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OCTOBER 2024 • VOLUME 26 • ISSUE 7

# MRO

## Management



## BIGGER & BETTER

DAE chief Jeff Wilkinson on how Joramco's Hangar 7 and new training academy are central to its future growth

P.22

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### SOPHISTICATED SOFTWARE

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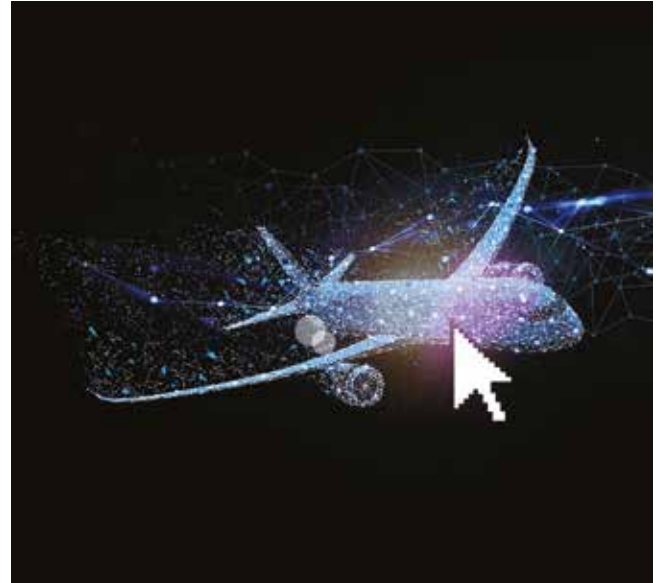
## WELCOME...

**A**s we gear up for our annual Predictive Aircraft Maintenance (PAM) conference, this year taking place in Dublin on 13-14 November, the excitement is really starting to take off.

With over 40 operators now signed up to attend, it's clear that the aviation industry is ready to come together once again and dive deep into exploring the future of maintenance, embracing cutting-edge technologies and innovative solutions that promise real transformation.

PAM is more than just a meeting – it's a platform to discuss what's next in predictive maintenance and how it will shape the future of MRO practices. Be sure to check out page 41 in this issue for all the details on how to join us.

The growing buzz around predictive maintenance speaks volumes about its potential to transform how aircraft health is managed. In this issue, you'll hear from some of the leading voices in the industry, including insights from three of our conference sponsors, who will be taking the stage in Dublin. Chris Leese-Wood from Gamit highlights how integrating AI, ML and IoT can dramatically cut aircraft downtime while enhancing safety and sustainability. David Harper from GE Aerospace delves into how advances in computing and AI/ML are driving more personalised, proactive maintenance strategies. Meanwhile, Boris Wolstenholme from Sentry



Aerospares explains how data-driven solutions can streamline MRO operations, reduce disruptions and optimise supply chains.

These experts remind us that while the opportunities are vast and exciting, challenges remain – from improving data quality to driving collaboration across the industry. But one thing is clear: predictive technologies are set to play a game-changing role in making aviation safer, more efficient and more sustainable.

We hope you enjoy this issue of *MRO Management* – one of the biggest in our history – and we look forward to seeing you in Dublin in November.

**Craig Waters**

**Editor**

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Aviation Business News

# AMOS. AGAIN.



**"Choosing AMOS was driven by its reliability and the efficiency it offers through integration with our AI solutions and seamless data sharing with partners. This enhances our operational transparency and decision-making, streamlining processes and improving cooperation across our supply chain."**

says Jan Kotka, COO of Magnetic Group.

## **Magnetic Group selects AMOS, the world-class M&E software solution.**

Trusting in Swiss-AS' history of over 200 successful implementations, the MRO provider is prepared to transition from its legacy systems and embrace AMOS' best practices.

This strategic collaboration underscores Magnetic Group's dedication to enhancing operational efficiency and streamlining maintenance processes across its operations.

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### ON THE COVER

Picture provided by Joramco

# MRO Management

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# Hangar Talk.

News from across the industry



Global Airlines

## HEAVY MAINTENANCE

### EFW AND GLOBAL AIRLINES SIGN MAJOR HEAVY MAINTENANCE DEAL

**G**lobal Airlines, the new all A380 airline, has teamed up with MRO specialist Elbe Flugzeugwerke (EFW) with a multi-million Euro deal to perform the base maintenance inspection that will enable return to commercial service for the first fully acquired aircraft.

The aircraft, 9H-GLOBL, will soon fly to Dresden where it will undergo all

necessary maintenance, including mandatory inspections and component replacements, before repositioning within Europe for an interior overhaul, ahead of starting operations in 2025.

EFW's Jordi Boto said: Given our years of experience in servicing the A380, we are excited to re-establish our MRO activities for this unique aircraft."



## TRAINING & DEVELOPMENT

### airBaltic welcomes first academy students

Latvian airline airBaltic has officially launched its Technical Academy, welcoming its inaugural class of 57 students who are set to begin their training as professional aircraft technicians.

The academy, which operates in Riga and Liepaja, offers hands-on training focused on Airbus A220-300 aircraft, and is a key part of airBaltic's ambitious goal to recruit and train nearly 400 new aviation maintenance professionals by 2030.

airBaltic's Martin Gauss said: "Skilled and well-trained professionals are the backbone of any successful airline. That's why we are committed to investing in the continuous development of our team, ensuring that airBaltic remains at the forefront of technical excellence with the best professionals and cutting-edge technological solutions."

**“We are committed to investing in the continuous development of our team**



Markus Mankia/Adobe Stock

## BASE MAINTENANCE

### Lufthansa Technik to handle A320 base maintenance for Pegasus

Pegasus Airlines has awarded Lufthansa Technik a comprehensive base maintenance contract for its growing Airbus A320 family fleet.

