

SATAIR

AVIATION INDUSTRY REPORT 2026 OUTLOOK:

Reliability,
availability and
scalability



Reliability, availability and cost: Why the supply chain will define 2026

The world's first global supply chain moved silk, spices and silver across continents. The Silk Road's greatest vulnerability wasn't distance, but dependence: one broken link and the system ground to a halt. More than two millennia later, aviation's maintenance, repair and overhaul (MRO) ecosystem faces a similar truth: the challenge of synchronising parts, people and predictability across continents remains unsolved.

Or does it? Unlike the Silk Road, today's MRO network has the tools to anticipate and adapt. This report casts a spotlight on the innovative services and solutions reshaping the supply chain that supports the vast network of companies designing, manufacturing, maintaining and operating aircraft.

By reading it, you'll not only develop a deep understanding of the challenges facing the commercial aviation and MRO industries as we enter 2026, but also of the potential solutions and outlook shaping the years ahead.

We hope it offers useful context for your planning and decision-making in an industry where continuity remains the hardest achievement of all.

Adapt to: The real cost of supply chain friction

Passenger numbers are expected to grow at a CAGR of 3.6 to 4.2% over the next two decades – a period during which global OEMs such as Airbus and Boeing expect to complete between 43,000 and 44,000 aircraft deliveries, [a range 2% higher than reported in 2024](#).

It's proof that the commercial aviation industry remains robust.

Nevertheless, margins are tight and there are operational challenges to overcome – most notably the steadily increasing average age of aircraft, as airlines wait for their fleets to be replenished.

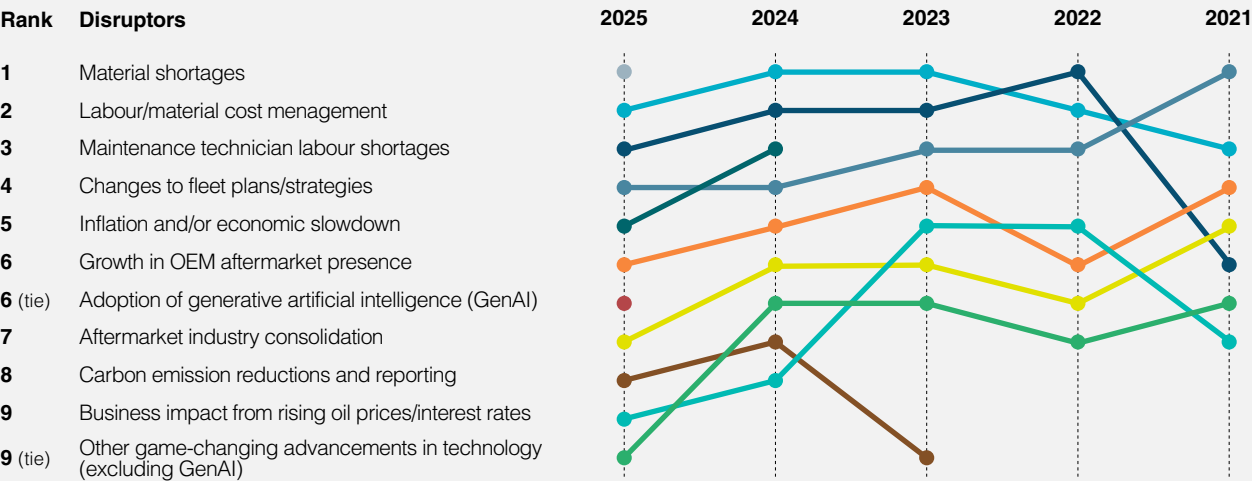
As highlighted in [an October 2025 report by IATA and Oliver Wyman](#), supply-chain friction will end up generating over \$11.3 billion of additional costs for airlines in 2025.

The IATA report underlines that supply-chain performance has become the defining challenge of this era. As Reuters [observed](#), it's “the first attempt to quantify the impact of a five-year supply chain crisis that has driven up fares and led to flight cancellations”

That backdrop sets up Chapter 1, ‘Predictability in a Volatile Market’, which explores how airlines are re-engineering partnerships to tame this volatility.

Top disruptors, 2021-2025

As ranked by survey respondents



NOTE: Items 1 and 6 (tie) are new to the survey. Tie ranking for 2025. Source: 2021-2025 MRO Surveys

MRO wake-up call: Supply chain challenges won't fix themselves

As airlines navigate constrained supply, the consequences end up concentrating in the MRO industry, resulting in higher shop loads, longer turnaround times and sharper parts exposure.

Meeting the increased maintenance needs of ageing aircraft is only half of the challenge, as new generation/future aircraft come with their own set of demands, with both engines and materials that are more complex to repair.

Where engines on legacy aircraft can expect a shop visit to last 35% longer than in 2019, new generation engines are waiting 150% longer in 2025 – an all-time high [according to Bain consultancy](#).

Although the MRO market is still growing – at a [CAGR of 2.7% heading towards 2035](#), by which point it will be worth \$156 billion a year, up from \$120.1 billion in 2025 – growth will be constrained if the persistent shortages of parts and people are not eased.

As we will discover in Chapters 2-4 of the report, the industry can't carry on expecting its supply base to simply 'catch up'.

The time has come for the industry to build resilience through productivity and technology – namely through investing in smart digitalisation (Chp 2), increasing regional availability of parts where demand is highest (Chp 3), and using automation and AI to ease the pressure on technician workflows (Chp 4).

Each of these solutions relies on a more predictable and connected supply chain. By addressing digital, regional and human resilience in sequence, the report reflects the way recovery is actually unfolding across the industry.



How supply chain design unlocks flexibility

Even amid supply chain disruption, profitability can improve: the key is how networks plan and manage variability. That is why the design and management of the supply chain is so important.

Every extra day in transit, every avoidable customs hold, and every mis-forecasted removal can add cost and uncertainty, but [IATA's financial outlook for 2025](#) underscores how this can be avoided with a three-pronged approach (as covered in chapters 5-7):

- By integrating logistics into maintenance planning, MROs can carry out the right work at the right time with traceable materials. This balance of efficiency, cost and sustainability is central to operational resilience (Chp 5).
- MROs that navigate trade, customs and regulatory complexities will gain a competitive advantage, as this will compress variability and protect ETAs (Chp 6).
- MROs that scale capacity in line with demand – by positioning stock closer to key routes and building digital partnerships – will capture growth fastest (Chp 7).

This report will demonstrate how every operational question – predictability, digitalisation, reliability, sustainability, compliance, workforce and regional growth – ultimately comes down to supply chain design and execution.

7 **CHAPTER 1**
Predictability in a Volatile Market

17 **CHAPTER 2**
Digitalisation and the Connected Supply Chain

29 **CHAPTER 3**
The Reliability Imperative: Regional Availability
and Network Resilience

37 **Chapter 4**
Labour Shortages and Workforce Transformation

47 **CHAPTER 5**
Balancing Efficiency, Cost and Sustainability

59 **CHAPTER 6**
Overcoming Trade, Customs and Regulatory Complexities

70 **CHAPTER 7**
Growth Markets and Future Opportunities



Chapter 1

Predictability in a Volatile Market

These are exciting times for the aviation and MRO industries: the industry is going through a crucial period of transition and moving on from short-term, transactional sourcing to long-term, predictive partnerships built on data, trust, and transparency.

This chapter explores the structural pressures driving this shift, the digital and operational strategies emerging in response, and what these changes mean for achieving true predictability in a volatile market.

The Shift: From transactions to trusted partnerships

A decade ago, most airline-MRO relationships were short-term and price-driven. Contracts were typically single-event repairs or time-limited power-by-the-hour (PBH) deals. That landscape is changing fast.

According to Aviation [Week's 2025 Commercial Fleet & MRO Market Summary](#), airlines are “placing heavier reliance on large, programmatic support models” covering entire fleets and multi-year horizons.

These program structures – Total Component Support (TCS), Material-by-the-Hour (MBH), and pooling agreements – now represent the majority of new MRO contract value, up from 42 percent in 2018 to more than 60 percent in 2025.

The evidence is everywhere:

- China Airlines and Lufthansa Technik signed a [20-year TCS](#) covering all 777 and 787 aircraft.
- Korean Air and Boeing Global Services announced a [predictive-maintenance collaboration](#) at MRO Asia 2025.
- WestJet agreed a multi-billion-dollar engine-MRO [deal](#) for the LEAP-1B through 2027
- Air India and SR Technics signed a six-year engine-support [program](#).

Across 2024-25, at least a dozen airlines renewed or launched long-term support contracts explicitly built on data-driven forecasting and reliability guarantees.

Driving this surge is operational necessity. Persistent supply-chain bottlenecks and maintenance-shop saturation have made spot sourcing unreliable. When turnaround times stretch and spares are delayed, the price of short-term flexibility skyrockets.

As Risto Mäeots, CEO of Magnetic Group, puts it:

“The supply-chain issue is the new norm. I don’t think it’s going to be fixed any time soon.”

In this environment, predictability is the new premium. Airlines increasingly see long-term partnerships not as a hedge, but as an operating requirement guaranteeing capacity, parts, and data visibility in exchange for loyalty and shared planning.



Reflecting this shift, Mäeots notes:

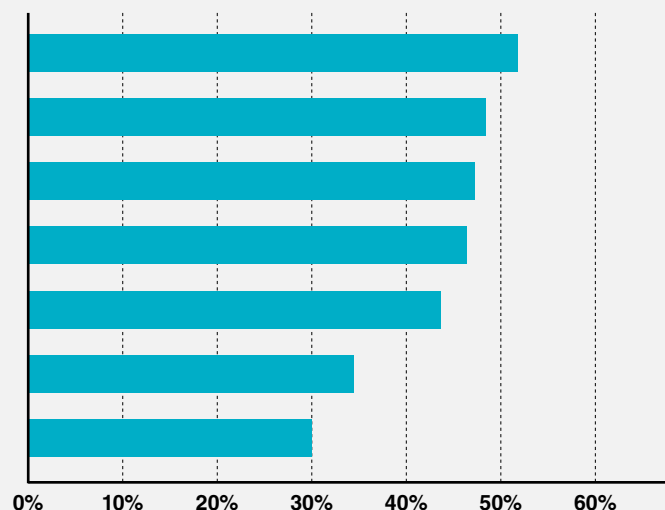
“There are always hidden costs in the shopping-around strategy. If you focus on certain partners – which we have started to do – you can start talking about more predictability: volume discounts, stocking up just for you, consignment programmes. The winning combination is when you can focus on certain specific customers year after year”

For suppliers and MROs, these contracts provide the stability needed to invest in new tooling, facilities and digital forecasting, as part of a focus on boosting reliability through partnerships. The industry is now optimising for contract value and capacity stability over solely focusing on transactional speed.

Behind this behavioural shift lie structural realities reshaping aviation’s ability to plan.

Measures to strengthen the aftermarket supply chain (top 3 mentions)

- 1 Established long-term supply agreements for critical parts.
- 2 Creating integrated supply chain management platforms.
- 3 Building strategic alliances or joint ventures to share resources and optimise supply chain operations.
- 4 Leveraging advanced analytics to monitor and improve supplier performance.
- 5 Increasing supplier diversification to mitigate risks.
- 6 Partnering with local suppliers to shorten lead times.
- 7 Conducting joint forecasting and planning sessions with suppliers.



Source: [Accenture](#)

Why it’s happening: The forces behind the shift

The shift toward predictive partnerships has structural roots in production delays, parts scarcity and supply-chain fragility.

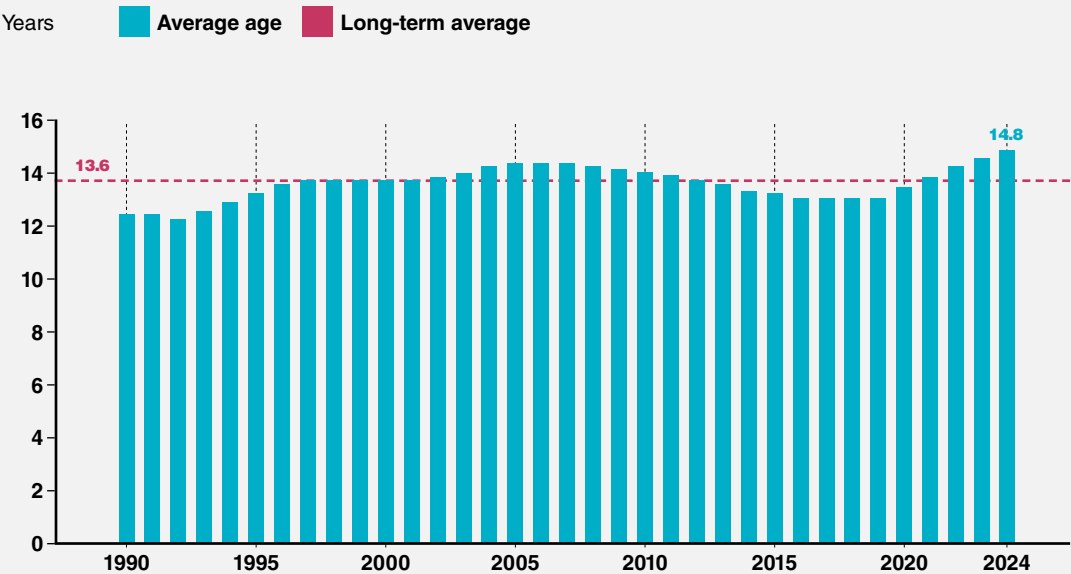
Global aircraft output still lags at pre-pandemic levels. Just 1,300 new aircraft were delivered globally in 2024 – down 30% from the 2018 peak of more than 1,800. Both Boeing and Airbus concur it will take until the late 2020s before production catches up.

One consequence is an ageing fleet: the global average aircraft age reached 14.8 years in 2024, marking an all-time high against an average of 13.4 for active aircraft, according to IATA. Older aircraft need more maintenance, which places pressure on shop capacity and parts supply.

Jonas Murby, Partner at Aerodynamic Advisory, describes this as a fundamental break with the pre-COVID status quo:

“I think we’re still adapting to a situation that is much less plannable and linear than it was before. That’s the problem: we were reliant on a very lean and global system before. Now it’s not lean, and so cost is being added to every single tier in the production and MRO supply chain ... and all of that is cascading through in turn times and extra costs.”

Average age of global commercial fleet, years



Source: IATA Sustainability and Economics using Cirium

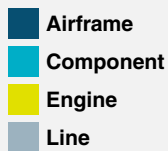
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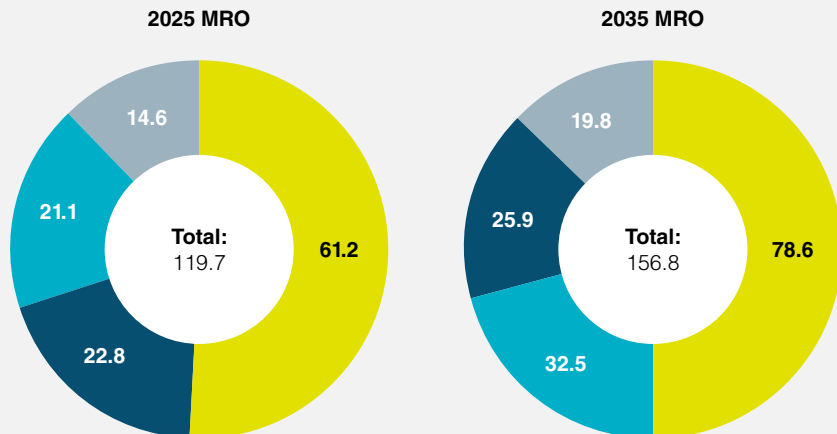
Jonas Murby,
Partner at Aerodynamic Advisory

MRO share by segments, 2025-2035

In US \$ billions



Source:



At the same time, new-generation engines are more complex and time-intensive to overhaul.

The average shop visit for a new generation engine is considerably longer than for a legacy model, and 150% longer than the average was in 2019. [Bain consultancy predict](#) this is only going to get worse:

“Our analysis shows that aircraft engine MRO demand is likely to experience a near-term peak in 2026 and remain constrained through the end of the decade.”

It’s imperative the MRO industry closes this capacity gap by 2030, contends Bain, or a “large surge in demand” from new generation engines will result in much higher MRO costs for airlines.

If MRO continues to grow at its current rate, and nothing is done, demand for shop visits will exceed supply by 17% in 2030, warns Bain.

Labour shortages further deepen this constraint. More than [two-thirds](#) of aviation companies now cite “severe shortages of skilled labour” as their top operational challenge. Experienced engineers are retiring faster than replacements can be trained.

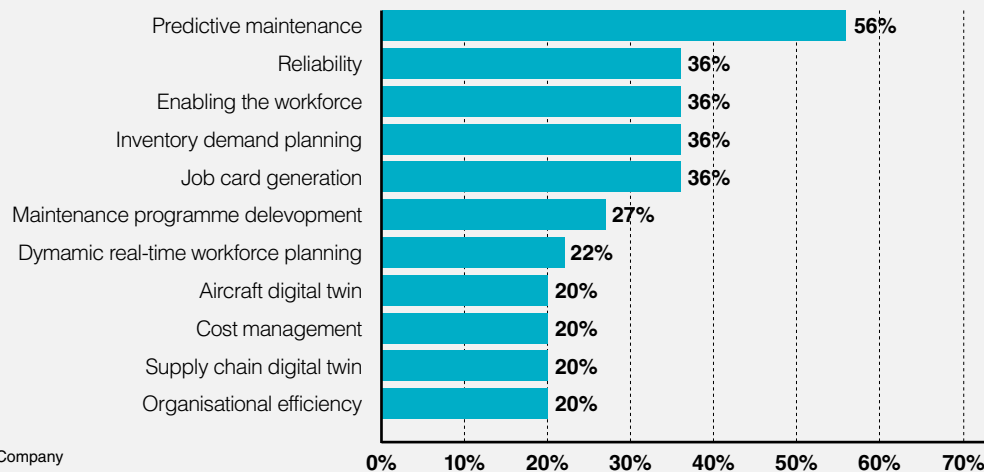
Richard Brown, the Managing Director of Naveo Consultancy, summarises the structural drag:

“The industry has a supply problem, not a demand problem. Everything is going up – just not at the pace the industry needs. We’ve been talking about the current engine shop visit bow wave for years. The pandemic merely exacerbated challenges that were already structural: shortages of people, ageing workforces, and increasing aftermarket demand.”

The result is a bottleneck economy: too few parts, too few people and too little time. All too often, when one bottleneck is cleared, it becomes another airline’s shortage.

