VERYON

Report

THE NEW ERA OF AVIATION INTELLIGENCE

How AI Is Transforming Maintenance, Reliability, and Decision-Making

Introduction

WHY MAINTENANCE NEEDS A SMARTER HANDBOOK

Walk into any maintenance hangar today, and you'll feel the contrast. You might see advanced aircraft loaded with next-gen avionics parked right next to technicians flipping through paper logbooks or swiping through static PDFs. A lot of legacy maintenance practices are not just slow; they are reaching a point where they simply cannot keep up.

At the same time, Aircraft-on-Ground (AOG) events are climbing. When an aircraft goes down, there is a ripple effect across the operation: schedules, availability, passenger commitments, and the bottom line all feel the impact.

In the face of these mounting pressures, Artificial Intelligence (AI) is emerging as a transformative solution. It can help operators predict potential failures before they ever ground an aircraft. It can pull up the exact troubleshooting step a technician needs in seconds. It can turn scattered data into insights that help make decisions.

But while **70%** of aviation organizations we surveyed[1] believe AI could transform their operations, half of them haven't taken the first step.

Whether you're a director of maintenance exploring new technologies, a reliability engineer seeking better analytics, or an executive focused on operational efficiency, this eBook will provide the insights you need to turn this challenge into an opportunity.

KEY INSIGHTS

- AOG incidents cost major carriers up to **$200 million** annually
- **70%** of aviation organizations believe in the transformative power of AI
- **17%** have successfully implemented AI
- **50%** haven't started their AI journey yet

INSIDE THIS EBOOK:

- The current state of aviation maintenance—and why traditional approaches are falling short
- How AI is transforming aviation maintenance operations
- How Veryon AIRE helps business and commercial operators sharpen efficiency, relieve pressure on maintenance teams, and keep their planes in the air

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[1] 2025 Veryon Aviation Benchmark Report

Section 1

DEALING WITH TURBULENCE - THE REALITIES OF AVIATION MAINTENANCE

78% of commercial aviation operators are flying aging fleets

62% of professionals view technician shortage as a critical issue

$200 million is lost by major carriers annually due to flight disruptions

THE PRESSURES ARE MOUNTING

Maintenance teams are carrying more responsibility with fewer resources. Three forces drive this strain.

FORCE 1: AGING FLEETS

OLDER AIRCRAFT ARE AT HIGHER RISK OF:

- Metal fatigue
- Brittle wiring
- Hydraulic leaks
- Obsolete avionics
- Failed inspections + compliance
- Haphazard, undocumented modifications
- Limited parts availability

In the 2025 Veryon Aviation Benchmark report[1], **78%** of commercial aviation respondents said most of their fleet is more than 15 years old.

A commercial aircraft can typically fly safely for 20 to 30 years, depending on its model, usage patterns, and past maintenance quality. However, this doesn't mean aircraft perform consistently throughout their lifecycle, and it costs more to keep older fleets reliably in the air. They consume more fuel. They drive up insurance premiums. And they require more maintenance man-hours, which compounds the technician shortage crisis.

FORCE 2: CRITICAL LABOR SHORTAGES

SURVEY HIGHLIGHT

62% of respondents in our Aviation Benchmark survey call out technician shortages as a critical issue, and this figure likely understates the severity of the problem.

The industry faces a demographic cliff as experienced senior technicians retire, taking with them their intuition and decades of institutional knowledge. Younger recruits bring energy and new skills, but there's no shortcut to developing the instincts that make a technician great.

GROWING KNOWLEDGE GAPS LEAD TO:

- Rising costs to hire limited talent
- Breaks in operational continuity
- Slower, inconsistent troubleshooting and diagnosis
- Over reliance on "tribal knowledge" that is often lost when senior technicians leave

Maintenance teams must work within tight timeframes to diagnose complex issues, manage maintenance priorities, train and retain technicians, and coordinate across multiple siloed systems, then do it all again the next day with shrinking resources. And that's before even considering supply chain disruptions that can leave critical parts unavailable, delaying the fixes that should have been completed yesterday.