The three-year agreement includes more than 60 checks on A320ceo, A320neo and A321neo aircraft for the Turkish airline.

All contracted services will be performed within a dedicated overhaul line at Lufthansa Technik Sofia.

Pegasus Airlines' Şerife Akin said: "The newly concluded contract and thus the long-term intensification of our cooperation with Lufthansa Technik gives us flexibility and at the same time guarantees our high-quality standards."



Embraer

## BRIEFS

- Embraer Services & Support has announced several new initiatives including new MRO facilities, full-flight simulators network expansion, Pool Program growth, AHEAD (Aircraft Health Analysis and Diagnosis) update and connectivity solutions for E-Jets.

- Smart Aviation has secured an ACMI charter partnership between Air Arabia Maroc and GetJet Airlines with a Latvia-registered A320 aircraft.

- AMAC Aerospace has completed maintenance work on a head-of-state Gulfstream G550. The aircraft received annual maintenance checks, an avionics modification and a refurbished divan in the cabin.

- Magnetic Training has obtained EASA Part 147 approval to provide comprehensive training programmes for A350 and B787 aircraft, with courses set to be launched in the autumn.

- AJW Group has secured a comprehensive PBH contract with Ascend Airways to support the airline's Boeing 737MAX and 737NG aircraft with components and MRO services.

- QOCO Systems is to cooperate with Swiss-AS for a technical integration of its advanced tool management solution with AMOS.

## IN NUMBERS

120

Air Arabia has 120 Airbus A320neo aircraft on order

19,700

DHL Express's Vitoria Airport facility will cover 19,700 sqm

400

The number of AMT professionals airBaltic aims to train by 2030



Mirko/Adobe Stock

## ENGINE MRO

## STANDARD AERO LANDS NEW LEAP-1B SERVICE CONTRACT WITH CORENDON

**S**tandardAero has entered into a non-exclusive agreement with Turkey-based Corendon Airlines to provide CFM LEAP-1B engine services for the carrier's Boeing 737 MAX 8 fleet.

This agreement places Corendon Airlines among a growing number of airlines choosing StandardAero's LEAP-1A and LEAP-1B MRO capabilities at its San Antonio, Texas facility.

Corendon Airlines' first LEAP-1B engine has already been inducted for a Continued Time Engine Maintenance (CTEM) shop visit. Alongside its MAX fleet, the airline also operates Boeing 737-800s

powered by CFM56-7B engines, further expanding its ongoing partnership with StandardAero, which already services these engines.

StandardAero's Will Pitcher said: "We value the confidence shown by Corendon in our San Antonio-based LEAP team, and look forward to meeting the service expectations of Corendon and its passengers for many years to come."

“

**We value the confidence shown by Corendon in our San Antonio-based LEAP team**



## TRAINING &amp; DEVELOPMENT

## TVSDC and Joramco partner to boost maintenance technician training



The Technical and Vocational Skills Development Commission (TVSDC) has entered into a strategic partnership with Amman-based MRO Joramco to enhance vocational training and create new opportunities for young Jordanians in the commercial aircraft maintenance sector.

Through this collaboration, TVSDC will facilitate the training of selected students at the Joramco Academy, which specialises in preparing individuals for careers in commercial aircraft MRO.

Participants will engage in a comprehensive four-year aircraft maintenance programme, equipping them with the necessary skills to excel as technicians.

“

**Participants will engage in a comprehensive four-year aircraft maintenance programme**

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MRO NETWORK

## “This agreement builds on our existing partnership with Honeywell and supports Air Arabia’s broader fleet growth strategy”

Adel Al Ali, group chief executive, Air Arabia



frank/adobe Stock

### HANGARS/FACILITIES

#### DHL expands in Spain with new €40m MRO facility

**D**HL Express is investing over €40 million in Vitoria-Gasteiz to build a new state-of-the-art aircraft maintenance hangar, set to open by mid-2027.

This will be DHL's second-largest repair centre in Europe after Leipzig, Germany.

The facility will initially create around 50 jobs, with a focus on recruiting local aviation technicians.

The hangar will handle maintenance for the DHL B757 fleet, with plans to expand to other aircraft.

It will include dedicated areas for key part replacements, including engines, APU systems, landing gear and thrust reversers.

Located west of Vitoria Airport, the facility will cover 19,700 sqm, including a 6,600 sqm hangar, outdoor areas and an 11,500 sqm runway platform.

**“The facility will initially create around 50 jobs, with a focus on local technicians**



### HANGARS/FACILITIES

#### ExecuJet Haite and CBM open new facilities at Daxing airport

**>** Beijing Daxing International Airport has enhanced its business aviation services with new facilities by ExecuJet Haite Aviation Services China and Capital Airport Holding Business Aviation Management (CBM).

ExecuJet Haite's 5,000 sqm hangar will accommodate up to eight business jets and offer maintenance services for Bombardier, Dassault, Embraer and Gulfstream aircraft.

CBM launched China's largest FBO facility, featuring 12 VIP rooms, 85 parking spaces and five hangars to serve domestic, international and VVIP travellers.



### APU SUPPORT

#### Honeywell wins APU support contract for Air Arabia's A320neos

**>** Honeywell is to supply its 131-9A auxiliary power units (APUs) for Air Arabia's existing order of 120 Airbus A320neo aircraft.

Air Arabia will get comprehensive maintenance support for the Honeywell APUs, ensuring enhanced dispatch reliability and fleet availability, and lower unplanned maintenance costs across the carrier's fleet.