Predictive maintenance was the top digital priority for manienance, repair and overhaul survey respondents

Organisations' top digital priorities for maintenance, repair and overhaul in the next 3/5 years, % of respondents (n=45)



Source: McKinsey & Company

As Alejandro Ceballos, Director of Technical Assets at AerLingus, puts it:

“The supply chain is sometimes not reliable... Our planning is constantly wrong because current events simply don't follow historical patterns.”

This instability is forcing a rethink of traditional procurement. Long-term, predictive contracts let airlines and MROs pool resources and share risk. Integrated data systems and digital forecasting allow maintenance slots, material flows, and cashflow to be planned months ahead instead of weeks.

Digitalisation is the enabler, but only when paired with the physical capacity to act on the related insights. Predictive tools require sufficient shop space, tooling, manpower and a resilient logistics footprint in order to turn forecasts into operational reality.

At the same time, establishing these data-driven partnerships is not straightforward. Organisations must overcome concerns around intellectual property, data leakage and the risk of giving away competitive advantages when sharing operational information. Robust governance frameworks are needed to build the trust required for deeper collaboration.

McKinsey's [Aircraft MRO 2.0](#) report finds that 56 percent of MRO leaders now list predictive maintenance as a top priority, while Accenture's [Commercial Aerospace Insights 2025](#) concludes that integrated digital tools are essential to navigate constrained capacity.

In this way, data is becoming the new contract language. Predictive models link aircraft health, shop capacity, and logistics data into one picture. That integration turns long-term partnerships from fixed-price insurance into living, data-driven ecosystems, able to forecast disruption and act before the impact hits.

The Outlook: Predictability becomes the partnership currency

The next phase of growth will belong to companies that can guarantee predictability – commercially, operationally, and digitally.

As McKinsey forecast several years ago, the industry is “moving from transactional maintenance to continuous, data-enabled collaboration.” Operators and MROs are using shared systems, rather than discrete contacts, to link reliability, cost, and capacity.

However, this evolution is now being driven by integration rather than expansion – long-term partnerships are becoming living, data-driven ecosystems that connect planning, performance, and procurement in real time.

In 2025, Accenture [reported](#) that 64 percent of aerospace executives now prioritise “integrated digital partnerships” as the key to mitigating volatility – more than double the number from 2022.

The strongest collaborations combine joint forecasting, shared KPIs, and transparent digital workflows. Aviation Week [observes](#) that predictive collaboration is now written directly into major MRO frameworks, such as Lufthansa Technik’s fleet-wide TCS renewals to Boeing Global Services’ predictive-maintenance programs with Korean Air.

Airlines and MROs able to synchronise their data — aligning demand signals, shop capacity, and reliability metrics – will be able to anticipate disruption, adapt rapidly, and deliver predictability through every cycle of volatility.

The same logic of integration is reshaping the physical network too: where capacity sits, how quickly it can respond, and how resilience is built into each region. Digital progress alone cannot achieve this: scaling physical infrastructure and workforce capability remains essential to absorb volatility and turn shared data into dependable execution.

Aviation Week’s 2025 Fleet & MRO Forecast [highlights](#) a growing preference for distributed, locally-tooled MRO capacity as global providers shift from centralised hubs to regional readiness – a development we will explore in more detail in Chapter 3.

Three key pillars: partnerships, connectivity and reliability

Across 2026 and beyond, three trends are likely to define the market:

1. Multi-year agreements as the norm

Aviation Week’s [2026 Commercial Fleet & MRO Forecast](#) predicts that 70 percent of new MRO contract value will be tied to long-term, programmatic support by 2027. These agreements extend well beyond maintenance, as they embed joint forecasting, performance-based pricing and digital integration clauses.

2. Digital connectivity as the differentiator

Predictive maintenance, AI-assisted planning and real-time data portals will separate transactional suppliers from true partners. McKinsey’s [analysis](#) shows early adopters cutting unplanned removals by 10-15 percent. IATA’s [ONE Record](#) cargo framework demonstrates how shared data standards can eliminate ‘status-chasing’ and provide a single source of truth across the chain.

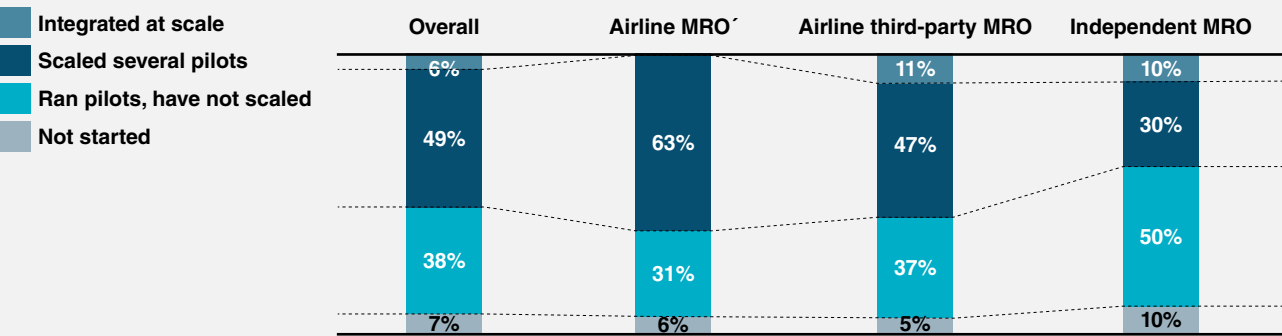
Going it alone does not make good business sense, according to Mæeots:

“We realised the hard way that developing AI in-house makes no sense. We need partners who are IT-savvy and move fast.”

But connectivity is only effective when backed by physical readiness – from expanded shop networks to skilled labour pipelines – and by clear rules governing who owns what data, how it is shared, and how sensitive information is protected.

Very few maintenance, repair, and overhaul organisations have implemented digital at scale

Organisations’ implementation of digital and analytics solutions, % of respondents (n=45)



Source: McKinsey & Company



3. Reliability as reputation

Airlines are already choosing suppliers based on measurable performance indicators – fill-rates, turnaround times, and AOG recovery metrics. For example, [Accenture](#) reports that 92% of C-suite aerospace executives expect supplier delivery performance to meet or exceed expectations within the next 12 months. This underlines a clear shift from promises to measurable performance and shows how transparency has become the new trust.

Predictability as the new product

Investing in digital customer platforms and the OEM Portal enables the connection of buyers, sellers, and inventory through transparent digital systems and enhances predictable reliability at scale.

A long-term partnership model also supports growth ambition: stable, multi-year frameworks provide visibility of demand and enable smarter capacity investment. In a market where volatility still costs billions, predictability has become both the product and the promise.

As the industry enters 2026, one conclusion is clear: growth will no longer be measured by volume alone, but by the stability of the systems that sustain it. Those who master predictive, partner-aligned planning will define the decade ahead.



Chapter 2

Digitalisation and the Connected Supply Chain

Following on from the conclusion that predictability is the foundation of reliability, the aviation supply chain is being rewired around the data visibility and digital integration that can provide this foundation.

This chapter explores how APIs, IoT tracking, and AI forecasting are transforming data exchange across airlines, MROs and OEMs, along with how new digital platforms and portals are enabling the collaboration.



The Shift: Connecting the supply chain

Aviation is entering its most connected era yet. The once fragmented networks of emails, spreadsheets, and phone calls are being replaced by real-time data flows linking airlines, MROs, OEMs, and logistics partners into a single digital ecosystem.

[SITA's Air Transport IT Insights 2024](#) reported record-high IT investment intentions, with 74 percent of airlines expecting their IT budgets to rise – a clear signal that digital transformation is now viewed as a core operational lever rather than a cost centre. The aim is simple: to make aircraft, engines, and components visible, traceable, and predictable throughout their life cycle.

At the heart of this digital shift are IoT, AI and APIs – three converging technologies that together create a connected, self-learning maintenance ecosystem.

IoT: Turning assets into data sources

Sensors embedded in aircraft systems, engines and even logistics containers feed continuous health, temperature and location data to digital twins.

The global size of the IoT in the aviation market is set to grow at a CAGR of 22.7% over the next decade, according to [Precedence Research](#), taking it from \$12.95 billion in 2025 to \$81.01 billion by 2034.

This data underpins live operational awareness: platforms such as Lufthansa Technik's [AVIATAR](#) and Pratt & Whitney's [EngineWise](#) rely on live telemetry to detect anomalies early and prevent unplanned removals.

The value of IoT depends not just on sensors, but on ensuring the data is usable across an interconnected network.

As Jonas Murby, Partner at Aerodynamic Advisory, explains:

“The problem will be the fragmented scope of data... Smaller players have more difficulty accessing the sources of data they need. Any new solution will need to grapple with the same thing: how can we get enough data for this to be used?”

AI: From detection to prediction

AI builds on these IoT data streams to forecast what will happen next. Predictive algorithms trained on flight hours, weather patterns, and historical maintenance records can now anticipate component wear weeks in advance.

McKinsey estimates that MROs applying AI-based forecasting can cut unplanned removals by up to 15%, while also improving shop-load planning accuracy.

As Richard Brown, Managing Director of Naveo Consultancy, argues:

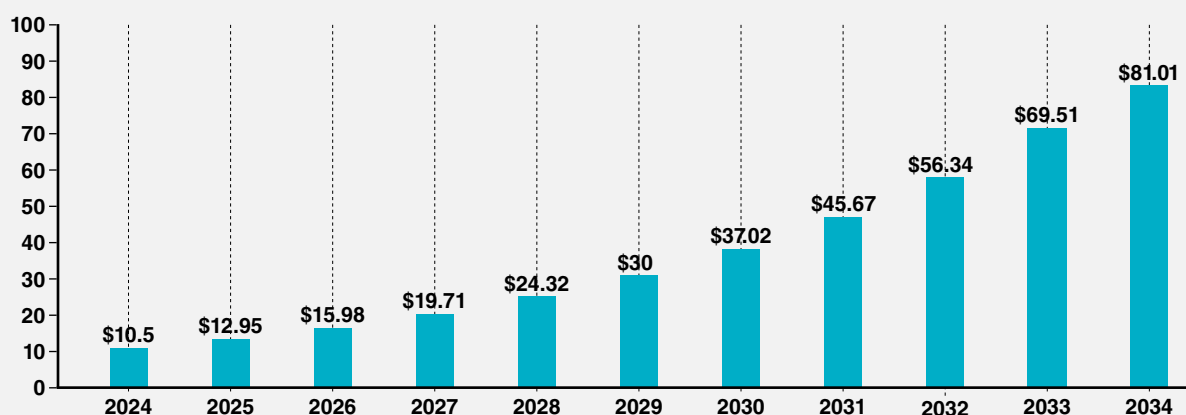
“Improving reliability and reducing unnecessary delays by using digital twins and technology can help... Some tools can help us enter into service with a more mature product.”

Brown also highlights the efficiency impact:

“AI can assist with manual tasks, such as digitising records, thereby freeing up the mechanic to spend more time on maintenance and less time on the admin side. In this way AI can make things more efficient.”

As a result, maintenance is evolving from a reactive task into an orchestrated supply-chain discipline, where every data point triggers an informed, coordinated action.

Aviation IoT Market Size 2024 to 2034 (USD Billion)



Source: www.precedenceresearch.com/aviation-iot-market

APIs: The connective tissue

Application programming interfaces (APIs) bind this ecosystem together by allowing information to move seamlessly between systems, turning static reports into live data exchanges.

IATA's ONE Record, in line with its target to become the industry's default cargo-data standard by 2026, already involves [more than 200 companies](#) testing a single, API-based, cargo data framework.

Meanwhile, Lufthansa Technik's AVIATAR (integrated with AMOS and flydocs) and Pratt & Whitney's EngineWise (linked to SITA's e-Aircraft DataHub) demonstrate how planning, reliability, and airworthiness data can be synchronised across organisations.

The 2025 [TRAX-Rolls-Royce Blue Data Thread](#) interface goes further, enabling MRO systems and OEM platforms to communicate at API level to shorten on-wing time. However, even with APIs simplifying front-end integration, the challenge of harmonising data standards across fragmented legacy systems remains significant. For many organisations, especially those operating decades-old platforms, aligning back-end architectures is still one of the biggest technical barriers to scaling digital connectivity.

Risto Mäeots, CEO of Magnetic Group, emphasises the strategic choice behind digital integration:

“One of the reasons we're replacing our main software is that we wanted a partner who is very IT-savvy and who would go along with AI development. Our strategy is not to develop in-house; it's to leave that job to professionals.”

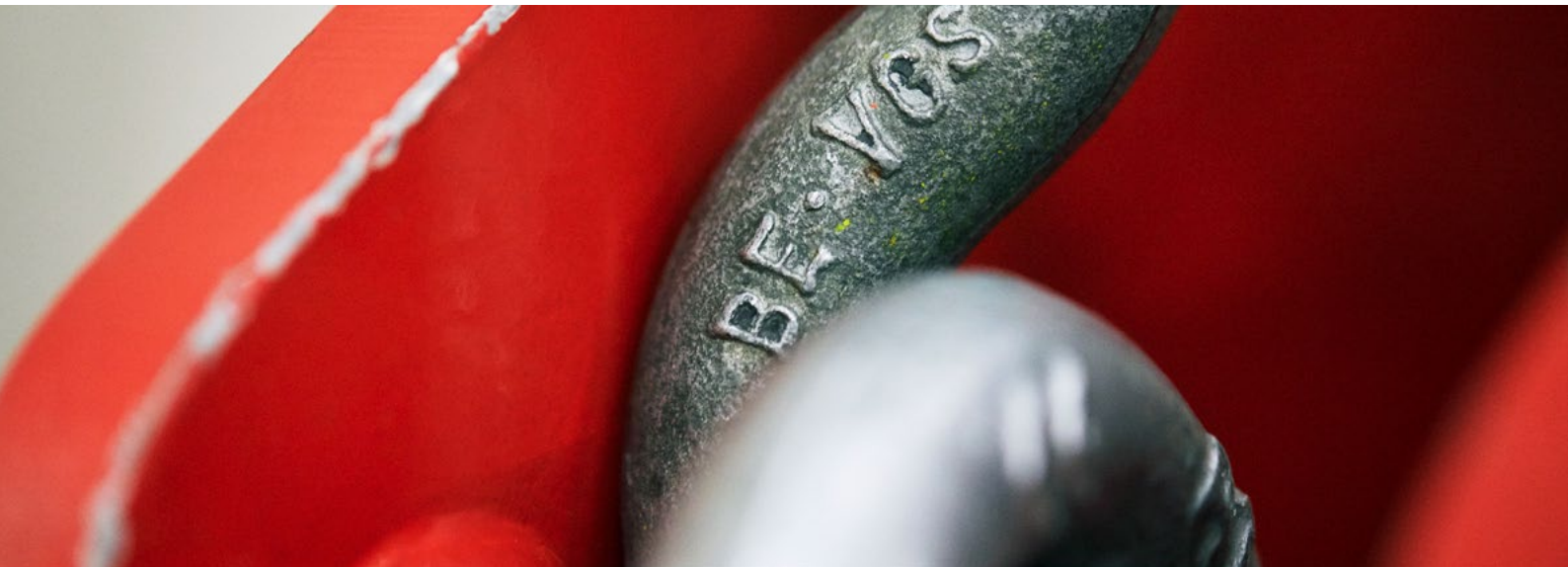
This is a powerful illustration of digital partnership over internal development: a central theme in connected supply chains.

Building resilience through connected networks

Each of these initiatives has a common purpose: removing latency from decision-making. What once took hours of manual reporting can now be synchronised instantly through digital twins and shared records.

As SupplyChain Magazine [notes](#), connected visibility gives stakeholders “a clear view of the risks facing interconnected supply chains... Allowing supply chains to be agile because risk is identified early and disruption is minimised.”

This is no longer merely innovation – it is an operational necessity, as connectivity is increasingly the backbone of resilience in aviation supply chains.



As a recent Roland Berger [report](#) concludes:

“Aerospace supply chains have reached their limits – a new supply chain setup with increased collaboration and new ways of working across all tier levels is needed.”

Yet with every additional stakeholder integrated into these connected networks, cybersecurity becomes a non-negotiable pillar of resilience. Increased digital exchange expands the potential attack surface, making it essential that organisations pair integration with robust cyber safeguards to protect operational data and maintain trust.

Why it's happening: Pressure for predictive coordination

The industry's rush towards connected data is a response to a decade of disruption. Persistent production delays, volatile demand, and fragmented systems have left operators planning reactively instead of strategically.

[Accenture's Commercial Aerospace Insight 2025](#) highlights limited data visibility as a key obstacle to accurate forecasting. And despite record IT spending, SITA [confirms](#) that only 39 percent of airlines have achieved fully integrated systems capable of predicting potential disruptions – meaning most of the industry is still catching up.

As Alejandro Ceballos, Director Technical Assets at AerLingus, explains:

“The supply chain is sometimes not reliable ... Our planning is constantly wrong because current events simply don't follow historical patterns.”