[1] 2025 Veryon Aviation Benchmark Report

FORCE 3: PART SCARCITY

One of the toughest problems maintenance teams face as fleets age is the increasingly desperate search for replacement parts. When an aircraft model has been out of production for a decade or more, the seemingly simple task of replacing a failed component can turn into a complex treasure hunt spanning continents, involving multiple suppliers, and grounding an aircraft for weeks or even months.

While there are other options outside of purchasing directly from OEMs, they each come with their own challenges:

Sourcing components from retired aircraft takes serious legwork. Technicians have to track them down, pull them off, inspect them, and then hope that hidden wear or damage does not disqualify them from use. There is never a guarantee they will meet your fleet's airworthiness requirements.

Parts from third-party manufacturers rarely go through the same level of testing as OEM components. Even small differences in materials or tolerances can cause issues that only surface once the aircraft is flying. That leaves maintenance teams with extra troubleshooting, closer monitoring, and more documentation to manage.

Custom fabrication eats up time and expertise, both of which are already stretched thin. Failed components have to be reverse-engineered, validated with regulators, and then manufactured, often at a high cost.

Maintaining rare part inventories can tie up millions of dollars in capital. Many of these components need climate-controlled storage and routine inspections, and some will degrade long before they are ever used. Operators end up holding shelves of parts with little to no resale value, even though they are vital to keep aging aircraft flying. On top of that, teams must guess at failure rates with limited historical data, weigh the risk of AOG events against inventory budgets, and hope that regulatory shifts do not instantly devalue their entire stock.

THE CRUSHING COST OF DOWNTIME

WHAT ARE AOG INCIDENTS COSTING COMMERCIAL AIRLINES AND BUSINESS AVIATION OPERATORS:

- **$74**[2] per minute of delays
- **$10,000 - $150,000**[3] per hour of a grounded flight
- **14 AOG events**[4] annually on average
- **$100 million - 200 million in losses**[5] to major carriers annually
- Top financial concern for operators

AOG incidents are among the most costly and disruptive events in both commercial and business aviation. For commercial airlines, the financial fallout ripples across the entire network. For business aviation operators, a single grounded aircraft can derail high-stakes trips, damage customer relationships, and put enormous pressure on already stretched maintenance teams.

For some large-fleet commercial operators, these numbers translate into significant operational disruptions. The resulting losses can run into millions of dollars, even before compliance and regulatory penalties. Business aviation teams deal with a different flavor of the same pain: executive travelers left waiting, charter itineraries reshuffled, crews displaced, and revenue flights slipping away.

Beyond the immediate financial costs, AOG events trigger a cascade of operational challenges that amplify their impact:

- Disrupted schedules
- Passenger and customer dissatisfaction
- Crew scheduling conflicts
- Network-wide or fleet-wide delays

AOG events get even more complicated once you add international operations into the mix. An overseas emergency can force teams to juggle foreign regulations, coordinate parts shipments across multiple countries, and navigate language and time zone differences. And all of it happens while budgets are getting tighter, not bigger.

Tackling these challenges starts with solid planning and reliable data so you can predict and prevent AOG situations before they happen. But here is the catch: simply collecting more data does not fix the problem on its own.

[2] 2019, Airlines for America

[3] Boeing Commercial Airplanes Operations Center

[4] 2023, Minimizing Downtime: How AOG Events Impact Airlines Like Delta

[5] 2025, Boston Consulting Group

MORE DATA, NOT TRIVIAL INSIGHT

20 TB The volume of engine information created per hour[6] by the average commercial aircraft. That's **20,000 gigabytes.**

98 million TB Projected amount of data generated annually[7] by the global connected fleet by 2026

The modern aircraft is basically a flying data center, but all that information has started to feel more like a burden than an advantage. The nonstop stream of fault codes, alerts, and sensor data does not automatically translate into real predictive insight.

On older systems, it often creates the opposite problem. Legacy platforms generate error codes that do not align with modern predictive maintenance tools, and the data ends up scattered across disconnected systems that do not communicate with each other. Instead of helping teams get ahead of failures, the information overload makes it harder to manage and even harder to act on.