With the integration of the 131-9A APUs, the low-cost carrier will also be able to implement Honeywell's High Efficiency Mode (HEM) upgrade, which allows for a 1-2% improvement in fuel efficiency and carbon dioxide emissions reduction of up to 22 metric tonnes per APU per year.

Air Arabia's Adel Al Ali said: “This agreement builds on our existing partnership with Honeywell and supports Air Arabia's broader fleet growth strategy, emphasising our commitment to implementing sustainable practices across our operations while adopting the latest technology to enhance fuel efficiency and passenger comfort.”

**“The low-cost carrier will also be able to implement Honeywell's HEM upgrade**



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Alvin Limqueco, senior vice president and chief supply chain officer, Philippine Airlines



## CERTIFICATION

### SACAA certifies ExecuJet Dubai for Legacy 600/650 heavy maintenance

**T**he South African Civil Aviation Authority (SACAA) has granted approval to ExecuJet MRO Services Middle East's facility in Dubai to carry out heavy maintenance checks on the Embraer EMB-135/145 series (Legacy 600/650 series), including checks up to 192 months.

ExecuJet operates a 15,344 sqm advanced MRO facility at Al Maktoum International Airport in Dubai. The facility has already begun servicing its first two clients, with their Legacy 600 aircraft undergoing 96-month and 144-month airframe maintenance checks.

Already certified by the European Aviation Safety Agency (EASA) for heavy maintenance on Legacy aircraft, ExecuJet's new SACAA certification was facilitated by the validation of its EASA credentials. This makes SACAA the 18th civil aviation regulator to approve the Dubai facility.



## HANGARS/FACILITIES

### West Star Aviation opens new hangar at East Alton facility

**>** West Star Aviation has celebrated the opening of its new €20 million Hangar 67 at its East Alton facility, adding 75,700 sq ft of space, including 40,000 sq ft of dedicated hangar space and 35,700 sq ft of support space for the company's advanced modification capabilities.

The expansion enhances West Star Aviation's capacity for interior, avionics and sheet metal services, while enabling the implementation of cutting-edge production technologies, including a new state-of-the-art design centre.



Mariusz Wnuk/Adobe Stock

## HEAVY MAINTENANCE

### Philippine Airlines to receive A321 maintenance support from HAECO

**>** HAECO is to provide heavy maintenance services up to D-Checks for Philippine Airlines' Airbus A321s.

The services have already begun and will be carried out at HAECO's facility at Xiamen Gaoqi International Airport.

Philippine Airlines' Alvin Limqueco said: "This partnership guarantees that our aircraft remains safe, reliable and compliant with regulatory requirements, and ultimately signifies our commitment to offer only the best service for our passengers."

HAECO Group's Gerald Steinhoff said: "With our full range of capabilities in delivering world-class maintenance repair and overhaul services across airframe, components and engine services across global locations, we look forward to extending our exceptional services to support Philippine Airlines' growing widebody and narrowbody fleets in the future."

**“**  
**We look forward to extending our services to support Philippine Airlines**



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B777-200/300



E170      E190  
E175      E195

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Queen Alia International Airport - Jordan

# In the Spotlight.

The latest partnerships, appointments  
and innovations advancing the MRO sector



Lufthansa Group

**PEOPLE NEWS**  
The Lufthansa Technik Supervisory Board has appointed Grazia Vittadini (pictured) as its new chairwoman, succeeding Dr Detlef Kayser whose term of office recently ended.

Vittadini has been Lufthansa Group's chief technology officer since 1 July, overseeing fleet, technology, IT, innovation and sustainability.



ETP Thermal Dynamics

## MERGERS & ACQUISITIONS

Lufthansa Technik has acquired an 80% majority stake in US-based ETP Thermal Dynamics (ETP) which specialises in MRO services for heat exchangers, oil and fuel coolers.

Lufthansa Technik says this acquisition is part of its strategy to expand its aircraft component services portfolio in the Americas and will enable it to increase its heat exchanger capacity and strengthen its supply chain.

## DIGITALISATION

Saudi Arabia's new 'digitally native' airline Riyadh Air has announced a collaboration with Boeing to adopt an array of advanced digital solutions.

Designed to streamline operations, reduce maintenance costs and improve overall flight performance, the technology, including Airplane Health Management (AHM) and FliteDeck Pro, will assist Riyadh Air as it prepares for its inaugural flight in 2025.

The airline is currently preparing for flight trials.



## PEOPLE NEWS

Florent Leforestier (pictured) has been named to succeed Fritz Beiner as SR Technics' senior vice president of procurement.

Leforestier was previously vice president of new engines at SR Technics.

Leforestier said: "I am excited to take on this role and eager to build on our current successes, leading strategic initiatives that will further strengthen our supply chain and maximise value."

## AIRCRAFT CONVERSIONS

Israel Aerospace Industries (IAI) has reached a key milestone in its Airbus A330-300 conversion programme.

Following completion of the final design review, the first aircraft was moved into IAI's hangar in early September to begin its transformation from a passenger plane to a freighter.



IAI



John Nadeau Stock



Tobias Ahlgraber/Adobe Stock

^  
**AFTERMARKET**

Mitsubishi Heavy Industries (MHI) and Japan Airlines (JAL) have signed an agreement to explore potential collaboration in the aircraft aftermarket business, including services such as repairs, maintenance, parts supply and refurbishment.

With global recovery in aircraft demand, the need for maintenance has also grown. In response, JAL and MHI state the partnership will help to address the challenges currently affecting the aircraft aftermarket.

✓  
**MERGERS & ACQUISITIONS**

Onex Corporation (Onex) has announced that its Onex Partners Opportunities Fund has reached an agreement to acquire Farsound, provider of supply chain solutions in the engine MRO market.