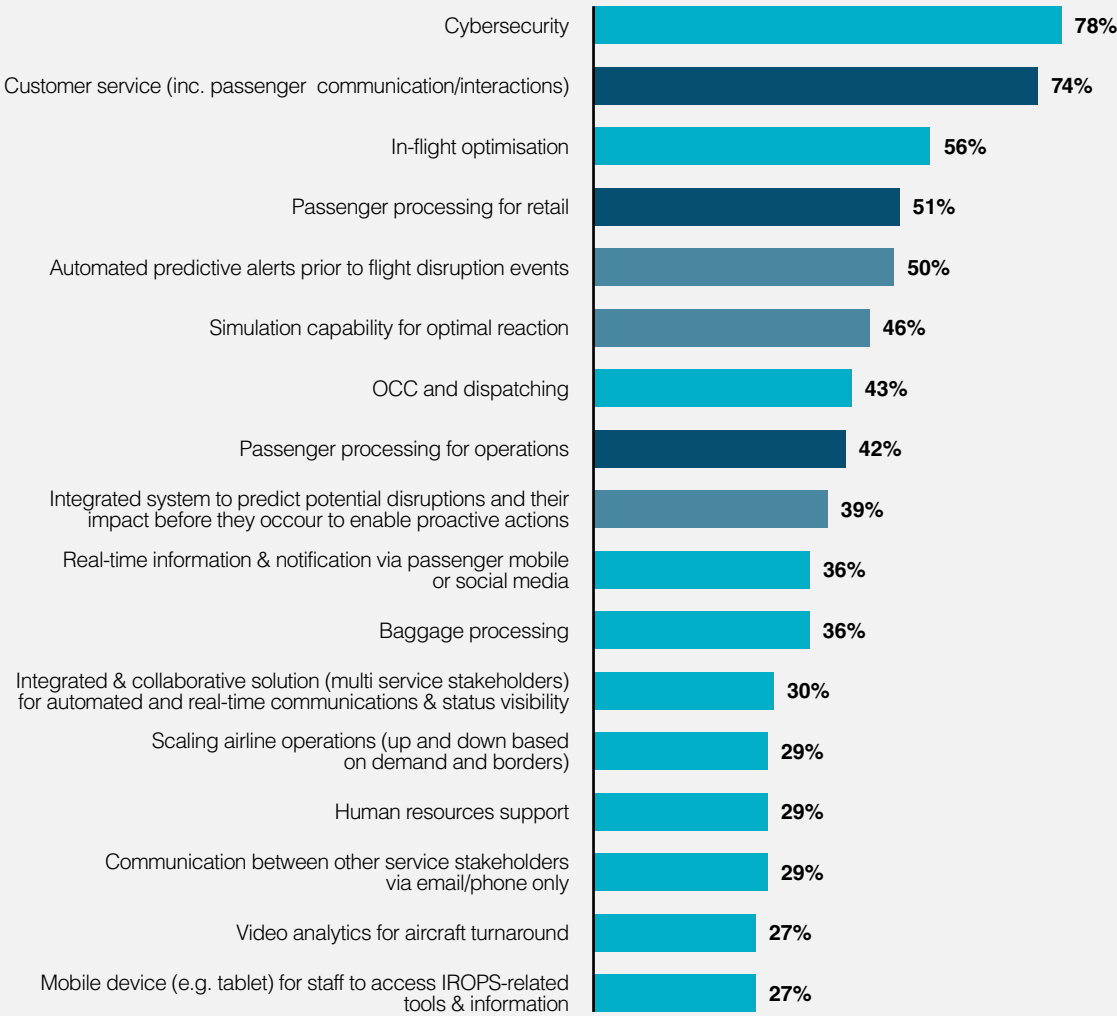


The supply chain is sometimes not reliable ... Our planning is constantly wrong because current events simply don't follow historical patterns.

Alejandro Ceballos,
Director Technical Assets at AerLingus

In which of the following areas are you currently using artificial intelligence tools or initiatives?

Airline operations Passenger services Systems development



Source: SITA's Air Transport IT Insights 2024

These inefficiencies carry heavy costs. A 2025 report by the US consultancy Alton Aviation [notes](#) that extended turnaround times and long parts lead-times continue to constrain maintenance capacity. In that environment, every unplanned failure cascades into a financial penalty – from extra leasing charges to missed flight hours.

Data from Accenture's [Commercial Aerospace Insight Report](#) further shows that digital maturity is accelerating: 27 percent of airlines are already using digital tools and data to improve operational processes, with another 26 percent expecting to reach that stage by the end of 2026.

Top priorities for enhancing operational efficiency

■ Immediate ■ Next 2 years



Source: Accenture

This steady climb demonstrates that the industry's investment focus is shifting from experimentation to execution – turning technology pilots into operational norms. Digitalisation is the enabler:

- **IoT sensors** provide live performance and utilisation data, reducing unplanned removals by **10-15 percent**.
- **AI forecasting** merges flight patterns, environmental data and shop-visit history to anticipate demand spikes ahead of time.
- **APIs** replace manual updates with real-time visibility, turning 'status chasing' into automated synchronisation.

These systems create a common operating picture across the supply chain, enabling faster coordination between engineering, procurement and operations teams.

Predictive insights are increasingly used to pre-position spare parts, optimise slot allocation and even forecast labour requirements weeks ahead – directly addressing the unpredictability of supply and turnaround times.

These technologies are no longer isolated pilot projects; they're becoming embedded in day-to-day operations across fleets and facilities.

Culturally, too, the mindset is changing. SITA's 2024 [findings](#) highlight growing collaboration between airlines, OEMs and technology partners – a clear shift from transactional exchanges to shared accountability.

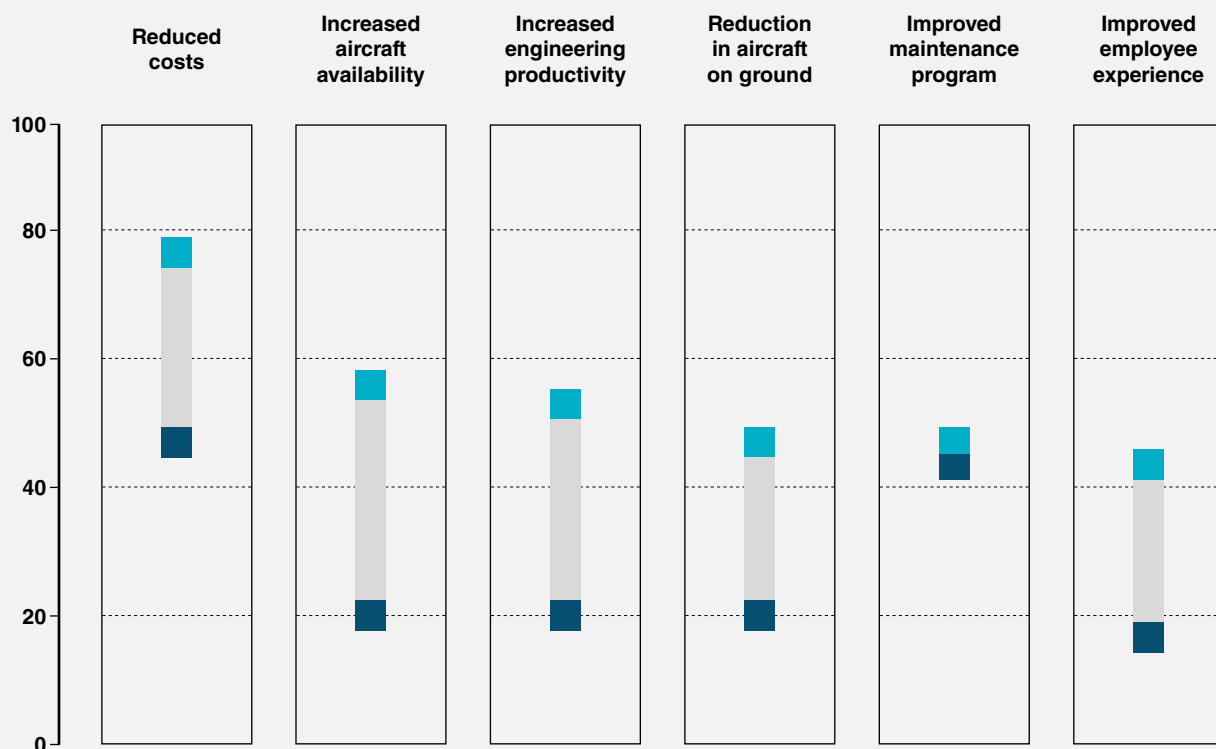
Regulatory and industry standards reinforce the momentum. IATA [ONE Record](#) formalises the API framework for cargo and logistics, while EASA initiative [Continuing Airworthiness](#) promotes electronic maintenance records and harmonised data exchange.

The result is a connected ecosystem in which foresight – not reaction – defines competitiveness, and data-sharing becomes the new foundation for trust across the aviation value chain.

Maintenance, repair, and overhaul organisations with digital maturity have achieved improvements in multiple areas

Biggest benefits from implementing digital solutions by digital maturity level,¹ % of respondents (n=42)

■ High maturity ■ Low maturity



¹ Low maturity = respondents who indicated their organisations have not started implementing digital or scaling pilots (n = 17); High maturity = respondents who indicated their organisations have fully implemented digital or scaled multiple pilots (n = 25)

The Outlook: From data to decisions

As digital transformation matures, the competitive edge will no longer come from having data, but from acting on it, contends Accenture. The winners of 2026 and beyond will be those who convert connectivity into coordination.

As Accenture notes, leading MROs are already investing in predictive maintenance, workflow automation and supplier partnerships to ease pressure on constrained capacity – early proof that integration is becoming the default operating model.

Accenture identifies three principal ways this shift is playing out:

1. Full-ecosystem integration

By 2027, the majority of new MRO contracts are expected to include digital data-exchange clauses. The boundaries between airline, OEM and MRO systems will blur into a single ‘digital twin’ of the operational network, which is continuously updated through APIs and shared standards.

2. Predictive visibility as standard

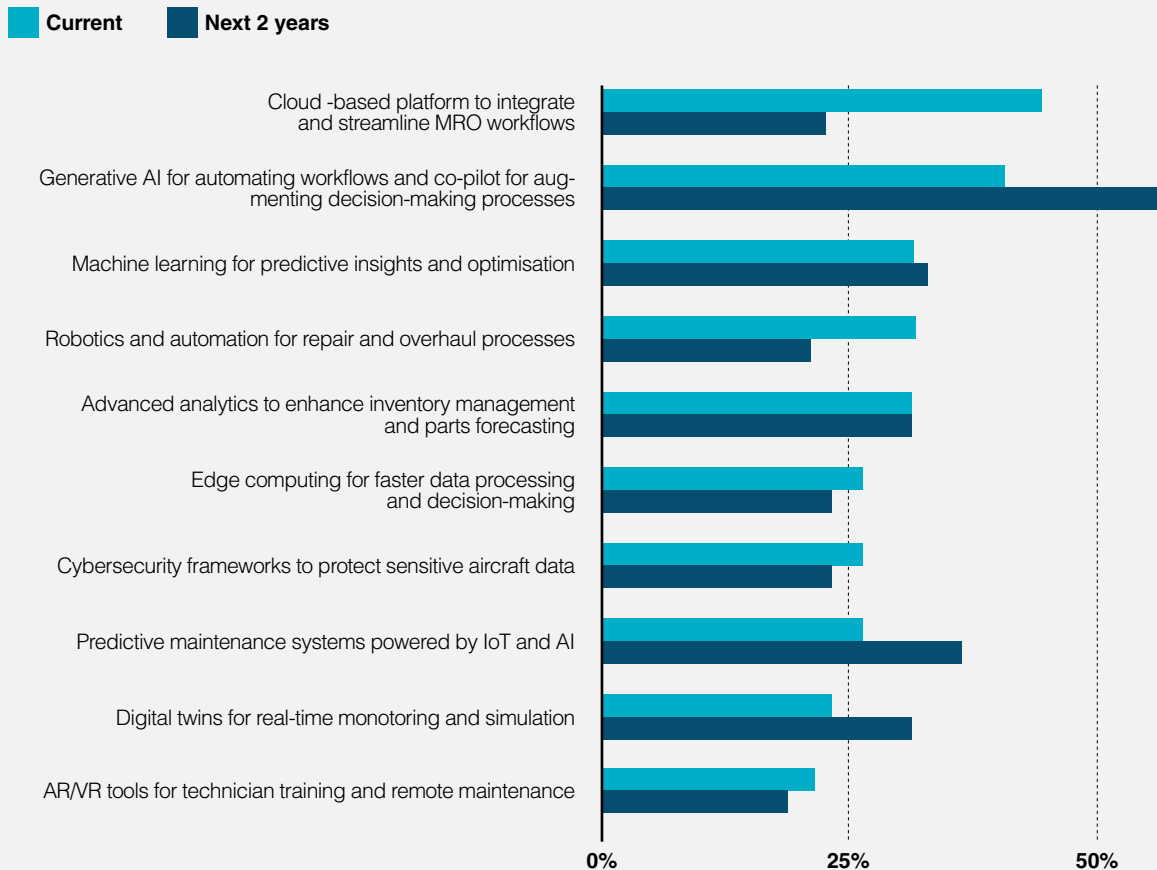
Real-time health monitoring of engines, other critical components and AI forecasting will become baseline expectations. Early IATA pilot projects [report](#) measurably faster issue resolution when partners share predictive data streams.

In the connected supply chain, seeing and acting before disruption will be the new measure of maturity. Accenture [notes](#) that cloud integration and AI-powered predictive maintenance rank as the top digital priorities for aerospace executives – confirming that the tools enabling predictability are now mainstream.

According to Alejandro Ceballos, Director Technical Assets at Aer Lingus, this is good news for operators:

“With AI it would be interesting to have technology connecting the supplier and the customer at different levels – to do the planning, but also to have, on the go, feedback from the supplier on what the problems are, what the mitigation is, and the prioritisation in the factory.”

Digital priorities fro MRO optimisation



Source: [Accenture](#)

3. Portal-driven transparency

Customer and supplier portals will evolve into shared performance dashboards, offering line-of-sight on service levels, turnaround times, and logistics milestones.

Platforms such as [AVIATAR](#), [NacelleLife](#), and [EngineWise](#) illustrate how visibility transforms relationships from reactive reporting to proactive partnership.

The shift towards open digital marketplaces makes a lot of sense, contends Risto Maesto, CEO of Magnetic Group, as connected portals are central to ecosystem-wide predictability:

“OEM portals are useful, but they don’t often interact with other OEMs. Platforms like Rotable and SkySelect are in a better position to connect different OEMs. We use both, and we get access to a lot of different OEMs.”



Joining the dots so connectivity becomes dependable performance

Each of these initiatives has one purpose: to remove latency from decision-making. What once took hours of manual reporting can now be synchronised instantly through digital twins and shared records, giving every stakeholder – from airlines to parts suppliers – real-time visibility of fleet health, maintenance queues and shipping status.

As the TCS global consultancy [notes](#): “Digital twin models and real-time analytics are becoming a new quality in decision-making support.”

This is no longer merely innovation – it is an operational necessity, as connectivity is increasingly the backbone of resilience in aviation supply chains.

As a recent Roland Berger [report](#) concludes: “Aerospace supply chains have reached their limits – a new supply chain setup with increased collaboration and new ways of working across all tier levels is needed.”

As data models standardise and APIs proliferate, suppliers who lag behind on digital integration risk falling behind the next generation of collaborative, predictive networks.



Chapter 3

Regional availability and network resilience

The challenges faced by the aviation supply chain are just as much physical as digital: getting the right part to the right place at the right time.

Operators need faster fulfilment, MROs need dependable supply visibility, and suppliers need local reach that aligns with their global planning.

As fleets age and utilisation rises, local availability and network reliability have become the ultimate tests of resilience.

The Shift: From centralised supply to regional readiness

Persistent aircraft-delivery delays have forced airlines to keep older fleets flying longer. As Alejandro Ceballos, Director Technical Assets at Aer Lingus, explains:

“The problems from manufacturers are ultimately borne by airlines. The root cause sits upstream, but the pain sits with us.”

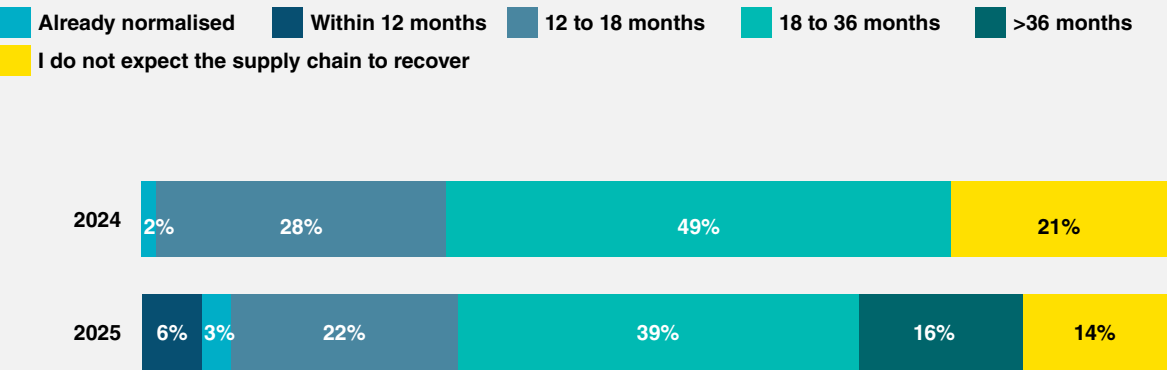
This is causing airlines to position inventory nearer to where aircraft operate. Oliver Wyman’s 2025 report on [MRO Demand Challenge](#) draws attention to how operators want improved parts availability and shorter lead times before they can feel confident in the reliability of their supply chains.

Industry leaders are responding through localisation: Lufthansa Technik’s [component pools](#) in the Middle East, Safran’s [nacelle facilities](#) across Asia, and ST Engineering’s [regional hubs](#) in Ezhou in China all bring repair and logistics capacity closer to operators.

This proximity model is now being scaled across the industry: GE Aerospace is investing more than \$1 billion to [expand and upgrade MRO sites](#) in Europe and Asia, while GKN Aerospace [has doubled](#) its repair footprint in North America with a new San Diego facility. Embraer’s [ONEChain digital supply platform](#), launched in late 2024, connects regional stock data to predictive forecasts, cutting wait times for parts in Brazil and Portugal.

When do you believe that the supply chain challenges will subside?

Percent of respondents selecting each option, 2024 and 2025 survey



Source: Oliver Wyman 2024 and 2025 MRO Surveys



Operators themselves are increasingly demanding near-site availability. As Risto Mäeots, CEO of Magnetic Group, emphasises:

“It’s super important. If any manufacturer or distributor came to me and said: ‘We could stock up for you on a consignment basis in your location,’ I’d be ready to pay more just for the convenience – to have the parts and, most importantly, to not freeze our cash. If someone offered it, therefore, I would rather choose them over vendors who may be cheaper – just to have them closer.”

This shift is not driven by operational pressures alone. Macroeconomic uncertainty, shifting trade patterns and recent geopolitical disruptions have highlighted the risks of concentrating supply chains in too few regions. As Mäeots notes:

“These sanctions are super complicated to follow ... And they have a tremendous impact on the industry. You are kind of forced to pick a side ... And it puts a lot of responsibility on businesses.”

As noted in Chapter 1, resilience now depends on diversifying physical networks while coordinating them through shared digital systems that maintain visibility across regions.