MAINTENANCE TEAMS ARE DROWNING IN:

- Continuous sensor logs and system alerts
- MEL/CDL events
- Fault codes
- Pilot reports
- Historical maintenance records

Aviation maintenance has more information than ever before, yet less actionable insight into what will fail, when it will fail, and what they should do about it.

[6] 2025, IATA

[7] 2016, Oliver Wyman, New Fleets Could Generate 98 Million Terabytes of Data Annually by 2026 According to Oliver Wyman's Annual MRO Survey.

BUSINESS VS. COMMERCIAL AVIATION: RISING TO CHALLENGES

Business and commercial aviation operators both struggle to address these challenges and their consequences, but they also face significantly different concerns.

BUSINESS AVIATION: RESOURCE RARITY

Business aviation maintenance teams operate in a world of constant resource constraints. According to the 2025 Veryon Aviation Benchmark Report[1]:

- **77%** want tools that eliminate redundant workflows and accelerate decision-making
- **68%** express frustration with outdated systems and manual processes
- **68%** report significant hiring and retention challenges
- **54%** identify cost predictability as a primary concern
- **44%** see technician shortages as the biggest threat to maintenance operations

These smaller operations often lack the resources to invest in comprehensive maintenance management systems, leaving them dependent on spreadsheets, paper records, and the institutional knowledge of a handful of key personnel. When a critical technician leaves, years of expertise walk out the door with no systematic way to capture or transfer that knowledge.

COMMERCIAL AVIATION: SCALE AND COMPLEXITY

Commercial operators face a different but equally daunting set of challenges. Our report reveals:

- **89%** focus on improving maintenance tracking to reduce turnaround time
- **82%** struggle with synchronizing data across their fleets
- **76%** report that unplanned maintenance severely disrupts operations
- **59%** still rely on a patchwork of systems rather than a standardized platform

Despite having invested in predictive analytics, commercial operators still face significant challenges. They are less concerned about technician shortages, but it still represents a critical vulnerability. The bigger the organization, the more that is at stake. Any solution to the problem must withstand the massive scale of implementation required.

THE BREAKING POINT: WHY INTELLIGENCE IS THE ONLY PATH FORWARD

AVIATION AI-POWERED SOLUTIONS CAN—AND MUST:

- Turn massive data streams into usable insights
- Predict potential failures before they happen
- Capture institutional knowledge while it still exists
- Help newer technicians work with greater skill and confidence
- Optimize resources across complex maintenance operations
- Support both the tight constraints of business aviation and the large-scale demands of commercial fleets

The aviation maintenance industry has hit a real breaking point. Traditional fixes such as adding more technicians, adding more steps, or collecting more data have reached their limits, and incremental solutions are insufficient. The only scalable path forward is artificial intelligence. The technology is here, and the data is already in hand. What the industry needs now is the vision and commitment to shift maintenance from a reactive obligation to a proactive, intelligent advantage.