Financial details have not been disclosed and the transaction is anticipated to close later this year, pending customary closing conditions and regulatory approvals.



^  
**PEOPLE NEWS**

C&L Aviation Services has announced Felipe Garcia (pictured) as its new component shop manager.

Garcia has over 30 years of aviation industry experience, and will lead on the company's new landing gear, wheel and brake capabilities and manage a team of skilled professionals to further develop aftermarket support, sales and operations.



**\$15**  
MILLION

The value of a new single-aisle jet engine (from Green Sky feature, p.122)



**20**

The Iberia Maintenance Training Centre recently celebrated its 20th anniversary (from Training & Development feature, p.64)



**1.5**  
MILLION

Neste is expanding its SAF production capacity to 1.5 million tonnes in 2024 (from SAF feature, p.114)



**€1**  
BILLION

GetJet Aviation Holdings is aiming for a €1 billion turnover by 2030 (from ACMI feature, p.96)

# DESPITE HEADWINDS

Lufthansa Technik continues to target earnings at previous year's level

**L**ufthansa Technik has reported mixed results for the first half of 2024. Despite achieving record financial performance thanks to a strong second quarter, the company continues to feel the strain of significant industry-wide pressures.

The company's financial performance for the first half of the year reflects both its resilience and the challenges facing the aviation sector.

Lufthansa Technik reported an Adjusted EBIT of €319 million, up 9.6% from €291 million in the previous year's first half, despite strike-related costs. Revenue also rose 16.5% by the end of June to €3.6 billion. However, the EBIT margin dipped from 9.3% to 8.8%, with the company aiming to reverse this trend to meet its 'Ambition 2030' goal of a sustained double-digit margin.

Dr William Willms, chief financial officer of Lufthansa Technik, commented on the results: "Of course, we are always pleased to see record figures. But part of the truth is that non-operational special factors and one-off effects were significant contributors. We still expect to deliver results at the previous year's level for the year as a whole."

He also highlighted the headwinds the company is facing: "We are negatively impacted by the disproportionately high cost increases and ongoing difficulties in the supply of materials across the industry."



Lufthansa Group

## "Lufthansa Technik continues to expand its workforce in response to growing demand"

Both the engine and aircraft component services segments, key pillars of Lufthansa Technik's operations, have felt the brunt of these challenges. Nonetheless, the company continues to grow, securing approximately 320 new contracts in the first half of the year, and benefiting from strong demand across its services.

Lufthansa Technik's digital portfolio also contributed positively to its overall performance. The AMOS software, developed by subsidiary Swiss-AS, continues to gain traction among airlines globally. Meanwhile, the company's AVIATAR platform, offering a broad suite of digital solutions for airline operations, remains on a positive growth trajectory. Contracts for AVIATAR now cover nearly 4,000 aircraft.

Lufthansa Technik's defense business is gaining attention. With a history of servicing German government aircraft, the company recently delivered a third Airbus A350 to the German Air Force. Its expanded cooperation with Lockheed Martin is also set to strengthen its MRO market position and enhance Germany's national security.

Lufthansa Technik is expanding its workforce to meet rising demand. By June 2024, the company employed over 23,400 people, up from 21,500 a year earlier. In August, more than 300 new trainees started at its German locations, reflecting the company's commitment to fostering young talent.

The company is well positioned for future growth but acknowledges that the challenges ahead won't be easy to overcome. "We are still on course to grow further from a strong position," said Willms. "However, it won't be a walk in the park."

As Lufthansa Technik navigates the complexities of the global aviation industry, its focus on digital innovation, defence expansion, and talent development will be critical to sustaining its leadership in the MRO sector. ●

1. Lufthansa Technik is one of the leading providers of technical aircraft services in the world 2. As of June 2024, Lufthansa Technik employed more than 23,400 people



Lufthansa Group



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# BUILDING FOR THE FUTURE

**Jeff Wilkinson**, chief executive of DAE Engineering, tells us about Joramco's vision through 2029, detailing how the new Hangar 7 and the Academy will fuel growth and develop industry talent

**Q: Can you provide an update on Hangar 7's construction and what makes it different from other facilities?**

Construction of Hangar 7, our biggest yet, began in January of this year, and I'm pleased to say we're progressing well. All necessary approvals are in place, and the groundwork is almost complete. The next phase will involve erecting its actual structure and, if we stay on schedule, Hangar 7 should be fully operational by early December.

One of the standout aspects of Hangar 7 is its construction method. Instead of using traditional materials like steel and concrete, we've opted for an aluminium structure, a portion of which is recycled. This not only makes the building process faster but also aligns with our sustainability goals. The outer 'skins' will provide excellent insulation, ensuring the facility remains energy-efficient. In the summer, the hangar



“  
**TECHNOLOGY AND SUSTAINABILITY WERE AT THE FOREFRONT OF OUR PLANNING FOR HANGAR 7**  
”

**JEFF WILKINSON**  
chief executive,  
DAE Engineering

**Q: What types of aircraft will Hangar 7 accommodate, and how does this tie into Joramco's growth plans?**

Hangar 7 is a massive 12,000 sqm facility, capable of accommodating some of the largest aircraft in the world, including the Airbus A380 and Boeing 777x. Its size allows us to house up to one widebody and four narrowbody aircraft simultaneously, and we're adding five more lines for heavy maintenance checks. This will increase our overall capacity to 22 parallel maintenance lines.

This new hangar is a critical part of Joramco's long-term growth strategy. Just seven or eight years ago, our workforce was delivering around 600,000 man-hours per year. Today, we've more than doubled that to 1.4 million man-hours using our existing facilities, but we've reached maximum capacity and Hangar 7 is the next step in our plan to further scale our operations.