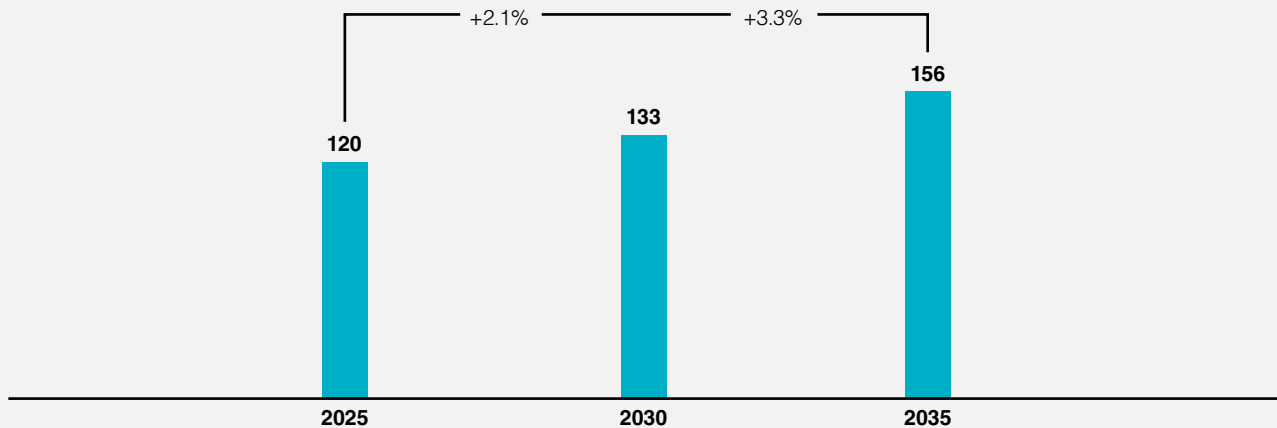
Together, these initiatives turn localisation from a contingency plan into a core operating model – one where regional readiness underpins global resilience. Each one aims to turn weeks of shipping delay into days, which provides a clear operational dividend when an AOG can cost tens of thousands of dollars per hour.

These regional nodes don’t replace global networks, they strengthen them. The results are already visible: Air France-KLM’s AI-enabled maintenance [partnership](#) with Google Cloud has cut predictive-analysis time from hours to minutes, improving utilisation and reducing unexpected removals, providing a clear return on regional digital-readiness investments.

As recent [MRO Europe 2025](#) discussions highlighted, operators increasingly view regional stock as essential for meeting reliability targets, marking a shift from global distribution toward near-site readiness.

Exhibit 1: Global MRO spending forecast 2025-2035

US\$ billions, CAGR

Source: [Oliver Wyman Global Fleet and MRO Market Forecast 2025-2035](#)

Note: CAGR stands for compound annual growth rate

Why it's happening: Ageing fleets and tight capacity

With OEM production still recovering, aircraft that would once have been retired remain in service.

As Risto Mäeots, CEO of Magnetic Group, confirms:

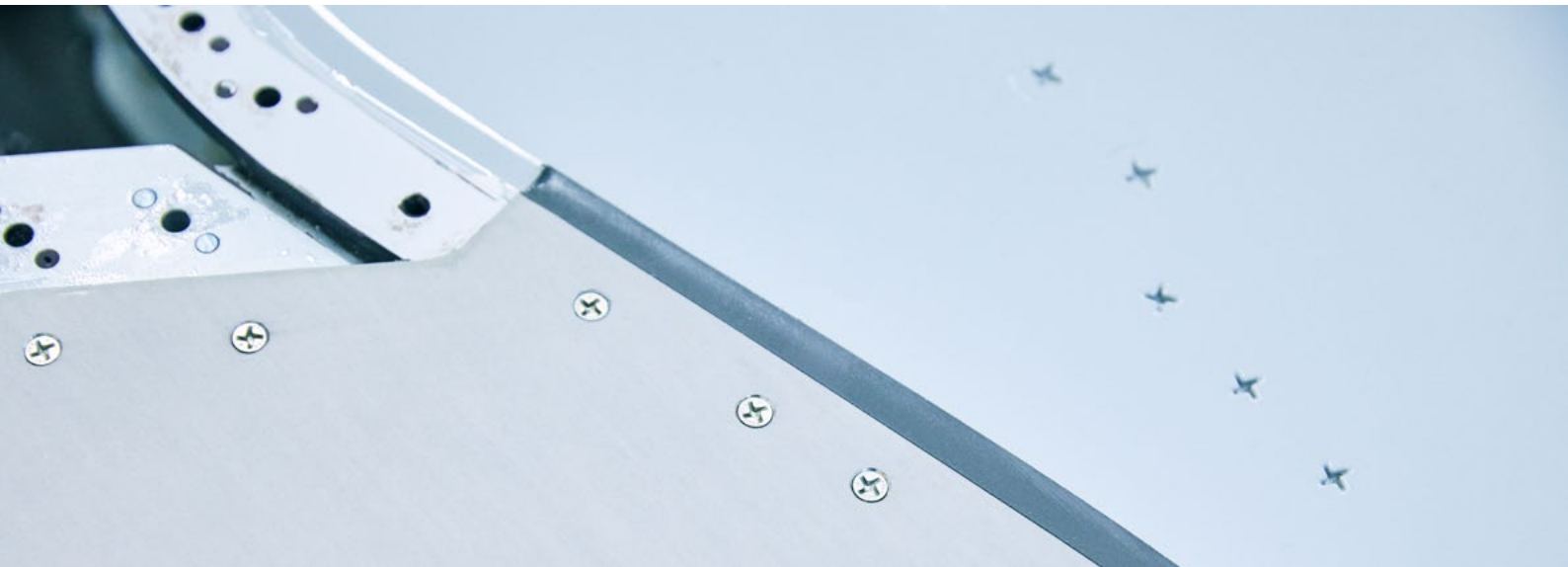
“For the first time in our history, customers are ordering D-checks on 20-year-old aircraft. Usually when they reach that age, that’s when they start to phase them out. The average duration of the checks is getting much, much longer – many more components have to be replaced compared to a younger aircraft.”

[Aviation Week Fleet & MRO Forecasts 2025](#) notes that extended fleet life and deferred retirements are driving heavier checks and more frequent engine overhauls.

Global MRO spending reached \$114 billion in 2024 – 7.2 percent above its 2019 peak – and is projected to rise to \$120 billion in 2025 and to **\$156.8 billion by 2035**.

That growth, however, masks systemic strain. According to Oliver Wyman and IATA's October 2025 [volatility analysis](#), airlines will absorb \$11.3 billion in additional unplanned costs in 2025, broken down into \$4.2 billion in excess fuel, \$3.1 billion in extra maintenance, \$2.6 billion in leased engines, and \$1.4 billion tied up in spare-parts stockpiles.

The Bain consultancy [reports](#) engine-shop turnaround times up 35 percent for legacy engines and 150 percent for new-generation models versus pre-pandemic levels, creating a throughput bottleneck that cascades through the supply chain. Labour shortages intensify the issue, with [two-thirds](#) of MRO executives citing skilled-technician scarcity as their top operational constraint.



The scarcity of used material is also creating pressure. As Jonas Murby, Partner at Aerodynamic Advisory, notes:

“You need used parts to keep this fleet going, and there’s a lack of that at the moment.”

This shortage forces operators to hold more buffer stock and invest in regional readiness to keep older aircraft flying, according to Richard Brown, Managing Director at Naveo Consultancy:

“Airlines have kept aircraft in service longer than anticipated. They face part-obsolescence issues and long lead times. Since we’re not retiring as many aircraft as we should be, there isn’t as much USM coming in – operators are trying to stock up on key parts and build up inventory.”

Digital tools are becoming the industry’s shock absorbers. Deloitte’s A&D Outlook 2025 [highlights](#) AI-based capacity simulation and predictive parts planning as critical levers for managing technician, material and bay constraints.

Predictive analytics are also being used to model shop-visit peaks and forecast which fleets will require life-extension work first, allowing MROs to smooth workload curves and prioritise scarce capacity.

Confidence is gradually returning. Accenture [reports](#) that executives cite improved on-time deliveries and lower logistics costs where regional capacity has been added, with supply-chain confidence climbing to 85% – up from 77% six months earlier – which is evidence that transparency and coordinated planning are starting to pay off.

“

Airlines have kept aircraft in service longer than anticipated. They face part-obsolescence issues and long lead times. Since we're not retiring as many aircraft as we should be, there isn't as much USM coming in - operators are trying to stock up on key parts and build up inventory.

Richard Brown,
Managing Director at Naveo Consultancy



The Outlook: Reliability as the new advantage

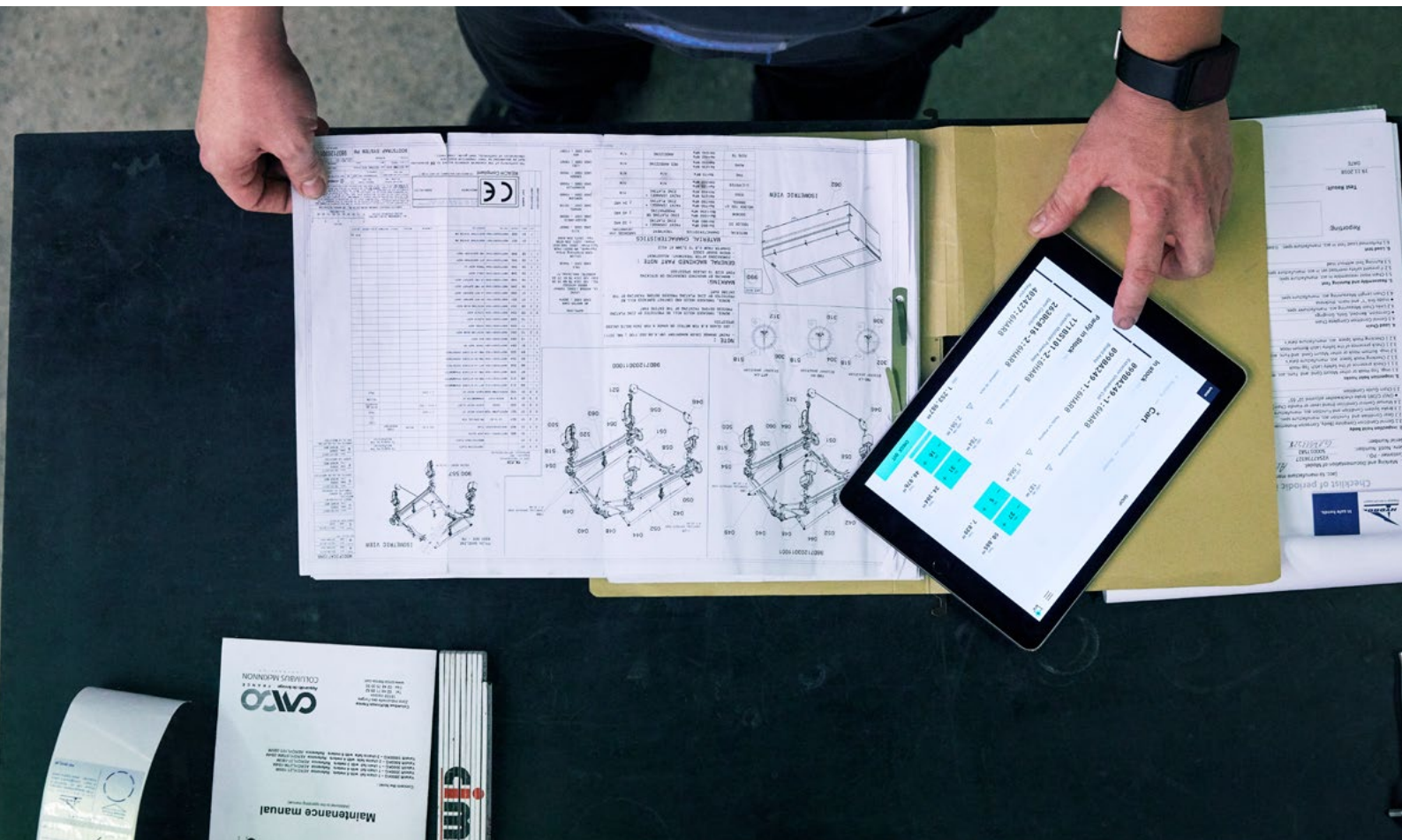
As 2026 approaches, the aviation industry's edge will depend less on the scale of its networks and more on how reliably those networks perform. Speed, visibility, and proximity are becoming the shared currencies of resilience.

Regional readiness is emerging as the new benchmark for reliability. But as highlighted in Chapter 1, regional readiness only delivers full value when paired with digital coordination: the shared data and forecasting tools that align physical capacity with real-time demand.

Roland Berger's Aerospace Supply Chain Report 2025 [notes](#) that "supply chain resilience will increasingly depend on local responsiveness and digital transparency rather than global scale."

Where efficiency once meant centralised inventories, the winning model now balances global oversight with local access. By positioning high-value components – engines, avionics, and structural assemblies – closer to where aircraft operate, operators reduce AOG exposure and convert hours of disruption into minutes of delay.

This approach creates a tiered model of readiness: utilising regional hubs for high-value, complex assets while establishing digitally-synced, forward-stocking locations (FSLs) for high-volume, critical AOG spares.



Even in moderation, it is a winning strategy. As ‘Localising supply chains and its impact on performance’, a PwC report in 2024, [notes](#):

“Even modest localisation efforts... Lead to a notable improvement in supply-chain performance.”

The next phase of advantages will come from integrating the physical and digital. Predictive analytics determine where to stock parts; regional hubs ensure they’re ready when disruption hits. Those who master that loop of forecast, position, fulfil, will set a new standard for operational predictability.

Based on recent industry analysis, three strategic dynamics will shape reliability through 2026 and beyond:

- **Local readiness** – aligning capacity and components closer to demand.
- **Predictive allocation** – shifting from reactive to data-driven parts positioning.
- **Collaborative resilience** – embedding transparency and accountability across partners.

These trends reflect the broader move from spot-fixing to system-design that both [McKinsey](#) and [Roland Berger](#) identify as critical for aviation’s next decade.

Reliability has become aviation’s defining product – the outcome customers expect, the standard partners are judged by, and the measure of how well the connected supply chain truly works.



Chapter 4

Labour shortages and workforce transformation

Labour scarcity following major crises is nothing new. In aviation, the labour shortfall has been compounded by production delays, material shortages and reduced engine-shop capacity: straining every link of the MRO value chain.

These labour shortages can't be solved by hiring alone. To understand how the MRO industry is adapting, we first need to look at how the shortages have evolved through the 2020s.

The shift: Aviation's shrinking skilled workforce

The MRO workforce challenge has become structural. Faced with a shortage, experienced technicians are now [retiring faster than new entrants can be trained](#), while ageing fleets and complex engines increase the demand for labour.

As Risto Mäeots, CEO of Magnetic Group, notes:

“The shortage is massive, and the pressure on salaries is getting very, very high. It is extremely difficult to find skilled engineers – the talent pool is shrinking and expectations on those who remain are only going up.”

How labour shortages are intensifying

Labour shortages in aviation caused by the pandemic – a mass exodus of skilled workers who found employment in other industries sometimes referred to as the ‘[Great Reshuffling](#)’ – continue to persist.

Alejandro Ceballos of Aer Lingus highlights the competitive pressure:

“In Dublin, we are in a sandwich ... The tech companies take the new talent, and the lessors take the experienced people. We lose people to better-paid jobs in other sectors and it's very difficult to bring them back.

Oliver Wyman's ‘Global Fleet & MRO Market Forecast 2025-2035’ [concludes](#) that “the availability of skilled mechanics will be one of the largest structural headwinds to growth”. In its 2025 Commercial Fleet & MRO Market Summary, Aviation Week similarly [describes](#) labour shortages as “the year's overall driving trend”. This worsening situation is due to the increased demands of an ageing fleet and long-cycle engine work that requires [more hours](#) in the shop.

MRO executives ranked labour shortages as one of the industry's top disruptors for the fourth year running in the [AAR/Oliver Wyman MRO Survey 2025](#). Manpower Group's ‘Aerospace & Defense World of Work 2025’ [highlights](#) how the scarcity of talent and skills gaps are hindering transformation and increasing both inter-industry and inter-market competition for workers.

As Manpower explains, employers are “competing across industries for digital and engineering talent”; thus blurring traditional job boundaries between aerospace, tech, and logistics.

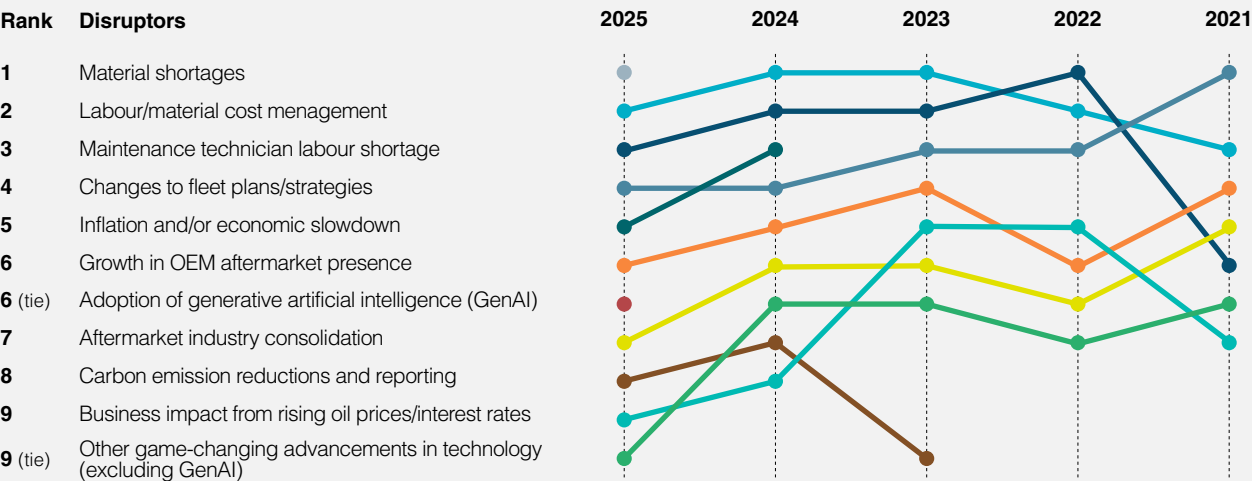


The shortage is massive, and the pressure on salaries is getting very, very high. It is extremely difficult to find skilled engineers – the talent pool is shrinking and expectations on those who remain are only going up.

Risto Mäeots,
CEO of Magnetic Group

Exhibit 2: Top disruptors, 2021-2025

As ranked by survey respondents



Source: 2021-2025 MRO Surveys Note: Items 1 and 6 (tie) are new to this survey. Tie ranking for 2025

The competition will only intensify, according to Manpower. Over the next decade, a new wave of retirements, which may include as much as a third of the current workforce, will tighten the labour shortages even further.

The industry is aware of the impending retirements - but not prepared, adds Richard Brown, Managing Director of Naveo Consultancy:

“The retirement wave has been visible for years. What’s new is that the supply of replacements is nowhere near enough.”

How the MRO industry is responding

As the industry slowly returned to business as usual following the pandemic, it was easy to presume the labour shortages would resolve themselves.

But they haven’t, and the MRO industry is accordingly responding with innovation to bridge the gap: more automation, digital tools and predictive analytics.

MROs are investing heavily in workforce training, digital tools and AI-driven automation to relieve constrained capacity, [reports](#) Accenture, and 74% of airlines are increasing their spending in the area [according to](#) SITA’s Air Transport IT Insights 2024.