[1] 2025 Veryon Aviation Benchmark Report

Section 2

HOW AI HELPS AVIATION MAINTENANCE TEAMS KEEP AIRCRAFT MOVING

Understand the true impact of this new transformative driver

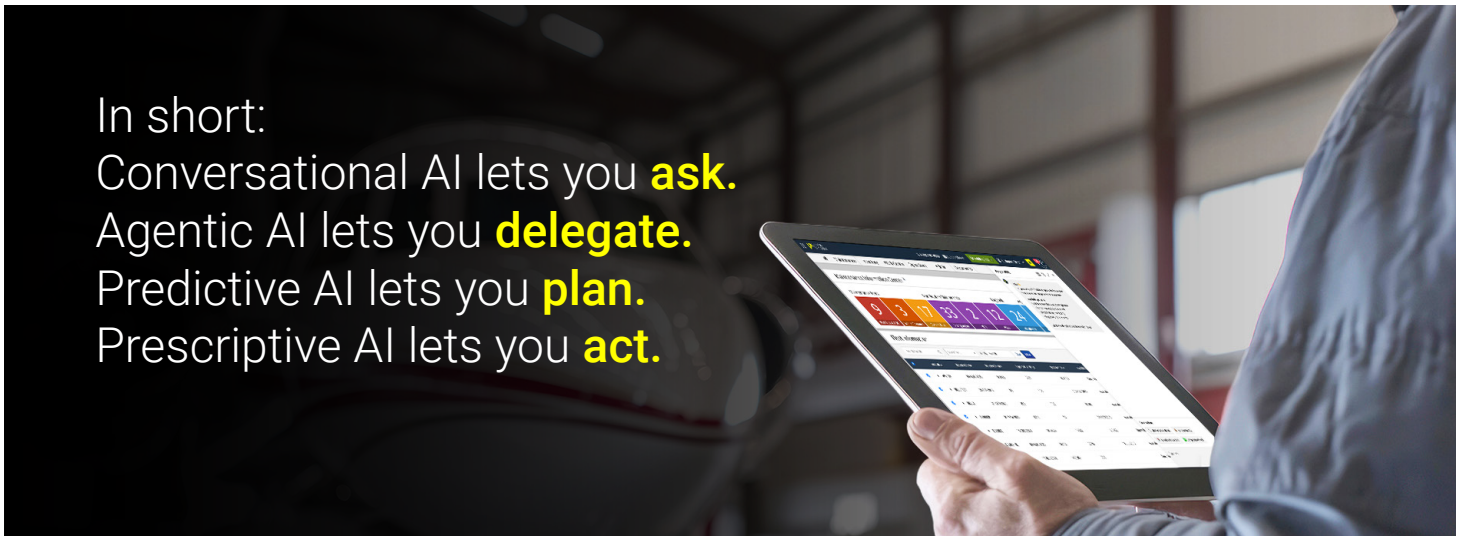
WHAT EXACTLY IS AI?

AI can take on tasks that typically require human intelligence. This includes recognizing patterns, making decisions, learning from experience, and solving problems. Unlike traditional software that follows rigid, pre-programmed rules, AI systems can learn to adapt their responses based on new information and recognize patterns humans might miss.

THE FOUR FACES OF MAINTENANCE AI

Aviation maintenance uses four main types of AI, each with its own role:

Conversational AI	Agentic AI	Predictive AI	Prescriptive AI
• An intelligent interface between technicians and systems • Answers questions in plain language, e.g. “Show me the hydraulic pump removal procedure for a 737-800” • Can instantly retrieve and explain information	• Pursues defined goals by planning and executing actions using approved tools and permissions • Orchestrates multi-step workflows across systems, data sources, and stakeholders • Learns from results and feedback to continuously improve decisions, routing, and next-best actions	• Analyzes patterns in historical and real-time data • Generates data-driven forecasts of future events • Enables proactive fixes and replacements before failures ever occur	• Predicts incidents and suggests actions • Analyzes multiple data sources to recommend optimal maintenance plans



WHAT'S POSSIBLE WITH AI—AND WHAT'S NOT

AI is incredibly strong at tasks built on patterns, data, and repeatable logic. What it cannot do is replace the human expertise that keeps aircraft safe.

AI CAN:

- Analyze thousands of sensor readings to identify anomalies humans would miss
- Process maintenance logs to identify recurring issues across fleet types
- Optimize maintenance schedules while weighing many constraints
- Pull, extract, and summarize information from large technical libraries
- Identify links between environmental factors and component failures
- Generate predictive maintenance alerts with increasing accuracy

AI CANNOT:

- Replace human judgment in new and complex situations
- Make ethical decisions
- Understand real-world context the way a person can, such as recognizing a stain on a report as coffee, not hydraulic fluid, or understanding when a technically correct procedure is unsafe in practice
- Replicate the intuition of an experienced technician who reads subtle cues that do not exist in any dataset

WHY AVIATION MAINTENANCE DEMANDS SPECIALIZED AI

AI SOLUTIONS IN AVIATION MAINTENANCE MUST UNDERSTAND:

- Regulatory complexity
- Safety criticality
- Technical specificity
- Documentation standards
- Failure consequences

Generic AI tools fall short in aviation maintenance because the domain is far more complex and far less forgiving. Platforms must be able to connect the dots, understanding that a fault in the bleed air system affects not just pneumatics, but also cabin pressurization, anti-icing systems, and engine performance. Deep, aviation-specific training data and models are a must.