We're not stopping at Hangar 7. We're already planning to build two more hangars over the next four years, reaching just under three million man-hours per year by 2029, which will allow us to meet growing demand. The aviation industry is expanding rapidly, and we want to ensure that Joramco is ready to support that growth by providing world-class maintenance services.

**Q: Can you elaborate on the technological advancements and sustainability features of Hangar 7?**

Technology and sustainability were at the forefront of our planning for Hangar 7. In terms of technology, the



will stay cooler, while in the winter, it will retain heat, reducing the need for extensive climate control systems.

Additionally, the design of the hangar is quite unique. It's not just a large, basic box, but a facility that's fit for purpose and carefully shaped to maximise utility while minimising wasted space. This helps keep costs down, both in terms of construction and operational efficiency. For example, our choice of state-of-the-art doors, which open and close more quickly, helps prevent energy loss and reduces the need for heavy machinery during construction, further supporting our sustainability efforts.



2

hangar will be equipped with the latest 5G Wi-Fi, allowing our technicians to use iPads for their tasks. This is part of our broader push towards digitalisation. Traditionally, aircraft maintenance required thousands of printed pages of manuals and checklists. Now, all of that information will be available digitally, allowing our engineers to work more efficiently while also significantly reducing paper waste. This move toward a fully digital workflow is not only good for the environment but also makes our processes faster and more accurate.

On the sustainability side, the aluminium structure itself is a major innovation. Aluminium is lighter and easier to work with than steel, which means we can build faster while using fewer resources. The insulation provided by the outer skin of the hangar ensures that it remains energy-efficient

year-round, cutting down on heating and cooling costs. The investment we've put into state-of-the-art doors that open and close more quickly means we will reduce our energy waste when large aircraft enter or exit the hangar.

In addition, we've installed improved water drainage and recycling systems that allow us to reuse more of the water used in daily operations. Every aspect of Hangar 7 has been designed with sustainability in mind, from the materials used to the way it operates.

**Q: With Hangar 7 nearing completion, what impact will it have on Joramco's workforce and operations?**

The completion of Hangar 7 is going to have a significant impact on our workforce and overall operations. For a hangar of this size, we'll need to expand our staff considerably. We're looking at

1. One of the unique features of the Academy is the hands-on experience provided 2. The new dual-floor Academy building is four times the size of the previous facility

hiring around 400 additional personnel, including maintenance technicians, back shop staff, and administrative teams. This is both a challenge and an opportunity. As we continue to grow, we'll need to attract and train more skilled workers, which ties into our plans for expanding the Joramco Academy.

In terms of operations, Hangar 7 allows us to scale up our maintenance capacity. With the added lines of maintenance checks and the ability to handle larger aircraft, we're in a stronger position to meet the needs of our clients, both existing and new. The fact that Hangar 7 is already fully booked even before it opens is a strong indication of the demand for our services. This



▲ Joramco aims to bring in around 70 to 80 students per year

## “ THE JORAMCO ACADEMY IS A CRITICAL PART OF OUR STRATEGY FOR THE FUTURE ”

demand, coupled with our future hangar expansions, means that we're well-positioned for long-term growth in the industry.

**Q: Can you tell us about the Joramco Academy and how it supports your expansion plans?**

The Joramco Academy is a critical part of our strategy for the future. With the success of our existing facilities plus the addition of Hangar 7, we recognised the need for a larger, more robust training programme to develop the skilled workers we need. The new dual-floor academy is four times the size of our previous facility, allowing us to increase student intake significantly. We've already enrolled 50 students for the 2024 cohort; going forward, we aim to bring in around 70 to 80 students per year.

The academy offers a comprehensive four-year programme, and students will graduate with an EASA/CARC licence. This qualification is like gold dust in the MRO industry and gives our graduates

a competitive edge. One of the unique features of the academy is the hands-on experience we provide. We have two aircraft on-site – Sabreliner and Boeing 737 – that students can work on.

This practical experience is invaluable and sets our graduates up for success when they enter the workforce. We're also focusing heavily on digitalisation at the academy, equipping students with iPads and using the latest technology in our classrooms.

**Q: What makes the Joramco Academy stand out in terms of industry accreditation and training quality?**

The Joramco Academy is accredited by some of the most respected aviation authorities in the world, including the Jordan Civil Aviation Regulatory Commission (CARC) and the European Aviation Safety Agency (EASA). These accreditations ensure that our training meets the highest industry standards, which is why our graduates are in such high demand.

Furthermore, we're also working closely with the Technical and Vocational Skills Development Commission (TVSDC), a Jordanian government agency. This partnership allows us to provide vocational training to promising young Jordanians, providing them with valuable skills that can help address the country's high youth unemployment rate.

We're particularly focused on apprenticeship schemes, which will help train 25 young individuals at our facility and matched by Joramco for a further 25, totalling 50 per year.

Looking ahead, we aim to attract more international students as well as mature learners who want to specialise in specific aircraft types.