Practical evidence supports this trend. According to a Tata Consultancy Services [report](#), AI-enabled workflow tools can reduce directive-processing time by up to 40% and raise labour utilisation by around 25%. [Case studies](#) compiled by Aeropoda show deploying big data and mobility platforms can cut planning time by 70% and improve technician efficiency by 25%.



These results illustrate how automation and predictive analytics can expand capacity without equivalent headcount growth.

[Aviation Week's 2025 summary](#) identifies AI-driven digitalisation and data analytics as the primary levers to ease workforce constraints and raise throughput. As Richard Brown, Managing Director of Naveo Consultancy, notes:

"AI doesn't replace technicians, it removes the admin burden so they can focus on the real work."

Why is it happening: The pressures behind the labour gap

The numbers tell a clear story: the maintenance industry faces rising demand and a diminishing talent pool. So what are structural reasons behind this imbalance?

What's causing the structural gaps

As of 2023, the aviation maintenance industry had a vacancy rate of 11 percent, according to [data](#) provided by the Aviation Repair Station Association (ARSA). Given that the industry globally employs 400,000 maintenance workers, this amounted to 42,000 workers – a figure that continues to grow.

According to Airbus projections, the MRO industry will need an extra [705,000](#) technicians by 2044 to cater to the growing demands of the wider aviation industry. Not only will flight capacity need to more than double over the next two decades, but new-generation aircraft are more complex to maintain, which requires more personnel.



These structural gaps have three main drivers:

Firstly, the retirement rate is soaring. According to ARSA, nearly 40% of aviation maintenance technicians are over the age of 50, making it reasonable to conclude the industry will lose close to half its workforce by 2044. The problem is most acute in markets where the labour force is steadily decreasing, such as Europe (with [one-fifth](#) aged 65+), the US (18%) and Japan (29.3%).

Secondly, the replacement process is not a simple like-for-like reshuffle. As Livia Hayes from Oliver Wyman [explains](#), it is unrealistic to think the output of a skilled worker with 25-30 years' experience can be simply replaced by somebody with 2 or 3 years' experience. Instead it will take between 2 and 5 years before the "new technician is fully productive"

And thirdly, new-generation aircraft require deeper specialisation in composites, software and digital diagnostics – skills not covered by legacy training frameworks. Demand is rising both for hands-on maintenance and data-literate engineering; without investment in both, productivity gains stall.

Why the MRO industry must respond

Faced with this significant recruitment challenge, the industry knows it cannot afford to stand still.

Not only has stalling aircraft production caused older fleets to remain in service longer, raising maintenance demand in the short-term, but the complexity of new-generation aircraft will raise demand in the medium to long-term.

These structural pressures explain why the industry's response has also centred on training and new partnership models.

However, Roland Berger's Aerospace Supply Chain Report 2025 [reveals](#) that many companies are being held back by a lack of experience in the field.

While Roland Berger reveals that although 65% of aerospace companies are already using or planning to use AI and other innovative software tools, their focus tends to be limited to less than 10% of business processes, most commonly in the areas of cybersecurity and quality inspection.

In the areas of AI-driven digitalisation and data analytics, 61% of aerospace companies cite difficulties including a lack of experience and 53% say there are problems integrating with existing systems.

The Outlook: Building capacity through technology

If labour supply cannot keep up, productivity gains must be maximised to mitigate the capacity gap. This section explores how investment in digitalisation, automation and predictive analytics is reshaping the MRO landscape, not by replacing people but by amplifying their capacity.

As Oliver Wyman notes in its April 2025 'MRO Industry Sees Growth Amid Supply and Labor Pressure', the industry is "turning to productivity and technology to meet rising demand". This demand includes digital workcards, guided inspections, automated parts-picking and AI-assisted troubleshooting.

Automation, analytics and partnerships take the lead

Airlines [spent](#) \$37 billion on IT in 2024, a figure which is set to soar as they continue to invest in areas that can ease their labour shortages.

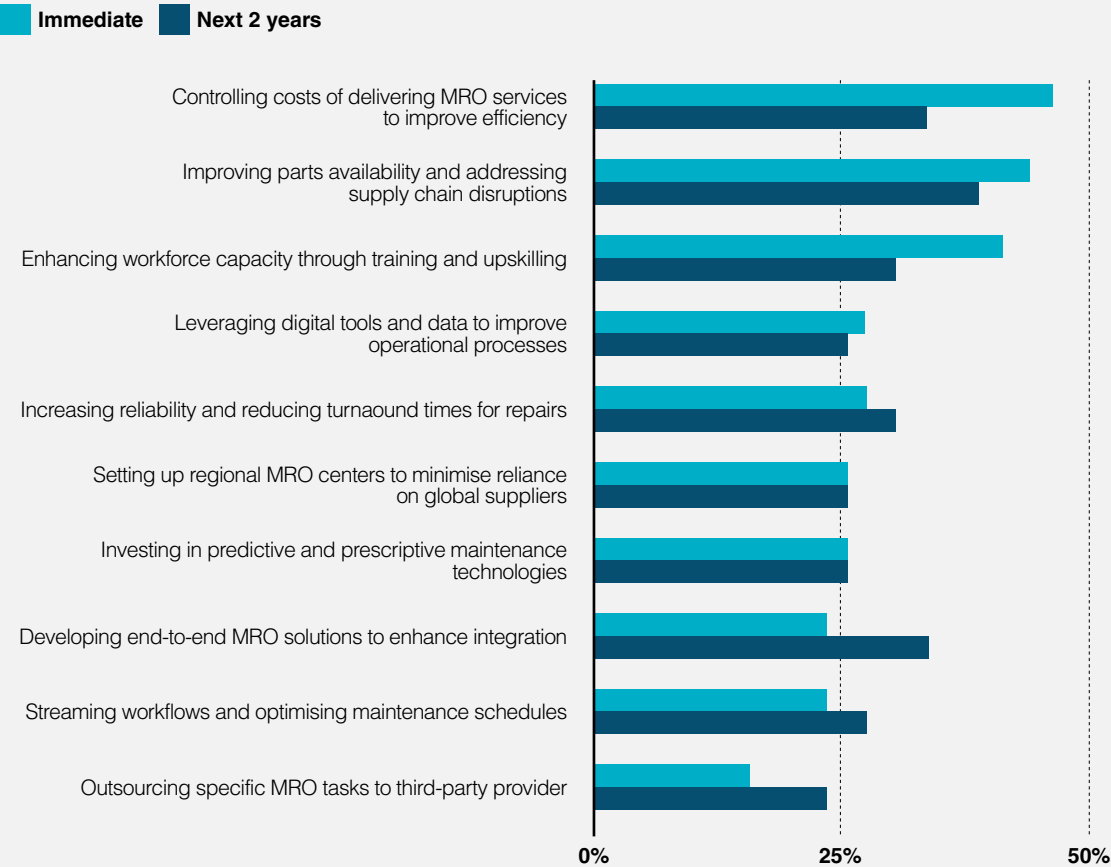
Some 74% of airlines told SITA they planned to spend more on IT in 2025 and 2026, and a fair amount of this increase will occur in the area of digitalisation, [contends](#) Accenture, as adoption rises across airlines, airports and their partners.

The global digital MRO market is [projected](#) to grow at a CAGR of 14.4% over the rest of the decade: from \$1.17 billion in 2025 to \$2.29 billion by 2030.

Some 54% of airlines and MROs say that leveraging digital tools and data is among their top three priorities by the end of 2026; a figure that tallies with the 73% that are prioritising enhancing their workforce capacity through training and skilling.

McKinsey pulls no punches about the potential of digitalisation in its report '[The generative AI opportunity in airline maintenance](#)'.

Top priorities for enhancing operational efficiency

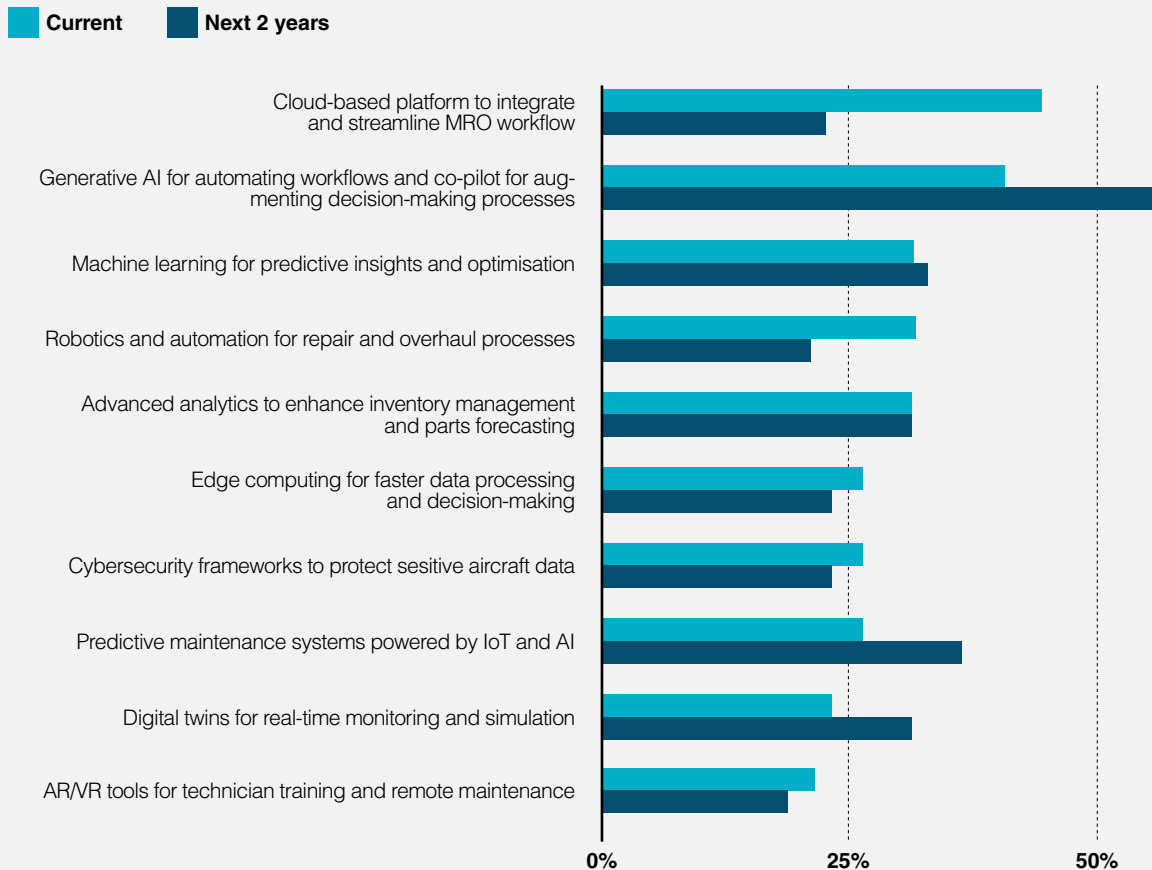


Source: Accenture

Citing data from other industries concerning the potential of generative-AI and data-analytics tools to transform technician productivity, it suggests a possible 35% reduction in troubleshooting time and 25% reduction in time for unplanned repairs once AI root-cause analysis tools are scaled. These gains illustrate how digital tools can materially amplify limited technician capacity. As Alejandro Ceballos, Director Technical Assets at Aer Lingus, observes:

“We need tools that make our people faster – because we won’t be able to hire our way out of this.”

Digital priorities fro MRO optimisation



Source: [Accenture](#)

Four solution pathways for 2026

Here are four solutions, spread across digitalisation, automation and partnerships, which the industry can expect to see more of in 2026:

- **Workforce development and knowledge transfer** – workforce [strategy](#) combining targeted training and upskilling to improve performance of new technicians and close the production gap when an experienced worker is replaced. Predictive analytics can be used to help maintenance planners assign technicians based on skill level and expected fault risk, which improves first-time-fix rates (a key KPI). Meanwhile, generational knowledge gaps can be closed with simulation-based learning and digital job aids.



- **Automation and analytics to amplify capacity** – [scaling](#) predictive maintenance, workflow automation and data-driven planning to raise throughput without equivalent headcount increases. AI-powered predictive maintenance to optimise MRO work is an area where adoption is expected to surge over the next 2 years. Some 54% of airlines and MROs single out cloud-based platforms to integrate and streamline workflows as their biggest digital priority for MRO optimisation.
- **Integrated digital workflows across partners** – digitalisation [enables](#) inventory visibility, parts forecasting and slot planning, and increasing resilience.
- **Programmatic partnerships to guarantee capacity** – to overcome the challenge of tight shops and long engine queues, airlines and MROs can use [multi-year frameworks](#) that embed forecasting and inventory collaboration to stabilise TAT and material flow.

Turning scarcity into sustained performance

Together, these approaches signal a transition towards a more technology-dependent MRO model. They illustrate how digital transformation is becoming a prerequisite for sustained MRO capacity – and this is just the beginning.

By 2030, efficiency gains will hinge on how well airlines and MROs fuse data, automation and partnerships into a single, predictive ecosystem – one that turns scarcity into sustained performance.



Chapter 5

Balancing Efficiency, Cost and Sustainability

Early MRO was all about efficiency. Aviators paid whatever it cost to get them in the air. But as demand from passengers grew, aviation became a business and cost became just as big a priority.

Over 50 years of balancing cost and efficiency followed before a new priority entered the fray: sustainability. Initially nice-to-have, it has now become a must-have.

Together, efficiency, cost and ESG are the factors that determine most decisions in aviation maintenance.

The shift: Three-way balancing act

The post-pandemic environment has permanently altered how maintenance decisions are made.

Cost and availability remain dominant, but ESG is no longer optional for airlines, MROs and OEMs.

Instead, they must navigate a three-way balancing act: controlling costs, ensuring material availability and delivering sustainability gains without compromising reliability.

Cost: Supply disruption threatening margins

For the fourth year in a row, cost management is a major MRO concern, according to the AAR-Oliver Wyman report '[MRO Demand Challenge 2025](#)'. Along with labour and material shortages, two-thirds of MRO, OEM and airline leaders view it as one of their biggest disruptors over the second half of the 2020s.

Despite the concern, the same survey revealed that 68% of aviation decision-makers believed the industry performed well financially in 2024, and 72% expected the industry to improve over the next two years.

Certainly, there has been steady growth: the MRO sector market value is expected to [total](#) \$120 billion for 2025 and grow to \$156 billion by 2035.

However, the findings of a [2025 report](#) by Oliver Wyman and IATA suggests that supply disruptions are adding more than \$11 billion in extra costs for airlines in 2025. The MRO sector, therefore, owes a fair share of its 'growth' to volatile cost predictability problems hitting airlines, which in turn are causing the MRO sector serious cash-flow and resource availability problems.

IATA director-general Willie Walsh spoke of the widespread surprise across the industry when he told [Reuters](#):

"Even if you halve the number, it's still a massive drag on the industry."

As Richard Brown, Managing Director of Naveo Consultancy puts it:

"Everything is getting more expensive – labour, materials, energy, logistics – and the industry is struggling to absorb it."

Availability: Spare parts and capacity under strain

In case there was any doubt about industry concerns around supply chain availability, 'MRO Demand Challenge 2025' introduced a new disruptor for leaders to choose from: 'Material shortages'. Two-thirds promptly voted it their number one disruptor.

While OEM production [has not yet caught up with demand](#) and these delays ripple downstream into the spare parts market, parts suppliers also face shortages across both narrow-body and wide-body platforms.

Parts suppliers are also [contending](#) with casting/forging bottlenecks, electronic component shortages, and certification delays.

A major contributing factor is the increased regulatory emphasis on digital traceability and documentation completeness, without which many components cannot enter service, further slowing turnaround times.

Lead times for some parts – selected rotables, avionics units (including sensors, actuators and LRUs), interior components and certain new-generation components – have grown by [2 to 5 times since 2019 levels](#). In one recent case, a lead time of [72 weeks](#) was given for a specialised part that used to typically take 36-40 weeks to arrive.

And there are also [delays](#) awaiting repairable parts, which is increasingly [causing planners](#) to turn to exchange units, part loans and USM to keep aircraft on schedule. As Risto Mäeots, CEO of Magnetic Group, notes:

"We see lead-times going crazy – and it's not just one or two parts, it's across whole categories."

Sustainability: Transparency becomes the defining factor

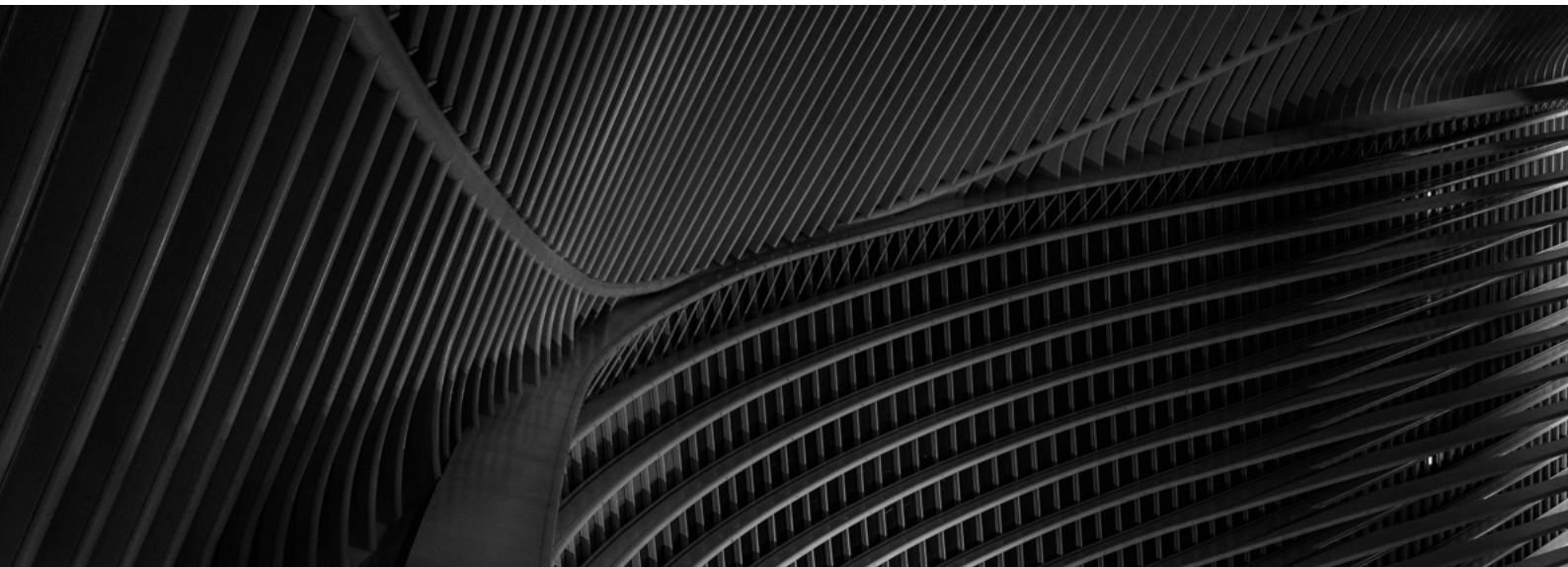
PwC's '[Aviation Industry Review & Outlook 2025](#)' identified 2024 as a turning point for sustainability in aviation.