Safety leaves no room for error. AI recommendations must align with FAA, EASA, and other regulatory requirements. They have to interpret PIREPs, MAREPs, logbooks, and reliability reports with an understanding of their real-world significance. And the systems must be designed with conservative decision-making and clear boundaries for uncertainty, because lives and livelihoods depend on them.

THE IMPLEMENTATION GAP: PROMISE VERSUS PRACTICE

One of the most revealing data points in aviation AI adoption shows a clear disconnect. While **70%** of the organizations we surveyed believe AI could meaningfully improve their operations, only **17%** have actually integrated it into their workflows.

50% of aviation organizations aren't using AI at all. This gap is one of the industry's biggest missed opportunities and challenges

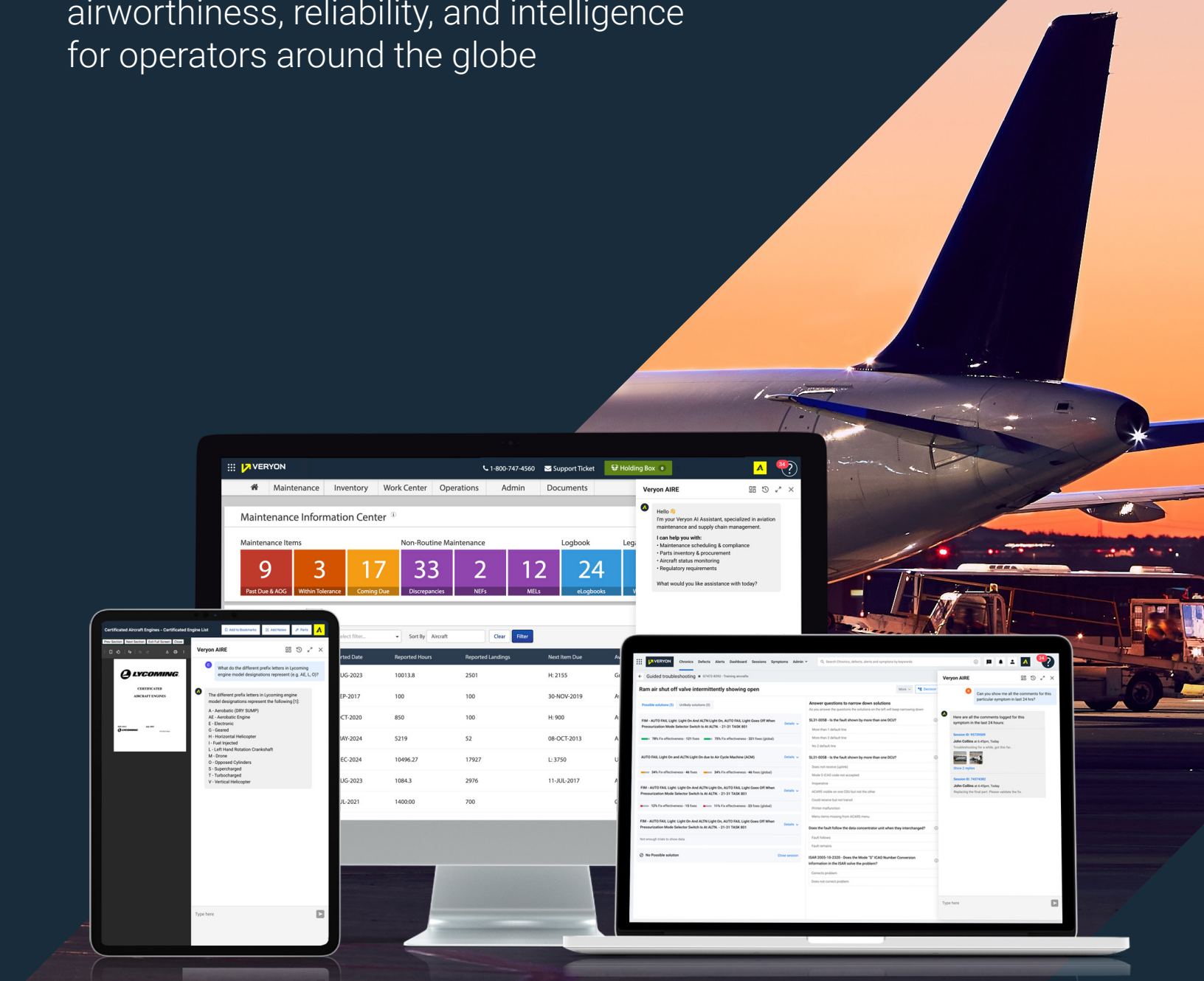
The high confidence number tells us something important. Maintenance professionals see the value. They are cautious adopters who are waiting for tools built to aviation standards, not generic tech that falls short.