We're very fortunate that with the 17 different aircraft types that we maintain at our facilities means that we have access to roughly 70% of the world's fleet, so I think we offer an attractive opportunity for career development. ●



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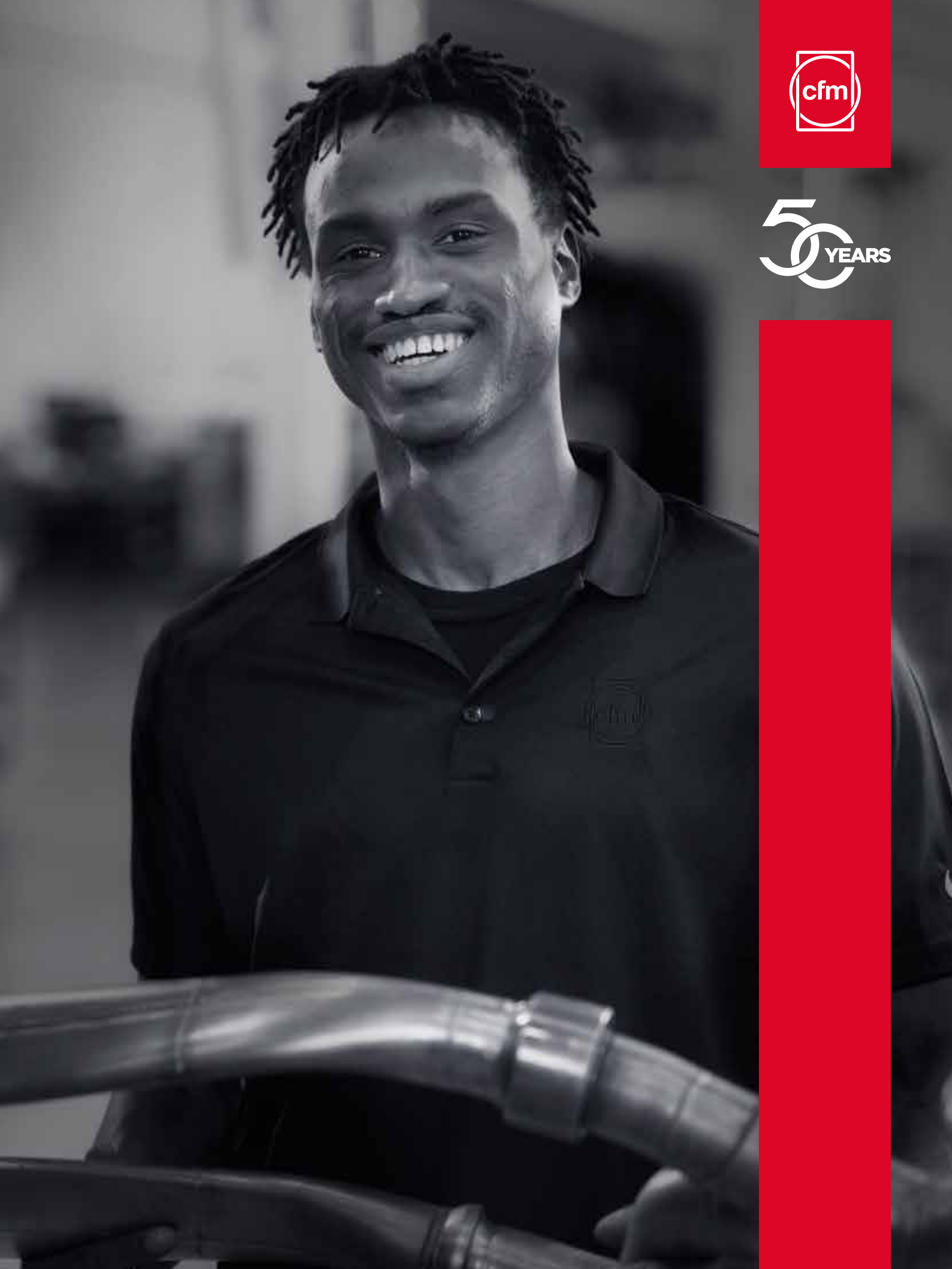
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*Gaël Méheust  
President & CEO, CFM International*



50 YEARS



# Clearing the air on EU Deforestation

Jason Dickstein explores how the EU Deforestation Regulation (EUDR) affects aircraft parts

One of my good friends recently reached out to me about the EU Deforestation Regulation (EUDR), a regulation that threatens to impact certain aircraft parts being imported into the EU, because it requires a certification from the exporter. This raises two important issues which I will provide guidance on in this article:

1. How do MROs keep abreast of new regulations and policies that could affect their business?
2. How does the EU Deforestation Regulation affect aircraft parts?

## STAYING UPDATED ON NEW REGULATIONS AND POLICIES

My friend complained to me: "How can a small business be expected to keep up with all of the new regulations?" I agreed with him that the ever-changing world of new regulatory requirements presents a daunting challenge to follow.

I spend full-time keeping up with regulations and policies that affect aviation businesses, and I can confirm that there is something new out there every day: aviation rules, tax rules, labour rules, import rules, export rules... the list seems to go on and on. Luckily there are resources to help.

Industry education is a collaborative effort. An important partner in that effort is the trade press community. Without magazines like *MRO Management*, a lot of important concepts would never be shared.

Another important partner is the companies that are putting on aviation industry meetings and providing aviation industry education. I just attended an air carrier purchasing meeting where I was



“THE GOOD NEWS IS THAT VERY FEW AIRCRAFT PARTS WILL BE AFFECTED”

**JASON DICKSTEIN**

president, Washington Aviation Group

asked to speak about SMS and about Incoterms (two very different topics but both quite important to the community). This was a great opportunity to share information about compliance and useful commercial practices.

I think one of the most important parts of the education process is the trade association community. Trade associations are in the business of gathering and sharing information. I write for two different aircraft blogs: the ASA blog (*parts distribution: [aviationsuppliers.wpcostaging.com](https://aviationsuppliers.wpcostaging.com)*) and the MARPA blog (*parts manufacturing: [pmaparts.wpcostaging.com](https://pmaparts.wpcostaging.com)*).