The sector, contended the report, "stopped benchmarking everything to pre-COVID" and started confronting the "reality" of sustainability challenges, rather than treating them as a distant goal.

Smart Freight Centre Airline ESG Survey 2024 [documented](#) how technology is making it easier for airlines, MROs, shippers and logistics providers to exchange sustainability data – a huge boost for transparency.

Much of this transparency comes from the adoption of digital traceability systems, which allow stakeholders to verify material provenance, lifecycle emissions and sustainability performance through shared digital records.

As operators gain clearer visibility into emissions and material flows, attention is shifting toward the practical levers that can deliver measurable improvements. This is where circularity and USM have moved from sustainability concepts to operational strategies.



Circularity: No longer a concept

The circular economy is no longer theory but practice, argued an ICAO [report](#) in 2025, which emphasised how aviation value chains can be redesigned to reduce environmental impact and resource use.

The ICAO report's principles of reuse, repair, remanufacture and recycling chime with [an increased focus on repair over replacement, smarter management of end-of-life assets](#), and better data on material provenance. All of these support cost, availability and ESG targets simultaneously.

The EU has been proactive in the area. Its [SUSTAINair](#) programme applies circular principles across aircraft design, manufacturing, operations and end-of-life, targeting more efficient use of high-value aerospace materials and setting new standards for greener supply chains.

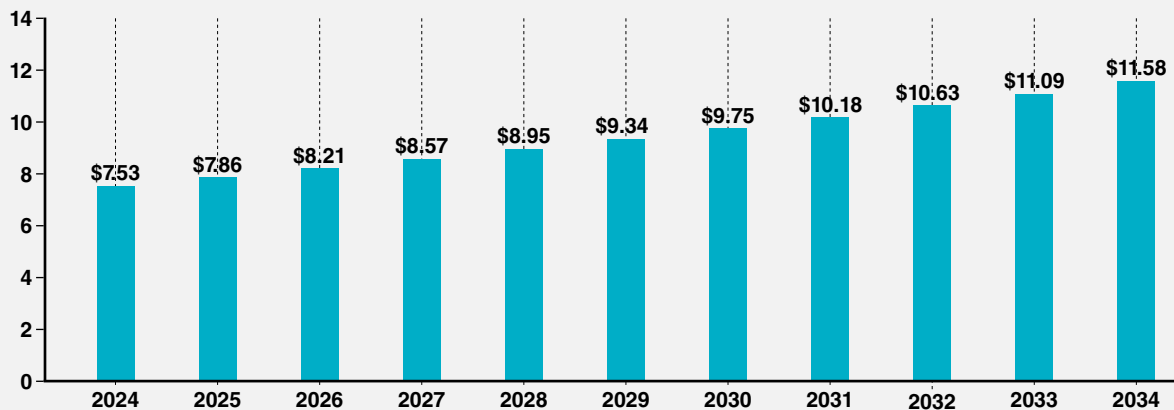
Advisory firms, too, are framing circularity as both a sustainability and business lever. KPMG argues that circular supply chains have “a compelling business case” as they can help aviation to reduce Scope 3 emissions, shrink consumption footprints and transition to more sustainable models without sacrificing competitiveness.

USM: A noticeable jump in demand

The increased popularity of Used Serviceable Material (USM) has become one of the [most visible levers](#) of the circular shift. Demand has been rising steadily since 2022 in line with increasing numbers of airlines losing their reservations and growing supply chain challenges.

High-quality USM has emerged as an “[ultra-competitive](#)” solution, contends Aviation Week, and in 2025 there has been a noticeable “[jump](#)” in assets needed in the used-parts pipeline, according to AAR.

A 2025 [forecast](#) estimates the global USM market is worth \$7.53 billion with the potential to reach \$11 billion by the early 2030s.

Air Transport USM Market Size 2024 to 2034 (USD Billion)

The global air transport usm market size is predicted to increase from USD 7.53 billion in 2024 to approximately USD 11.58 billion by 2034, expanding at a CAGR of 4.40% from 2025 to 2034.

Source: www.precedenceresearch.com/air-transport-usm-market

Increasingly, sustainability is cited as an additional driver: reusing serviceable components from teardowns reduces waste and the embodied carbon of manufacturing new parts.

Richard Brown, Managing Director of Naveo Consultancy, notes:

“USM isn’t just a cost story anymore; it’s an emissions story too.”

A critical enabler of this shift is digital certification: full traceability, digital birth records and standardised documentation formats are now essential for operators to trust and scale the use of USM. Without them, many components simply cannot be accepted into service.

Why this is happening: Deep drivers behind the new landscape

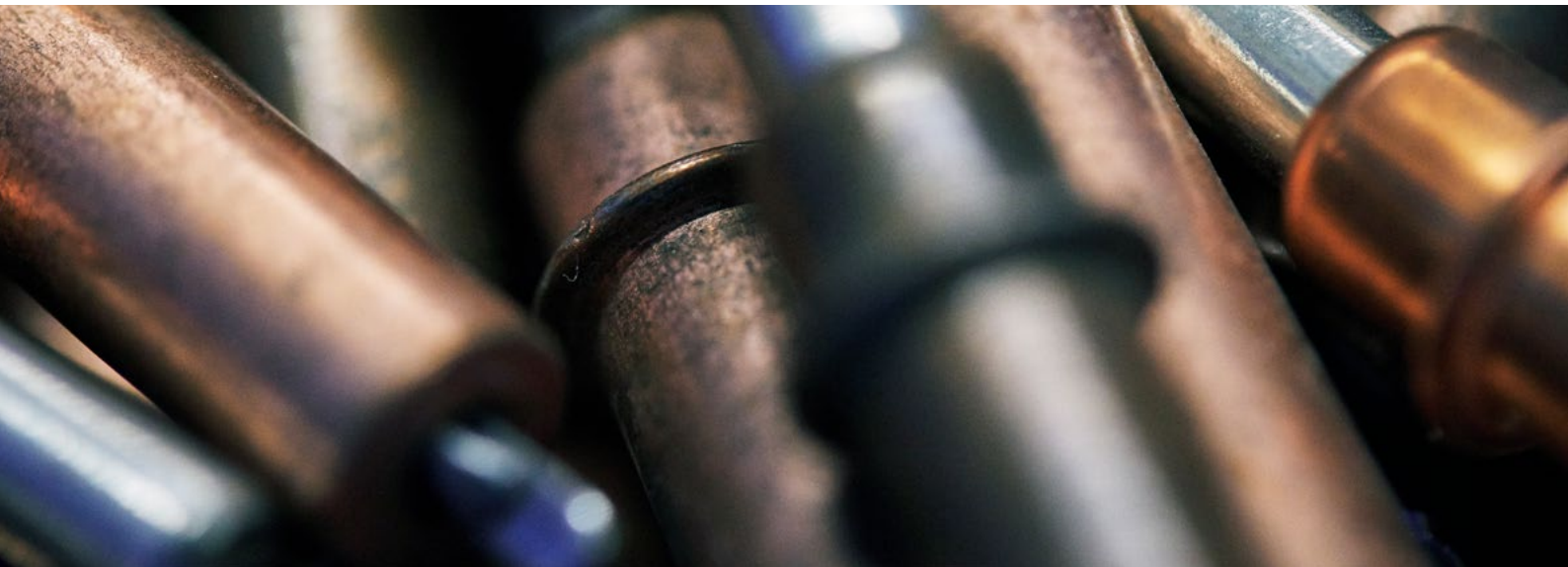
The industry’s shift toward alternative sourcing, predictive planning and circular practices is being driven by deeper structural forces.

Costs are rising as fleets age and supply chains struggle; availability is constrained by capacity gaps; and ESG expectations are expanding across procurement and regulation. Understanding these underlying drivers explains why the balance of cost, availability and sustainability has become unavoidable.

“

***USM isn't just a
cost story anymore
- it's an emissions
story too.***

Richard Brown,
Managing Director at Naveo Consultancy



Cost: Paying the price for supply-chain volatility

Supply-chain volatility is driving costs higher, according to the Oliver Wyman and IATA [report](#). Airlines faced \$11.3 billion in extra MRO costs in 2025. Broken down, this was caused by:

- **\$4.2 billion for excess fuel costs** – caused by older, less fuel-efficient aircraft because new aircraft deliveries are delayed.
- **\$3.1 billion for additional maintenance costs** – older aircraft require more frequent and expensive maintenance.
- **\$2.6 billion for increased engine leasing costs** – airlines need to lease more engines since engines spend longer on the ground during maintenance.
- **\$1.4 billion for surplus inventory holding costs** – airlines are stocking more spare parts to mitigate unpredictable supply chain disruptions, increasing inventory costs.

Meanwhile, new-generation engines and systems are also costly to service. A [report](#) from Boston Consulting Group highlights how they generate higher part counts and shorter intervals between visit cycles, stressing repair/replacement budgets.

Availability: Root causes of component scarcity

Some 65% of aerospace companies blame component supply bottlenecks on personnel shortages while 34% cite missing production capacity, according to a Roland Berger report. The personnel shortages are well documented in Chapter 4, while the missing production capacity can be attributed to the casting and forging industry, which is responsible for manufacturing a wide range of critical components.

It has become one of the biggest [chokepoints](#) in the global supply chain due to decades of under-investment – a situation that worsened during the pandemic when foundries and forging houses lost capacity and staff. Some even closed down, causing a huge problem as new venues take three to five years to build.

Reduced availability results in longer lead-times, unpredictable parts delivery and an elevated risk of operational disruption for airlines and MROs. As Risto Mäeots, CEO of Magnetic Group, observes:

“We’ve seen lead-times double or triple, and some parts are simply unavailable.”

Sustainability: How transparency has become key

Increased interest in embracing sustainability is mainly a result of the need to satisfy stakeholder reporting needs and procurement pressure.

The Smart Freight Centre’s [Airline ESG Survey](#), for example, reveals that aviation operators now benchmark ESG performance (emission rates etc.) because customers require comparable data for procurement decisions.

Airlines, shippers and freight buyers are accordingly exchanging ESG data [in a standardised format](#) – so no longer voluntarily.

Everything from support contracts to supplier selection requires measurable sustainability credentials, as do regulators, such as the EU’s [Corporate Sustainability Reporting Directive](#) (CSRD) and ICAO, which requires emissions monitoring under [CORSIA](#).

OEMs, meanwhile, are highlighting the fuel efficiency of new-generation aircraft and capability of using SAF, because ESG is no longer a [fringe priority](#). Rather, it is a [required procurement criterion](#) integral to maintenance strategy, influencing part-selection, sourcing, and lifecycle decisions.

As these pressures intensify, attention is turning to practical solutions that can ease cost, availability and sustainability challenges at the same time. This is where circularity and USM are gaining momentum.

Circularity: aligning cost, availability and sustainability

Circularity [is gaining momentum](#) because it enables aviation to align cost, availability and sustainability – three pressures that now move in the same direction.

Circular practices are increasingly [seen as cost-efficiency levers](#). For example, industry analysts note that the reuse of components reduces waste, lowers parts cost and shortens lead-times – thus aligning availability, cost and ESG.

Furthermore, according to [Aviation Week](#), an increase in the retirement rate in 2025 and delayed OEM deliveries are injecting more USM into the market, which is making circular pathways [economically attractive](#).

Following [improvements in composite recycling](#), the range of components that can be reintroduced into the maintenance cycle is broader than ever.

Meanwhile, regulators like the EU's [SUSTAINair programme](#) are steadily embedding circularity across design, maintenance and end-of-life processes, creating new standards for repair, remanufacture and responsible material recovery.

USM: demand accelerating in the race to cut costs

According to the 2024 industry analysis '[Aircraft Disassembly and Used Serviceable Materials](#)', MROs and airlines are turning to USM because “lengthy OEM lead-times” force them to seek faster alternatives.

Deloitte's [A&D Outlook](#) reveals that manufacturers face production constraints through 2026, keeping pressure on material availability and encouraging circularity, repair and reuse.

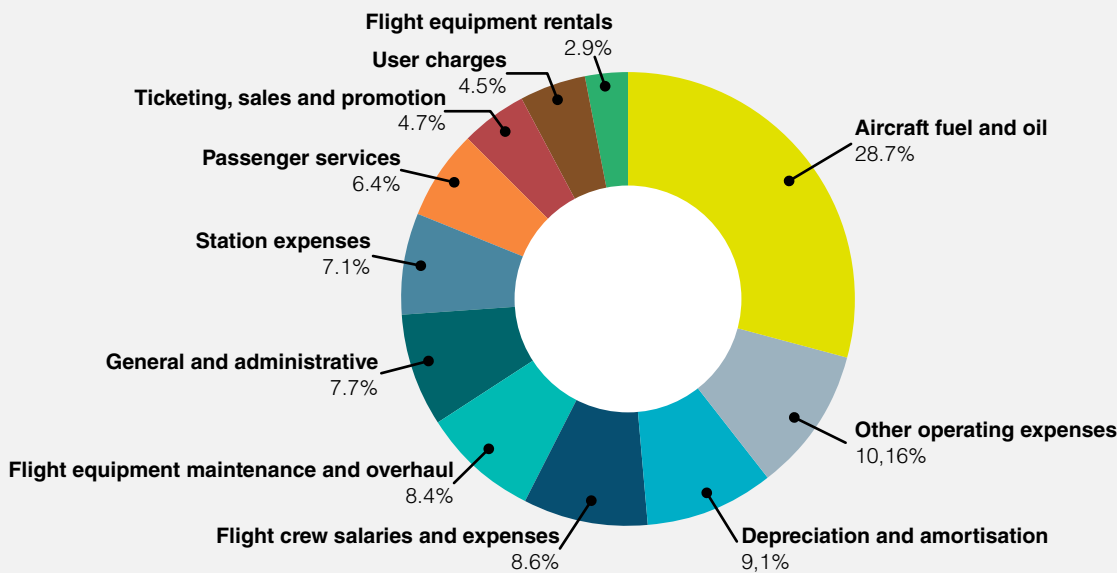
MROs and airlines are also turning to USM because of its affordability compared to new parts – after fuel, MRO expenses weigh in as one of the airline industry's biggest costs. In 2022, they accounted for [8.4%](#) of their annual expenditure, but this share has shot up due to the additional costs caused by [supply chain volatility](#). As Alejandro Ceballos, Director Technical Assets at Aer Lingus, puts it:

“If we can use USM and reduce both cost and waiting time, of course we will do it.”

PwC's 2025 [outlook](#) warns that volatility in parts, labour and fuel costs is narrowing operator margins, making efficiency gains essential.

The use of USM can accordingly achieve great savings. [For example](#), an engineering-analysis of engine shop visits found that using USM instead of new parts “has the potential to save several hundred thousand dollars in a single shop visit.

Airline Cost Items Breakdown



Source: [IATA analysis of WATS data](#)



Outlook: Towards a more resilient maintenance model

As the MRO sector enters the remainder of this decade, the balancing act of cost, availability and sustainability becomes the operative agenda rather than a theoretical one. With fleet growth, supply-chain stress and ESG regulation converging, maintenance strategies must shift from reactive fixes to proactive design-and-supply-chain orchestration.

Cost: optimisation coming into sharp focus

In response to increases in MRO and material spending, operators need to lock in cost-control through alternative parts sourcing, digital automation and longer-term supply frameworks.

Supply chain strain has made alternative sourcing such as USM [a key strategy](#), as operators seek lower-cost, faster lead-time parts.

At the same time, leading providers [are adopting](#) digital automation and predictive tools to stabilise costs and manage constrained capacity.

Finally, long-term supply frameworks [are becoming essential](#) to protect budgets from volatility and secure material availability, as highlighted in multiple 2025 MRO industry surveys.

Availability: engineered, not assumed

Supply-chain weaknesses remain [pivotal](#). Production shortfalls and labour constraints are expected to limit output and restrict aftermarket capacity well into 2030, contributing to higher maintenance backlogs and deferred shop activity.



To mitigate this, operators [are developing](#) alternative material pathways – including USM, teardown-sourced components and circular supply chains – as persistent OEM delays and long part lead-times force operators to diversify away from new-material dependence.

They are also building [predictive inventory](#) and using data to forecast removals and avoid unexpected shortages more accurately – a trend that has been accelerated by digital twins, predictive maintenance and integrated planning tools.

At the same time, MROs and airlines [are partnering](#) more deeply with suppliers through long-term agreements, joint forecasting, and integrated planning to secure material flow and protect turnaround times.

In an environment where demand outstrips supply, availability can no longer be assumed, it must be engineered.

ESG: embedded in the maintenance life-cycle

MRO organisations are steadily embracing ESG-aligned part selection ([prioritising repair options](#) and [lower-impact materials](#)), increased sourcing transparency ([including full digital traceability of parts and certificates](#)) and lifecycle-based planning (tracking emissions associated with repairs versus replacements).

Many MROs are already [incorporating](#) sustainability metrics into maintenance decisions through digital twins and emissions-tracking tools.

By 2030, [ESG will be structurally embedded into all maintenance strategies](#): operators will evaluate suppliers on emissions intensity, reward low-carbon material pathways and use digital records to optimise repair-versus-replace decisions.

ESG will no longer sit alongside cost and availability – it will actively shape them.



Circularity and USM: Converging into a single strategic pathway

Circularity and USM are increasingly working as a single pathway for improving cost control, strengthening material availability and supporting sustainability goals.

Their expansion is supported by industry evidence that repair, reuse and teardown-sourced components can reliably reduce cost and shorten lead-times.

Studies such as [Fraunhofer's work](#) on composite recycling demonstrate how more materials can now re-enter the maintenance cycle with sufficient structural integrity, while Deloitte's '[A&D Industry Outlook 2025](#)' highlights continuing OEM production constraints that sustain demand for teardown-sourced material.