The key to closing this gap lies in developing AI solutions that speak aviation's language, respect its safety culture, and integrate seamlessly with existing workflows. The teams that move first will gain real advantages, with technology that makes maintenance more efficient, more proactive, and far less reactive.

Section 3

YOUR NEW MAINTENANCE CO-PILOT: VERYON AIRE™

The leading capability strengthening airworthiness, reliability, and intelligence for operators around the globe



CHANGE IS IN THE AIRE

Operators aren't struggling with ambition. They're struggling with information. **72%** of maintenance teams say efficiency is their top priority, yet the data they need is buried in systems that don't talk to each other.

Veryon AIRE adds an aviation-trained intelligence layer directly inside the Veryon products you already use. No extra system. No new platform. Just the tools your team relies on every day, now powered with real-time insight, prediction, and context.

WHAT IS VERYON AIRE?

Veryon AIRE is an AI maintenance co-pilot built specifically for aviation and embedded across the Veryon product suite. It's trained on real operational history, understands aviation terminology and compliance requirements, and uses that knowledge to deliver guidance that feels practical and trustworthy.

BUILT FOR TRUST: SAFETY AND COMPLIANCE FIRST

Veryon AIRE is designed to strengthen safety standards with features that include:

- Complete traceability for every recommendation
- Audit trails for regulatory compliance
- Role-based access for multiple authorization levels
- De-identified model training that protects proprietary information while improving system intelligence

