in the coming years: Boeing alone has estimated over 600,000 new aircraft engineers will be needed in the next 20 years. Which is hardly surprising: a single aircraft—the Airbus A380—is made up of about four million individual parts produced by 1,500 companies from 30 countries around the world.

What's more, 70% of airline timecards are still on paper—a conservative estimate, many would agree. Given the sheer volume of frontline workers in aerospace, the digitalization of timecard processes alone could lead to significant efficiency gains.

Finally, there's aerospace's equivalent of downtime: AOG. Direct AOG costs for airlines are around \$30,000 per hour. Considered within the context of the Southwest glitch, the cost of any AOG, let alone prolonged, widespread groundings, can be astronomical.

Avoiding the worst-case scenario

As we've seen in recent news, it's often passenger headaches that grab the most headlines when an airline suffers an AOG event. The root causes of AOG often stem from issues that start long before delays and cancellations show up on the big board.

Issues with inspections, accuracy, and traceability are often the culprits. Even incremental improvements to borescope inspections, for example, can help to avoid production stoppages that lead to AOG. Boeing has made significant digital investments in Radio Frequency Identification (RFID) tags to track the locations of hand tools and digital threads providing verification to engineering and manufacturing teams of the correct completion of work procedures.





The TeamViewer Frontline formula for maximum ROI

The aerospace industry views digitalization as a key driver for competitive advantage, cost savings and future growth. Based on available industry data, here's a brief ROI calculator TeamViewer Frontline:



Higher accuracy

Enabling your staff to concentrate on the task at hand without interruptions by providing clear visual cues, enriched by pictures or technical drawings, allows technicians to be guided through detailed inspections, reducing any chance of oversight.



Time savings

Providing visual instructions along with the necessary job information minimizes distractions and wasted time. The use of real-time integrated process recording enables quicker documentation, boosting technician productivity, and reducing machine downtime.



Quality assurance

Integrating documentation steps and compliance checks into the inspection process ensures that every step meets the necessary regulatory criteria, which is crucial for audit trails and compliance adherence.



In-depth training

Translating your analogue and outdated training procedures into engaging digital experiences by using visual, interactive workflows improves knowledge transfer and retention, optimizing the efficiency of your training resources.

Fast solution delivery with limited time to market: **How it works**

Tethered to its impressive ROI is TeamViewer Frontline's short time-to-market. That goes for the solutions we build directly for aerospace clients, as well as any channel solutions built through SAP and Siemens.

It starts with a dedicated team of TeamViewer Frontline sales and solution engineers who specialize in aerospace. Thanks to their hard work and the strength of the platform, TeamViewer Frontline is acknowledged by research institutes and partners as market leader in the space:



Trusted SAP partner

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.

Siemens partnership

In many ways, TeamViewer Frontline acts as an extension of Siemens Teamcenter. The solution integrates directly into Teamcenter, enabling businesses to leverage their existing data for AR, 3D, and other applications.

The partnership also enables a streamlined user experience, one that provides an adaptable technical authoring process, as well as the intuitive reuse of existing content already within Teamcenter.



About TeamViewer

As a global technology company and leading connectivity platform provider, TeamViewer enables you to remotely access, control, manage, monitor and repair devices of all kinds. In addition to the high number of private users for whom the software is offered free of charge, TeamViewer has more than 600,000 paying customers and supports companies of all sizes and from all industries in digitizing business-critical processes through the seamless networking of devices: for example in the areas of remote connectivity, augmented reality, Internet of things and digital customer engagement.

Since the company was founded in 2005, the TeamViewer software has been installed on more than 2.5 billion devices globally. The company is headquartered in Göppingen, Germany, and employs more than 1,400 people worldwide. TeamViewer AG (TMV) is listed on the Frankfurt Stock Exchange as an MDAX company.



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Would you like to test our solutions?
Would you like an individual offer?

Get in touch with our Frontline experts:

www.teamviewer.com/en-us/products/frontline/get-started/

www.teamviewer.com/frontline

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