Key developments include:

- [More strategic end-of-life asset planning to feed USM pipelines](#), as required for rising retirement rates and teardown strategies.
- [Material provenance and certification systems to ensure component history can be verified](#), which are reflected in digital-traceability initiatives highlighted across ICAO guidance and USM marketplace development.
- Growing availability of teardown-sourced components as retirements rise, which is consistent with 2025 market observations reported by [AAR](#).
- Circular standards embedding reuse and remanufacture across aerospace value chains which are exemplified by the [EU's SUSTAINair programme](#).
- Operators adopting hybrid maintenance models blending repair, USM and OEM material as identified in Deloitte's '[A&D Industry Outlook 2025](#)' and wider industry analysis.

[By the late 2020s](#), circular and USM practices will form an integrated supply route that cuts costs, secures material flow and reduces environmental impact – making them [central pillars](#) of maintenance planning rather than optional alternatives.



Chapter 6

Overcoming Trade, Customs and Regulatory Complexities

Crossing international borders has always been very much part of aviation's DNA, but the complexity on the ground is heavier than ever.

For airlines, MROs and OEMs, navigating trade, customs and regulatory complexity is now as critical as managing labour or material shortages.

This chapter examines how these pressures are reshaping maintenance logistics, why they have intensified, and what the industry must do to stay resilient.



The Shift: Turbulent times for cross-border parts flows

The operating reality for cross-border parts flows has shifted dramatically amid rising tariff exposure, uneven customs regimes, geopolitical realignments and growing expectations for visibility and planning certainty.

These forces are altering how parts are routed, how quickly they move and how reliably maintenance schedules can be protected.

The following section outlines the key shifts that are redefining global parts logistics today.

Near-term issues expected to impact operations and supply – now and going forward

■ Agree ■ Strongly agree ■ Other

Supplier and material costs will increase significantly in the next 12 months.

52%

39%

9%

We will significantly change our supply chain strategies as a result of US trade policy changes.

54%

37%

9%

Geopolitical risks are driving us to make our operations more flexible.

47%

39%

14%

Question: To what extent do you agree or disagree with the statements?

Source: 2025 Digital Trends in Operations Survey

How tariffs are complicating cross-border parts flows

Aviation depends on international border crossings, both for aircraft and for the parts that keep them flying.

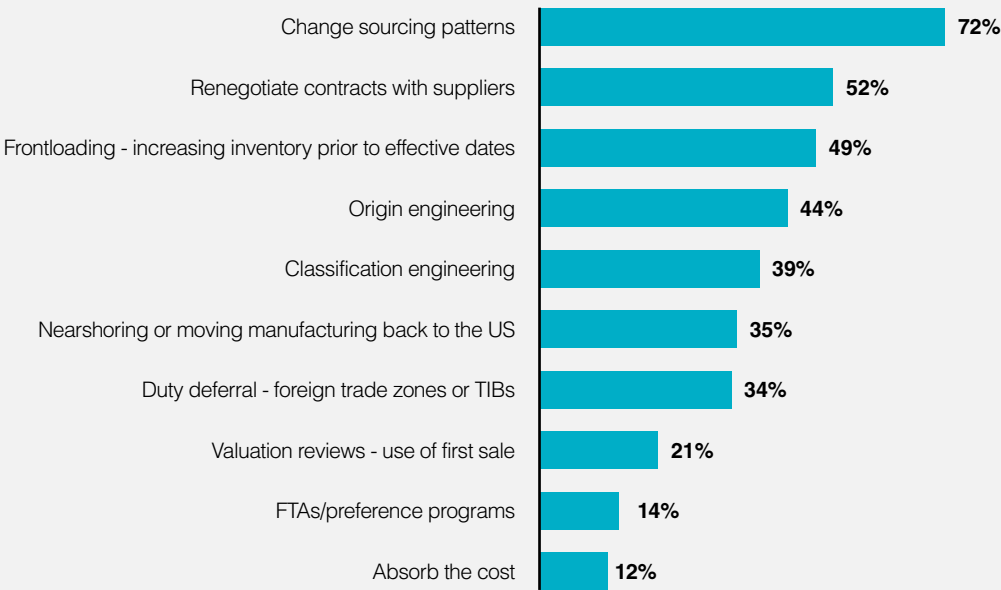
Today, however, global supply chains are grappling with rising tariff exposure and it is causing concern – 91% of operations and supply chain leaders say they'll significantly change supply chain strategies due to US trade policy changes.

According to the 2025 WTW Global Supply Chain Risk Survey, just 8% of businesses believe they have full control over their supply chain risks and 63% report higher-than-expected losses.

As Richard Brown, Managing Director of Naveo Consultancy, explains:

“Tariffs are another headache for leadership, distracting them from delivering parts and maintaining them on time, at the right price, for the customer. Aerospace has traditionally been exempt from tariffs, but now leadership has had to go through its supply chain and spend time understanding the impact (or lack thereof) of tariffs. Fortunately, our industry consists of engineering mindsets used to thinking calmly and methodically and working through problems. We handled everything the pandemic threw at us because aviation is good at adapting.”

Which of the following mitigation strategies are you using or considering to better manage the tariffs that have been or will be imposed by the United States?



Source: Thomson Reuters 2025

Customs fragmentation complicates cross-border parts flows

Customs fragmentation [is also increasingly disrupting](#) the movement of aircraft parts. The patchwork of customs regimes and evolving rules is generating friction in the timely movement of maintenance components.

Logistics providers [highlight](#) how changes in documentation, pre-arrival filing and multi-stage inspections vary by border, adding lead-time unpredictability to shop planning. In practice, critical components routed for engine shop visits may require additional declarations, segmented inspections or new origin checks depending on the jurisdiction – [all of which](#) undermine the availability of ‘just-in-time’ maintenance.

Industry analysis [indicates](#) that these inconsistencies are emerging across multiple regions simultaneously, creating uneven clearance experiences: the same shipment can clear rapidly in one country but stall unexpectedly in another.

Geopolitical shifts are complicating cross-border parts flows

Geopolitical realignments and trade policy shifts are influencing where and how maintenance parts move globally. Airlines and MROs [report](#) that sanctions, reciprocal tariffs, and evolving trade diplomacy are forcing reconsideration of supply-chain routing and partner selection.

For example, routes once regarded as stable – such as returning teardown parts from Asia or moving critical modules through the Middle East – now carry heightened exposure to border delays, re-routing and cost shocks.

As a result, operators are relying on alternative corridors, which are themselves [vulnerable](#) to regulatory or diplomatic change, tightening planning windows and increasing routing uncertainty.

A geopolitical overview is now an essential part of the job description, reveals Risto Mäeots, CEO of Magnetic Group:

“When I joined this company in 2007, I never believed my job would involve so much following of politics: always analysing where you might operate and where you shouldn’t.”

Transparency is integral to the parts-supply chain

Operators are increasingly prioritising transparency across the parts supply chain. McKinsey [notes](#) that aerospace companies are accelerating investment in sub-tier supplier visibility and real-time data sharing to prevent unexpected parts-chain failures.

Industry surveys echo this shift, as airlines are [increasing](#) their spending on data-sharing, APIs and operational visibility tools.

For MRO planners, the ability to track the origin, status, and movement of a part across borders is now a [prerequisite](#) for anticipating customs holds, duty exposure and routing volatility. IATA’s [ONE Record](#) initiative formalises this expectation by establishing a single, API-linked data standard across the cargo chain.

“

When I joined this company in 2007, I never believed my job would involve so much following of politics: always analysing where you might operate and where you shouldn't.”

Risto Mäeots,
CEO of Magnetic Group

Risto Mäeots, CEO of Magnetic Group, underscores the necessity of this transparency-driven compliance:

“As a responsible company, we need to know everything about our vendors and customers, both new and established, whether they fall under a sanction or blacklist, or if they have been trying to circumvent sanctions.”

Operators more drawn to planning certainty than flexibility

In today's tight maintenance environment, the demand for predictable lead times and reliable routing is acute.

Surveys [reveal](#) that operators regard the minimising variation of parts arrival and shop availability as a higher priority than incremental cost savings.

When the margin for delay is narrow and aircraft downtime is expensive, any ambiguity in customs or parts logistics becomes a significant operational risk, which drives the industry toward frameworks that emphasise [certainty](#) over flexibility.

Why this is happening: Complexity at every corner

Behind these shifts lie deeper structural drivers. Tariff volatility, asynchronous regulatory reforms, geopolitical fragmentation and capacity constraints are converging to amplify risk in the parts supply chain.

Understanding why these frictions have intensified is essential for interpreting industry behaviour: from operators' heightened demand for transparency to their increasing insistence on predictable routing and compliance certainty.

Why tariffs complicate cross-border parts flows

Tariff exposure is rising [because](#) global aerospace parts cross multiple jurisdictions both before delivery and during maintenance cycles. The repeated border movement means that a single component may incur multiple duties or trade barriers if policy regimes shift.

This is [raising costs](#) and adding complexity to routine MRO logistics. For example, Canadian and Mexican-origin aircraft parts that are being shipped into the US for maintenance [now face risks of tariffs](#) under evolving trade policies – a situation which forces MRO providers to weigh repair location decisions against duty burdens.

Additionally, trade policy is becoming increasingly unstable. Threats of large tariffs on aircraft and parts have [undermined](#) the duty-free norms that allowed aerospace supply chains to operate with minimal friction for decades.

Why customs fragmentation complicates cross-border parts flows

Customs fragmentation is intensifying because regulatory change is occurring asynchronously across countries. Some jurisdictions are tightening pre-loading security filings, others are introducing new sanitary or origin-verification rules, and several are revising duty-deferral and free-trade-zone arrangements. This regulatory divergence **creates** inconsistent clearance pathways for the same part.

OECD's Supply Chain Resilience Review **confirms** that uneven adoption of digital customs systems and disparate national compliance regimes are now major contributors to transit variability and border delays.

At the same time, capacity shortages and labour constraints amplify the impact of fragmented rules. Alton Aviation **notes** that when regulatory tightening compounds existing bottlenecks, turnaround times lengthen and procurement complexity rises.

This misalignment across borders forces MROs to build buffer time, over-stock safety inventory, or plan longer routing options to hedge against clearance uncertainty, thus **turning** regulatory inconsistency into a direct operational and cost risk.

Why geopolitical shifts complicate cross-border parts flows

The wider geopolitical environment is redirecting supply routes and reshaping trade alliances.

For the aerospace sector, this means that low-duty trade corridors can shift rapidly – for example when **China publicly warns** of US tariffs affecting the aviation industry.

The resulting uncertainty forces firms to treat supply-chain routing as a **strategic variable** rather than a fixed logistics cost, which elevates regulatory and trade-policy risk into planning models that were previously logistics-centric.

Why operators want transparency

When supply-chain complexity increases, the 'unknowns' multiply: unknown duty exposure, unknown delay risk, unknown routing cost. Transparency becomes the **countermeasure** to unpredictability.

McKinsey's **research** indicates aerospace companies are investing in sub-tier supplier visibility and real-time data flows to avoid being blind-sided by parts-chain failures. For MRO operations, that means tracing a part from teardown through certification, shipping, customs clearance and installation to improve **confidence** in planning. Without visibility, resilience becomes reactive and downtime risk increases.

Why operators want planning certainty

In a period of tight capacity for maintenance, ageing fleets, and high utilisation, **the margin for error** in logistics is small.

[Financial reports](#) show that surging repair costs and logistics risks mean that unplanned delays translate directly into revenue loss.

Accordingly, operators are [measuring](#) lead-time volatility as a key performance indicator. They are pushing instead for predictable delivery, reliable routing and fewer surprises – not just because it's best practice, but because the cost of variation has become unacceptably high.

More operators are investing in AI-enabled visibility platforms to prevent misrouted or delayed parts, as a direct response to customs variability.

Outlook: Complexity is an opportunity to build resilience

As trade and customs complexity becomes a permanent feature of the operating landscape, airlines and MROs must move from tactical workarounds to strategic resilience.

The [next five years](#) will accordingly push operators toward proactive compliance design, digital documentation ecosystems, diversified routing, predictive customs modelling, and deeper supplier integration.

These adaptations will define how effectively operators can protect turnaround times, stabilise costs, and maintain cross-border reliability.

Compliance-by-design will become standard practice

As trade requirements tighten across multiple jurisdictions, operators will be forced to build compliance into the maintenance workflow rather than treat it as a post-shipment checkpoint.

The EU's [ICS2 Phase 3](#) (effective March 2024-2025) requires pre-loading and pre-arrival data for all air cargo, and the Commission explicitly warns of penalties and shipment delays for non-compliance, which makes automated validation unavoidable.

Similarly, the UK's [Border Target Operating Model \(BTOM\)](#) introduces staged checks, new documentary requirements, and differentiated risk-based controls, which the UK Government acknowledges will increase process variation for importers through 2025-2026. Anticipating this, [IATA](#) has urged carriers to adopt digital pre-clearance workflows to reduce inspection-triggering errors and ensure smooth cargo transit across increasingly heterogeneous regimes.



Macro-economic research aligns: [Thomson Reuters' 2024–2025 Global Trade Report](#) forecasts placed geopolitical divergence and a “persistent rise in cross-border compliance exposure” as important through to 2030, meaning multi-jurisdiction alignment will become an operational necessity, not a strategic option.

Digital documentation ecosystems will replace legacy paperwork

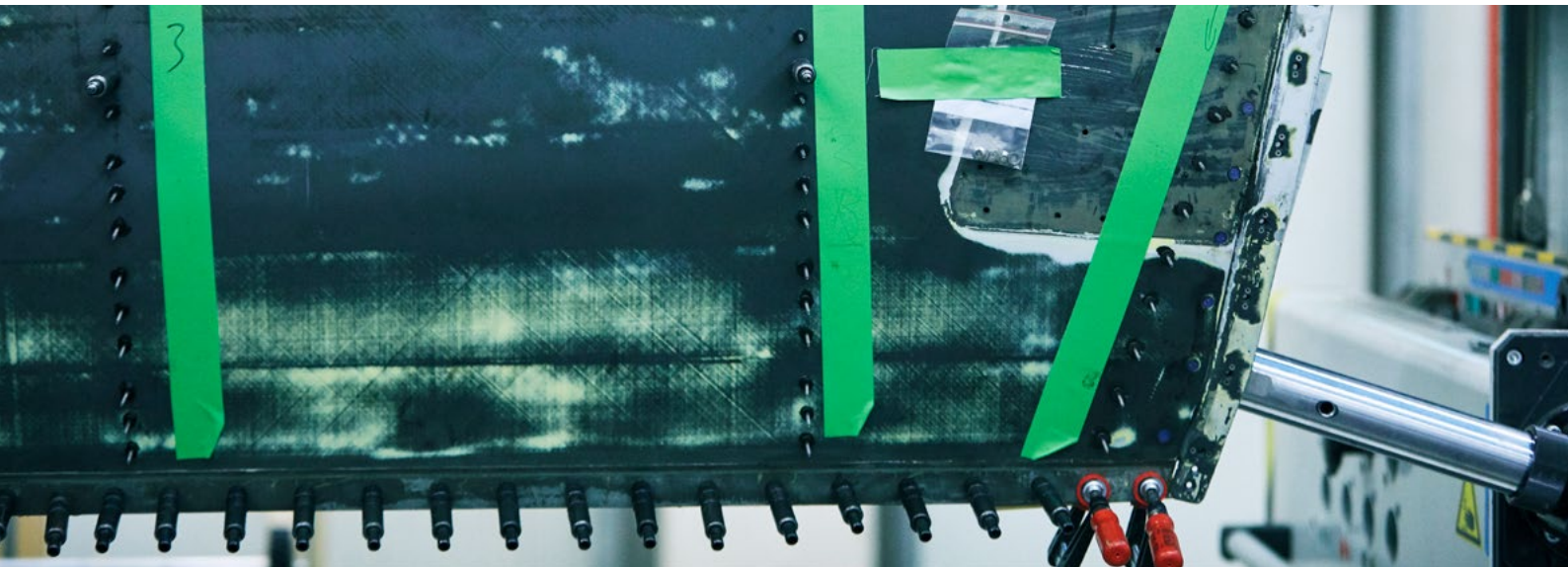
The next regulatory cycle will make paper-based customs processes obsolete as digital identity, API-linked documentation, and real-time status data become default operating conditions.

From 1 January 2026, IATA will designate [ONE Record](#) as the preferred global data-sharing standard, enabling a single shipment record and API-driven document synchronisation across all cargo stakeholders.

SITA's [Air Transport IT Insights 2024 report](#) shows that over 70% of airlines are increasing investment in digital workflow tools – including AI-enabled exception detection – specifically to prevent customs-related misrouting and delays.

At the same time, regulators are beginning to digitalise core airworthiness documentation, with EASA [confirming](#) that electronically carried and digitally authenticated certificates are acceptable under EU rules. This shift replaces traditional paper forms with secure digital records, supporting more efficient approvals, reducing inspection delays and improving cross-border auditability.

The OECD's [digital trade facilitation benchmarks](#) show that digital identity, e-declarations and pre-submission mechanisms cut clearance times materially, enabling operators to embed customs predictability into maintenance planning models.



Route diversification and multi-hub strategies will expand

To manage heightened trade friction, operators are already beginning to reshape logistics flows – and this will accelerate sharply through 2030.

Reuters [notes](#) that rising tariffs and weakening global trade rules are compelling airlines to avoid single-country repair pipelines due to exposure to sudden regulatory shocks.

Alton Aviation's Outlook 2025 [predicts](#) that geopolitical volatility will push airlines toward dual-sourcing strategies for high-value rotables and more fragmented hub networks to hedge clearance and routing risks.

Boeing [highlights](#) a structural shift of cargo flows toward the Middle East and South Asia, signalling that operators must diversify routing to maintain resilience across politically sensitive corridors.