Both are great ways to keep abreast of new regulations and policies that could affect your business. ASA

▼ Table 1: Two-digit categories most likely to be relevant to MROs who may be importing or exporting into the EU

| CN category        | Rough description                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| 41                 | Certain leather and hides – such hides that could be used in the interior of an aircraft                                  |
| 12, 15, 23, 29, 38 | Certain oils, salts, esters and acids when derived from palm oil (glycerol that is used as a solvent would be an example) |
| 40                 | Certain rubber products, like O-rings or plugs                                                                            |
| 12, 15, 23         | Certain soy products, including soy oil                                                                                   |
| 44, 47, 48         | Certain wood products                                                                                                     |
| 49                 | Printed books and other publications made of wood-based paper                                                             |
| 94                 | Wooden seats, furniture and buildings                                                                                     |

provides periodic webinars on topics that are important to the community and both ASA and MARPA have annual conferences that are heavily focused on education. Membership in these two associations is a very effective investment for keeping abreast of the changes that could affect your business.

## THE EUDR AND AIRCRAFT PARTS

The EUDR was promulgated on 31 May 2023. It is meant to address cattle, cocoa, coffee, oil palm, rubber, soya and wood. At first glance, this appears to deal with commodities that are disconnected from the aviation world.

The good news is that very few aircraft parts will be affected. The other news, though, is that *some* aircraft parts appear to be affected by the regulation.

The purpose of the regulation is to minimise the EU's impact on deforestation by trying to exclude products taken from deforestation sites. This is a 42-page regulation so we will not try to address everything it covers in this article, but instead we will examine how

this affects smaller aviation companies exporting certain aircraft parts to the EU.

Let's start with what is affected. The effectivity of the rule is based on the Combined Nomenclature (CN) codes ([https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L\\_202302364](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302364)). For those readers in the US, this is analogous to the HTSUS codes used for importing things into the US. These are codes (ten digits in the US or eight digits in the EU) that typically start with a two-character chapter and a four-character heading.

The first six characters (category, heading and subheading) tend to be common from country to country (so the chapters and headings will be common between the EU and the US). Thus, if you know your article's HTSUS heading, or schedule B heading, then typically the CN heading will be the same set of numbers.

Table 1 (see below left) explains the two-digit categories that are most likely to be relevant to MROs who may be importing or exporting into the EU.

Let's say that you are exporting

valcnsenat/Adobe Stock



▲ The EUDR aims to ensure a sustainable supply chain to protect forests and biodiversity

rubber O-rings to the EU from the US. You will need to identify the US schedule B number for the export (under US law). This typically has the same heading number as the CN code. If your CN category is not included in Table 1, then you do not have to worry about compliance with the EUDR. If it is included in Table 1, then you need to continue your analysis. You need to identify the heading number of your



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“  
**THE PURPOSE OF THE REGULATION IS  
 TO MINIMISE THE EU’S IMPACT ON DEFORESTATION  
 BY TRYING TO EXCLUDE PRODUCTS TAKEN  
 FROM DEFORESTATION SITES**  
 ”

export and then compare it to the actual text of Annex I of the EUDR (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1115>).

Let’s say that your O-ring is made of ethylene propylene diene monomer (EPDM) synthetic rubber material, and is covered under CN heading 4016 (the full CN code for such a product is likely to be 4016.93.00). This sort of O-ring is likely to be covered under the EUDR.

The EUDR prohibits covered products from being made available on the EU market unless they are deforestation-free. They also must be covered by a due diligence statement (in the form found in Annex II of the EUDR). To confirm compliance, the EU law will treat foreign (non-EU) businesses as ‘traders’.

Traders may be further distinguished as micro, small- and medium-sized

entity (SME) traders, which means those companies whose facts fall below the thresholds set by at least two of these three criteria:

1. Balance sheet total below €20 million
2. Net Turnover below €40 million
3. Average employees during the year below 250.

SME traders are required to: (1) obtain or create a ‘due diligence statement’ in a form found in Annex II to the EUDR (this statement can be obtained from a prior source); and (2) collect and keep the following information relating to the relevant articles that they place into the EU market (e.g. by exporting to the EU):

- The reference number for the ‘due diligence statement’ that was obtained or created for the articles
- The name, postal address, email address and web address of the party

who supplied the relevant articles to the SME trader

- The name, postal address, email address and web address of the party to whom the trader supplied the relevant articles (the export customer in the EU).

It is important to note that non-SMEs (large organisations) who export to the EU, and importers within the EU, have significantly more compliance obligations.

If you are exporting goods to the EU that are outside of the scope of the CN codes covered by the EUDR, then you do not need to worry about EUDR compliance for that transaction; but if you are exporting covered goods (such as rubber O-rings) to the EU then you will need to make sure you have the right records to meet the EUDR requirements. ●

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Alderman & Company partner **Bruce Andrews** and analyst **Connor Bernard** focus on the business aviation sector and examine how supply chain issues are impacting three key players



▲ Bruce Andrews, partner, Alderman & Company

**T**hroughout this year, the aerospace and defence industries' supply chain issues have been well documented, particularly regarding their effect on commercial aviation.

However, the aviation industry is more than just its commercial side. How is the business aviation supply chain faring and what are some business jet OEMs doing to mitigate issues faced in their supply chains?

### BUSINESS JET SURGE

During the Covid-19 pandemic, demand for business jets and subsequently business jet travel picked up dramatically. Wealthy flyers were fleeing from commercial air travel due to health and safety concerns, and we saw a surge in demand for business jets.

That demand has kept up even as the pandemic has subsided, with 730 deliveries in 2023, compared to the 10-year average of 709 during the period 2014-2023. However, business jet manufacturers have been facing a similar range of challenges impacting their production processes as have the large commercial OEMs.