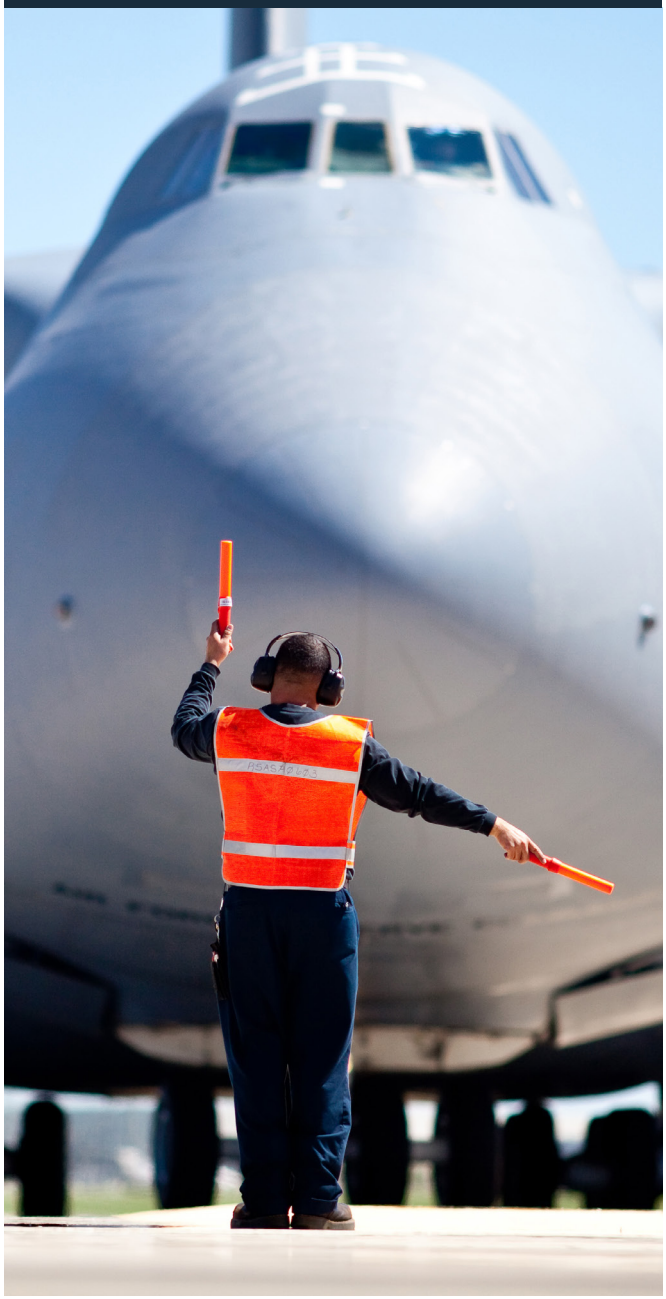
IMMEDIATE, PRACTICAL IMPACT

There's no new system to learn. Veryon AIRE simply makes existing workflows smarter. Operators see real-time fleet updates, automated shelf-life and inventory monitoring, planning aligned with downtime windows, and always-on compliance awareness.

When information becomes easier to access and understand, teams move faster. When the software can predict what's coming, downtime shrinks. And when critical moments hit, conversational AI isn't a nice-to-have. It's the difference between guessing and knowing.

OPERATORS USING AI-POWERED VERYON PRODUCTS REPORT TRANSFORMATIVE RESULTS:

- **95%** predictive accuracy in parts forecasting
- **75%** faster troubleshooting times
- **31%** less repeat defects
- **23%** lower downtime costs
- Up to **12%** higher aircraft availability



WHAT VERYON AIRE DOES

Veryon AIRE combines the industry's largest de-identified dataset with proven data science and decades of real-world aviation expertise. Inside the Veryon product suite, this intelligence shows up as conversational assistance, expert guidance, and smart automation that helps shift work from reactive to proactive.

Here's what it looks like in practice:

Smarter, Faster Fixes:
It recommends most likely fixes to boost first-time fix rates and enables technicians to ask publication-specific questions and jump directly to troubleshooting steps.

Intelligent Fleet Management:
It automates routine work, reduces maintenance expenses, and optimizes critical maintenance tasks and inventory management.

Enhanced Reliability:
It surfaces chronic patterns, rogue components, and short-life parts, and trend degradation early, before they escalate into unexpected AOGs.

BREAKS DOWN DATA SILOS

Before: Data scattered across PDFs, spreadsheets, and multiple systems.

After: Veryon AIRE ties everything together behind the scenes. Ask a question and the system responds with a complete, connected answer.

ACCELERATES FIXES WITH PRESCRIPTIVE MAINTENANCE

Before: Trends remained hidden until they led to a failure.

After: Veryon AIRE continuously analyzes historical and real-time data to surface early signs of recurring defects so teams can act before something breaks.

SPEEDS UP ACTION WITH NATURAL LANGUAGE PROCESSING

Before: Mechanics waste valuable hours on fixing and re-fixing the same defects.

After: Veryon AIRE lets teams identify and fix defect patterns early. It extracts insights from your logbook data and maintenance reports to flag repetitive defects after just two occurrences.

WHY IT MATTERS: **BUSINESS AVIATION**

In business aviation, an aircraft stuck on the ground isn't just inconvenient. It breaks a promise. When a business jet can't get an executive to a make-or-break meeting or another misses a roadshow because a part wasn't sourced in time, everyone feels it.

Veryon AIRE helps teams stay ahead of those moments by powering the Veryon products with the clarity and prediction needed to avoid surprises.

AI ASSISTANT FOR MAINTENANCE TRACKING IN VERYON TRACKING

Veryon Tracking becomes a proactive maintenance coordinator with Veryon AIRE as its engine.

Before: Teams manually juggled due items, inspections, and parts.

After: Veryon AIRE automatically builds due lists from hours and cycles, checks inventory across bases, and even looks ahead to combine tasks into a single downtime window.

AI ASSISTANT FOR TECHNICAL PUBLICATIONS IN VERYON PUBLICATIONS

Veryon Publications turns into a fast, context-aware assistant with Veryon AIRE powering the search.

Before: Techs dug through manuals and cross-referenced everything by hand.

After: Veryon AIRE answers natural questions and points directly to the right step, spec, or bulletin. It keeps work moving, even when the DOM is remote.