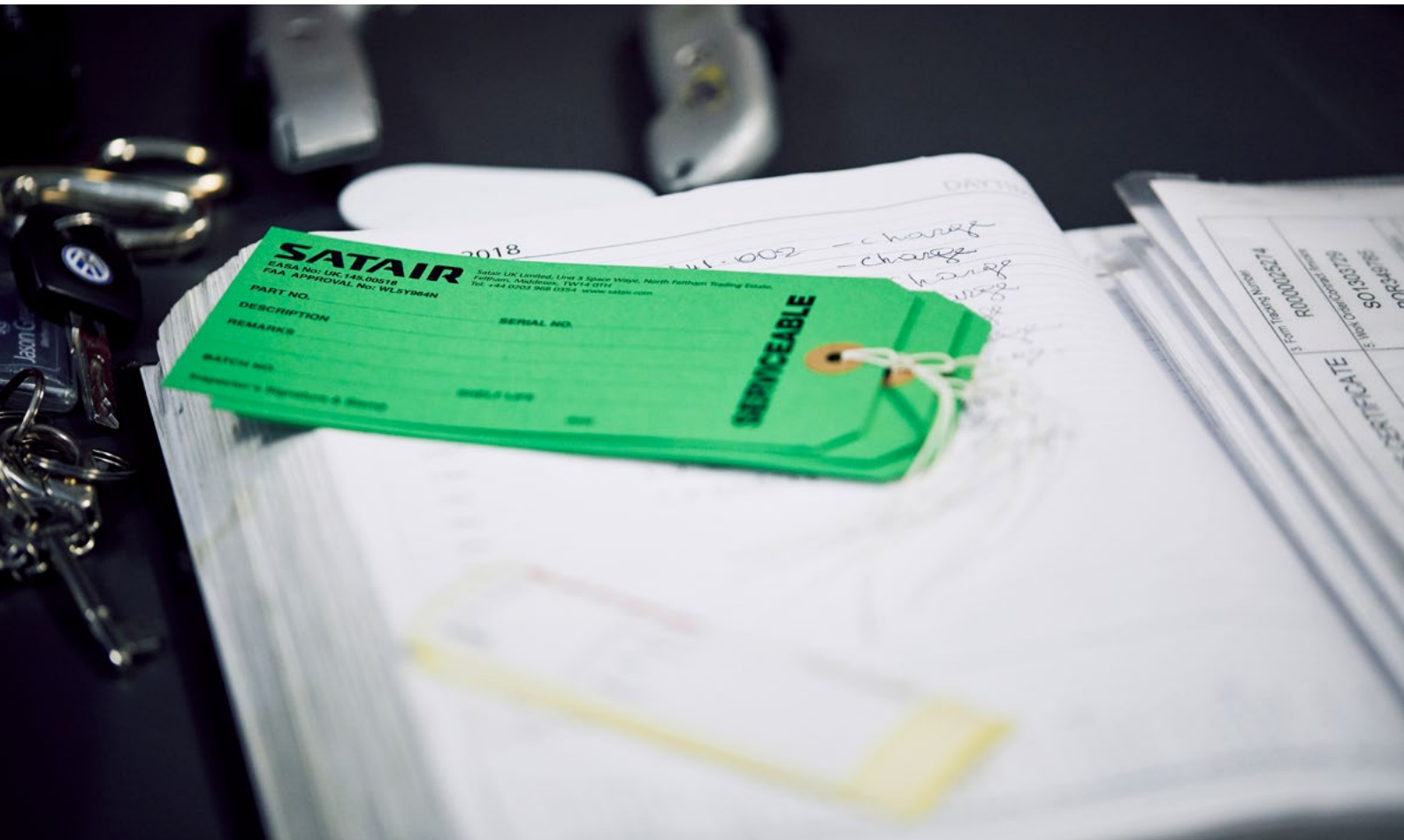
Predictive customs planning central to TAT protection

Maintenance organisations will increasingly rely on predictive modelling to safeguard turnaround-time reliability against customs-driven disruptions.

MRO Demand Challenge [suggests](#) that reducing lead-time volatility has become one of the top performance priorities for airlines and MROs, driven largely by unpredictable border processes.

The OECD [contends](#) that digital trade facilitation tools – pre-submission, automated risk-tiering and digital identity – significantly increase cross-border predictability, allowing MROs to model expected delays and plan slot allocation more reliably.

As fleets age and MRO capacity remains constrained, predictive customs modelling will [shift](#) from a competitive advantage to a basic operational requirement.



Supplier-operator integration will define resilient supply chains

The next stage of aviation resilience will centre on coordinated trade compliance, integrated planning and shared logistics forecasting across the value chain.

IATA's 2024 global outlook [states](#) that persistent supply-chain constraints require “collaborative planning, shared forecasting and jointly managed constraints” across operators and suppliers.

Similarly, KPMG's Aviation Leaders Report 2025 [notes](#) that airlines increasingly sign long-term logistics and material agreements to mitigate trade and customs risk, locking in routing stability and reducing surprise exposure.

Boeing's CMO 2025-2044 [emphasises](#) that multi-nodal supply chains increase vulnerability, but operators that integrate deeply with suppliers gain adaptive flexibility, which is crucial as geopolitical volatility reshapes cargo corridors.



Chapter 7

Growth Markets and Future Opportunities

Growth in the MRO industry has resumed where it left off towards the end of the 2010s, albeit with a few extra costs caused by OEM production delays – most notably in mature markets such as Europe and the US.

Demand for new aircraft and more MRO capacity is particularly high in the Asia-Pacific (APAC) region, where an explosion in middle-class populations has caused passenger numbers to grow at a very quick rate.

To conclude this report, Chapter 7 will assess the APAC growth and how it is generating optimism about the future opportunities of the industry as a whole.

The Shift: Keeping track of the growing demand

In light of their steadily growing middle-class populations, it will surprise few to learn that China and India account for a sizeable share of the growing demand for aircraft and MRO capacity.

APAC faces the same constraints that have dogged aviation and MRO since the onset of the pandemic, but has a more positive outlook in the areas of sustainability, automation and regional innovation.

As Risto Mäeots, CEO of Magnetic Group, observes:

“It’s the fastest-growing market by any measure.”

Demand for 42,450 commercial aircraft between 2025 and 2044



Source: Airbus

APAC the leading contributor to global fleet/MRO growth

APAC is the world's fastest-growing region for fleet expansion, passenger numbers and MRO demand. In June, IATA named the region as the “[engine of global air travel growth](#)”, citing how it accounted for 52% of the increase in global passenger numbers in 2024 on the back of 9% YoY growth. Europe, in second place, accounted for 28% of total growth in 2022 with a YOY of 6%.

This record year saw APAC carriers achieve an international load factor of 81.6% – which [AAPA](#) view as an impressive feat given how they were managing capacity constraints from supply-chain delays.

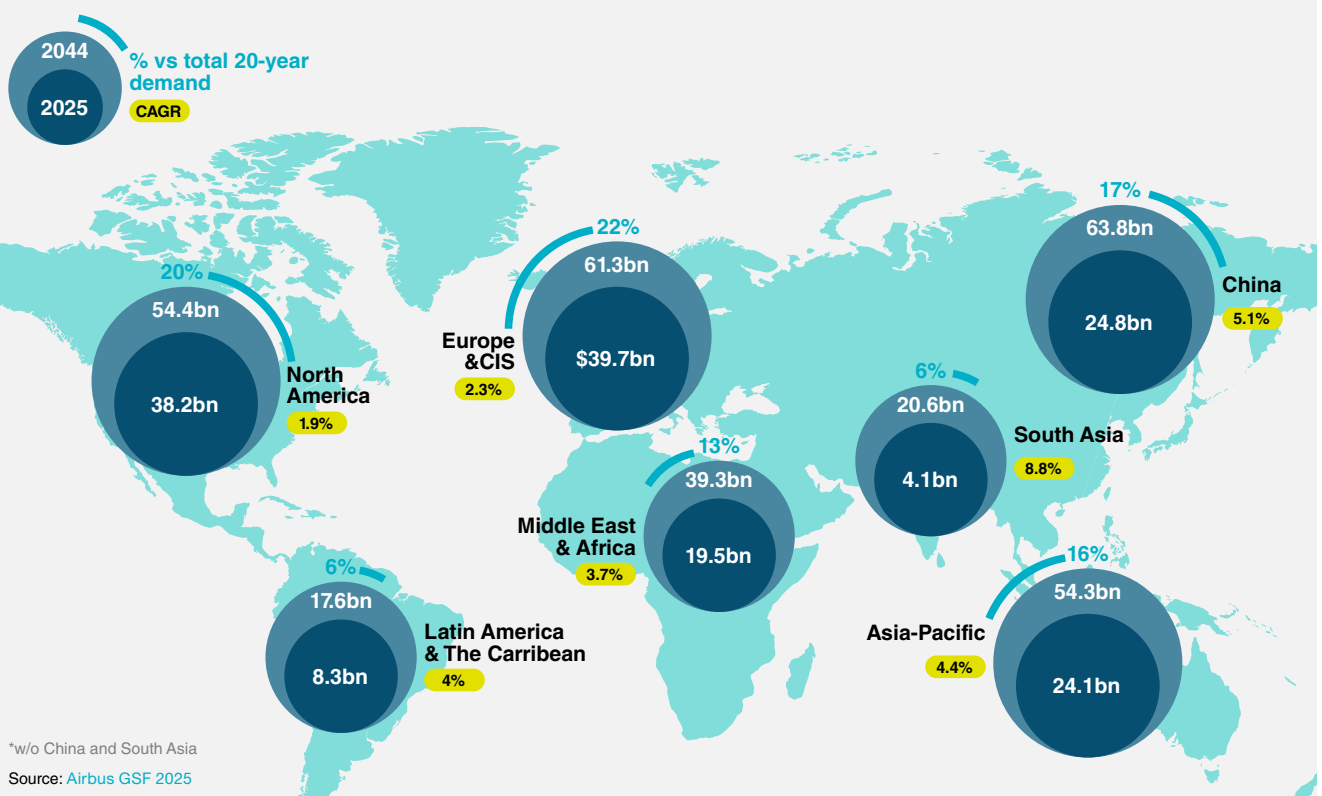
Fleet and MRO demand, meanwhile, have been accelerating alongside passenger recovery. [According to](#) Oliver Wyman's Global Fleet & MRO Market Forecast 2025–2035, APAC is the world leader for global fleet growth.

APAC's MRO spend is projected to grow faster than any other region as utilisation rises and engine-shop loads increase, [reports](#) Aviation Week's 2025 Commercial Fleet & MRO Market Summary.

As Richard Brown, Managing Director of Naveo Consultancy, notes:

“Asia Pacific and China are the key growth markets: that's where a large proportion of the aircraft backlog is heading.”

Aftermarket demand growth projections 2025-2044



Optimism around sustainability and automation

Across APAC, 70% of airlines plan to increase spending on AI, automation, and data-sharing, to improve operational efficiency, [according to SITA's Air Transport IT Insights 2024](#).

The region is moving quickly in the area of sustainability. Reuters reports that its sustainable aviation fuel (SAF) capacity is [ramping up at pace](#) due to new projects in Singapore, Malaysia, and Thailand that could potentially outstrip regional demand by the late 2020s, positioning APAC as a net supplier.

The [World Economic Forum's Global Aviation Sustainability Outlook 2025](#) notes rising executive confidence that SAF, circular maintenance practices, and digital emissions-management tools will scale meaningfully in APAC, even though cost and availability remain key concerns.

And innovation extends beyond sustainability. [CAPA's Asia-Pacific Aviation Outlook 2025](#) predicted that APAC, supported by regional startups, low-cost carrier expansion and new narrow-body long-range routes enabled by aircraft like the A321XLR, would exceed its pre-pandemic international capacity in 2025.

Why is this happening: The structural drivers of APAC's growth

APAC accounted for over half the increase in global passenger numbers in 2024, but as it is home to 60 percent of the global population, is it just a simple question of having more citizens?

No, it has more to do with their populations' increased spending power and the market's increased ambition heading into the future.

Why is APAC leading both fleet and MRO growth?

Why then, is APAC outstripping all other regions? In two words: China and India.

In 2024, the countries added 31 and 33 million new middle-class people respectively, over half of the total worldwide gain of [113 million](#). Over the rest of the decade, China's middle class will grow by another [8.7 percent](#) to take its total over 700 million, while India (where domestic passenger numbers have surged [129%](#) over the last decade) will add 17.8 percent to close in on half a billion.

Southeast Asia's middle-class population is also growing fast: Indonesia, Thailand, Vietnam and the Philippines expect their middle-class populations to increase by 10, 13.5, 24 and 49 percent respectively by 2030. In South Asia, meanwhile, the middle-class populations of Bangladesh and Pakistan are also growing quickly.

This expected growth is mirrored in air passenger increase [projections](#) (see table). By the time China overtakes the US (and intra-Europe) as the global leader in 2042, five other Asian countries will be in the top 11 – which aligns with the consensus that APAC secondary markets are under-served.

Airbus [highlights](#) how structural demand in China and India is being driven by first-time flyers and domestic network expansion. The report notes that Asia and the Middle East will account for the largest share of global aircraft capacity by 2044.

Aviation's growth outlook is strong, concurs Richard Brown, Managing Director of Naveo Consultancy:

“The link with emerging middle classes in developing regions – particularly in India, Southeast Asia, Latin America and the Middle East – means the outlook for aviation is strong. That's very exciting. People want to travel and have experiences, but we know this growth needs to happen sustainably. Recognising our environmental responsibilities and fulfilling net-zero obligations by 2050 is key. From an aftermarket perspective, we're getting increasing demand from airlines and MROs in growth regions that require support.”

Top 20 markets (Total passengers)

Rank	2023	2042	2052
1	United States	China	China
2	China	United States	United States
3	India	India	India
4	Spain	Indonesia	Indonesia
5	United Kingdom	Spain	Spain
6	Japan	Japan	Turkey
7	Turkey	Turkey	Japan
8	Brazil	United Kingdom	United Kingdom
9	Italy	Russian Federation	Thailand
10	Germany	Thailand	Vietnam
11	Mexico	Vietnam	Mexico
12	France	Mexico	Russian Federation
13	Indonesia	Brazil	Brazil
14	Russian Federation	Italy	Philippines
15	Canada	Germany	Italy
16	Australia	Korea	Korea
17	Korea	France	Australia
18	United Arab Emirates	Australia	Germany
19	Thailand	Philippines	France
20	Vietnam	United Arab Emirates	United Arab Emirates

Source: ACI World

“

People want to travel and have experiences, but we know this growth needs to happen sustainably. Recognising our environmental responsibilities and fulfilling net-zero obligations by 2050 is key.

Richard Brown,
Managing Director at Naveo Consultancy



Why APAC remains resilient despite supply-chain constraints

Even with OEM delivery delays and parts shortages, APAC demand continues to strengthen because regional carriers are growing faster than the global average.

Oliver Wyman [notes](#) that APAC's aircraft backlog is among the world's largest, with India's fleet set to double by 2035, ensuring long-term demand for engines, components and MRO services.

AAPA [adds](#) that cargo markets remain strong, fuelled by cross-border e-commerce and intra-Asia supply-chain integration – both of which generate sustained demand for freighters and conversions.

Why sustainability and automation investment is accelerating

The region's commitment to digitalisation and green aviation is driven by rising regulatory pressure, market differentiation, and the need to scale operations despite labour constraints. SITA [notes](#) that APAC carriers report the highest global intention to invest in automation, reflecting both ambition and necessity.

In the area of sustainability, Singapore's Green Fuel Forward initiative [illustrates](#) regional leadership, creating aligned demand signals for SAF and early infrastructure development.

Why regional innovation ecosystems are gaining momentum

Government-supported aerospace clusters in Singapore, South Korea, Japan and India are accelerating R&D and MRO capability.

Accenture's Commercial Aerospace Insight Report [highlights](#) APAC as a major hub for next-generation MRO technologies, digital twins, robotics and workflow automation.

The Outlook: Regional acceleration to reshape the next decade

The next decade will be defined less by global uniformity and more by regional acceleration, with APAC, the [Middle East](#) and parts of [Latin America](#) emerging as the gravitational centres of fleet growth, MRO demand, and sustainability innovation.

[According to PwC](#), the strategic opportunities for suppliers, MROs and OEMs, will come from aligning footprint, capability and investment with these fast-expanding markets.

1. APAC becomes aviation's commercial and MRO engine

Every major forecast points in the same direction: APAC is “[the engine of growth](#)”. The forecasts signal underlying robustness and a demand that will stretch infrastructure further.

Long-term forecasts reinforce the trajectory: not only are China, India, Southeast Asia and South Asia the world's fastest-growing regions for passenger increases and [the flow of new aircraft](#), but this will continue through the 2030s.

With more than 20,000 aircraft on order globally, and a disproportionately large share heading into APAC, the region will shape global aftermarket demand for decades.

For MRO providers and component suppliers, this shift creates [tangible opportunities](#):

- [Localised MRO hubs](#) – as APAC becomes the largest concentration of new-generation engines, regional MRO hubs (especially for LEAP and GTF engine families) will expand to absorb rising shop-visit loads, reduce ferry times and provide operators with faster, locally available turnaround capacity.
- [Expansion of component pools and rotatable inventory](#) – APAC's rapid fleet growth will drive demand for larger, strategically positioned component pools and rotatable stock, enabling airlines to secure high-availability parts without the cost or delay of long-haul logistics.
- [Growth in conversion and freighter programmes](#) – surging cross-border e-commerce is accelerating demand for narrow-body and wide-body freighter conversions, creating sustained opportunities for P2F providers and spare-parts suppliers across APAC.

2. Sustainability and circularity move from ambition to implementation

The APAC region is rapidly becoming a [testbed](#) for sustainability innovation – SAF production capacity in Singapore, Thailand and Malaysia is [scaling faster](#) than regional demand, positioning Asia as a net exporter and cost-reduction catalyst.

WEF's Global Aviation Sustainability Outlook 2025 [underscores](#) tSAF remaining the primary constraint, but CEO-level sentiment points to growing confidence as regional producers scale up.



Circularity also presents a major opportunity. GenZero & WEF's Green Fuel Forward [initiative](#), launched in Singapore, shows that APAC governments and investors are willing to catalyse early-stage green-fuel and recycling ecosystems, opening room for repair-first frameworks, USM expansion and more advanced composite-recovery processes.

However, USM is not catching on quickly enough in key APAC markets, according to Risto Mäeots, CEO of Magnetic Group, and this is potentially problematic:

“Some national airlines in these APAC markets are only using brand-new parts, despite their ageing fleet. The industry needs to tap into how we can tear down and reuse the material. So there are a lot of opportunities for selling, or acquiring and putting back to the market.”

3. Automation and digitalisation become force multipliers

SITA's [2024 Air Transport IT Insights](#) shows record IT investment across Asian airlines and airports, with strong prioritisation of AI, predictive maintenance and automation.

As fleets expand and labour imbalances persist, APAC operators will increasingly turn to:

AI-enabled maintenance planning – AI [will dynamically forecast](#) removals, shop-load requirements, and parts demand ahead of time, allowing operators to smooth peaks, pre-position inventory and reduce turnaround volatility.

IoT-linked logistics orchestration – IoT-enabled tracking [will give real-time visibility of parts in transit](#), enabling automated customs-risk alerts, route optimisation, and tighter synchronisation between logistics and maintenance schedules.

Digitally integrated MRO networks – Networks [will synchronise](#) capacity, material availability, and worksopes across regional facilities, shifting maintenance from isolated shops to coordinated multi-hub ecosystems. These tools will not only raise productivity but also [accelerate](#) APAC's shift from 'capacity constrained' to 'capability led'.



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