WHY IT MATTERS:
COMMERCIAL AVIATION

Commercial operations run on tight windows. Every minute counts, and IATA estimates each delay minute costs about $74. Maintenance issues aren't just frustrating. They're expensive.

The data needed to prevent disruptions is already there, but it's scattered. Veryon AIRE integrates into the Veryon suite, so airlines can spot what's about to cause a delay and take action before the clock starts ticking.

AI-POWERED PATTERN DETECTION IN VERYON DEFECT ANALYSIS

Veryon Defect Analysis becomes a fleetwide pattern-recognition system, powered by Veryon AIRE, to identify issues and determine whether they're recurring.

Before: Chronic issues slipped through as separate events.

After: Veryon AIRE clusters them, highlights failed corrective actions, and shows operators what's recurring and why.

AI-POWERED MAINTENANCE TROUBLESHOOTING IN VERYON GUIDED TROUBLESHOOTING

Veryon Guided Troubleshooting becomes a hangs-on diagnostic partner with Veryon AIRE at its core.

Before: Techs started with broad isolation and too little time.

After: Veryon AIRE ranks root-cause probabilities, links directly to the correct procedure, and helps tech jump straight to a targeted fix.

Section 4

HOW VERYON AIRE CAN HELP

Outcome-driven improvements
every maintenance team will love

VERYON AIRE CAPABILITIES: POWERED BY AVIATION'S LARGEST MAINTENANCE INTELLIGENCE

Veryon AIRE draws its strength from something no other aviation AI can claim: a foundation built on more than 80 million maintenance events, 1.3 million parts records, and over 2 million identified chronic defect patterns.

That scale matters. It gives Veryon AIRE the ability to understand aviation the way technicians and reliability engineers do, recognizing subtle trends, interpreting real-world context, and connecting clues that generic AI systems simply miss.

When Veryon AIRE evaluates your fleet's data, it's not guessing. It's drawing on decades of global aviation experience to deliver insights, and recommendations tailored to how your operation actually runs.

Below is a look at how Veryon AIRE shows up inside each product, and the outcomes operators are seeing.

Veryon Product	Veryon AIRE In-product Capabilities	Key Outcomes
Veryon Tracking	• Conversational ops interface • Due/overdue maintenance alerts • Inventory and shelf-life notifications • Planning work to downtime windows	• Faster return-to-service (RTS) • Fewer missed items • Reduced AOG time
Veryon Publications	• Conversational task retrieval • Pinpointed steps and specifications • Intelligent IPC linking • Context-aware search	• Less search time • Stronger compliance • Reduced human error
Veryon Defect Analysis	• NLP clustering of free-text entries • Hours/cycles grouping analysis • Chronic pattern detection • Trend identification	• Fewer repeat defects • Earlier corrective action • Proactive maintenance
Veryon Guided Troubleshooting	• AI-assisted fault isolation • Publication-linked troubleshooting steps • Operator and global data learning • Shorter troubleshooting times	• Higher first- time fix rates

Section 5

THE FINAL SAY

AI works best when you understand what it's good at and where it can genuinely help. The value comes from learning how to use it in ways that support smarter, more confident decisions.

WHAT COMES NEXT IS SMARTER MAINTENANCE

AI-powered maintenance isn't theoretical anymore. It's already shaping the next decade of aviation. Instead of reacting to failures or working off rigid intervals, operators are shifting toward intelligence-driven decisions that anticipate issues earlier, optimize interventions, and maximize availability.

Most teams already see AI's value. The real advantage now goes to the ones actually putting it to work. Early adopters are flying more hours with fewer interruptions, catching issues sooner, improving safety margins, and trimming operational waste. This isn't the future. It's happening right now.

Veryon AIRE powers this shift across the entire Veryon product suite. It brings predictive intelligence into the tools operators already trust, whether that's managing a handful of business jets or keeping a commercial fleet on schedule. And it does it all while meeting aviation's strict safety, compliance, and traceability requirements.

Built on the industry's most extensive maintenance intelligence and decades of real-world experience, Veryon AIRE gives operators a clearer path to higher reliability, sharper performance, and more time in the air.