### CHALLENGES

A major issue is the global shortage of essential components and raw materials, exacerbated by pandemic-related disruptions. This

shortage has resulted in delays in receiving critical parts, affecting assembly lines and manufacturing timelines. In addition, logistical problems such as transportation restrictions and port congestion have made it harder for manufacturers to get shipments on time. So, what are they doing about these issues?

To get a better look, let's dig a little deeper into the production issues facing three major manufacturers: Bombardier, Dassault and Gulfstream.

### THREE MANUFACTURERS

Bombardier is facing a significant issue in its supply chain with the restructuring of Spirit AeroSystems, whose Belfast facility manufactures critical fuselage sections for Bombardier.

Bombardier president and chief executive Eric Martel said in July: "If another buyer can guarantee long-term visibility on pricing, on execution, delivering on time and quality of the product, we're open to that. But we could also be the solution."

For Martel and Bombardier, the decision hinges on weighing the need to reintegrate an important piece of their supply chain versus paying upwards of a billion dollars for a potentially loss-making operation.

The situation with the Belfast facility highlights a critical issue being discussed across the

1. The Gulfstream G700 is now certified by the FAA and the EASA

# “SINCE THE PANDEMIC, DEMAND FOR BUSINESS JETS AND SUBSEQUENTLY BUSINESS JET TRAVEL HAS PICKED UP DRAMATICALLY”

aerospace industry – how much outsourcing is optimal and what processes should be kept (or brought back) in-house?

Now let's look at Dassault, which is also facing supply chain issues. In its latest earnings report in July, the company stated that “there are many shortages in our production lines due to supplier inefficiencies in some cases, especially in the aerostructure sector”.

The report continued: “These difficulties have given rise to risks affecting Falcon and Rafale deliveries, and also impact customer support.”

To combat this, Dassault is focusing substantial resources on immediate deliveries, which should enable the manufacturer to meet near-term delivery commitments.

However, management has acknowledged that this shift in resources will likely result in delays in later deliveries, unless there are substantial changes in its supply chain. In that regard, Dassault is looking to substantially increase content from India.

Through this move, which is one part of a broader strategy to create a more geographically diverse supply chain, Dassault is hoping to increase supply chain resiliency, increase throughput and keep control of costs.

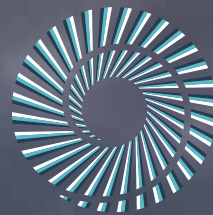
Finally, we will focus on Gulfstream, which appears to be taking supply chain issues in its stride. In the first half of 2024, Gulfstream Aerospace experienced a significant increase in both aircraft deliveries and revenue.

By mid-year, the company had delivered 61 jets, marking a 36% year-over-year rise, fuelled primarily by a 72% surge in large-cabin jet shipments, including 11 newly certified G700s. The G700's rollout encountered delays due to late FAA certification requirements, but these issues are largely resolved now.

Gulfstream expects to deliver approximately 150 jets by year-end; its highest delivery year since 2015. Despite ongoing supply chain challenges and geopolitical uncertainties, the company remains positive, as demonstrated by the \$150 million expansion of its Savannah Service Center East, to be completed by the end of the year, which will boost its maintenance and repair capabilities and support its expanding fleet.

For a list of sources used in the research of this article, please visit: [aviationbusinessnews.com/in-depth/city-insider-bombardier-dassault-gulfstream](https://aviationbusinessnews.com/in-depth/city-insider-bombardier-dassault-gulfstream) 📍

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# FOCUS ON FLEXIBILITY

René Lang reveals how Mankiewicz's high-tech coatings can streamline MRO processes for aircraft exteriors and interiors

**A**chieving high-quality results in minimal time is essential for a successful MRO job.

When restoring painted surfaces, modern high-tech paint systems provide numerous options for both interior and exterior parts, aimed at meeting this objective.

Several factors influence outcomes, affecting application performance, product properties and process speed.

## AIRCRAFT EXTERIORS

For aircraft exteriors, Mankiewicz aviation experts have introduced the ALEXIT® WingFlex coating system, a fast and optimised solution.

This system is suitable for both upper and lower wings, significantly enhancing the painting process and creating a glossy appearance.



1



“  
**WINGFLEX IS A  
FAST AND OPTIMISED  
COATING SOLUTION  
FOR BOTH UPPER AND  
LOWER WINGS**  
”

**RENÉ LANG**

executive managing director  
aviation, Mankiewicz

WingFlex offers flexibility to withstand compression caused by wing movement and protects surfaces from damage due to hydraulic fluids when the aircraft is on the ground.

Furthermore, its durability reduces the need for early refurbishments, saving on costs and unplanned maintenance.

Another challenge arises with the growing number of composite aircraft, which are more prone to cracking. Mankiewicz has developed ALEXIT® FlexPrimer, a highly flexible primer that ensures proper adhesion and flexibility, especially in areas subject to heavy vibrations and movement, such as engine nacelles.



2

## CABIN INTERIORS

In cabin interiors, the versatility of coatings is equally important. The ALEXIT® FlexCoat system allows for the repair of vinyl and engineered leather surfaces.

This one-layer system offers high durability, mechanical resistance and full coverage with minimal film thickness, providing an easy-to-apply solution.

Reusing rather than replacing is also a priority with ALEXIT® EdgeFiller. This fast-drying filler can repair deep damage in sandwich parts (composite structures composed of thin face-sheets and lightweight cores) without compromising stability, making it ideal for smoothing or rebuilding edges of sandwich interior parts.

## MRO EUROPE

The complete range of Mankiewicz products, including interior and exterior coatings, as well as structural part coatings, will be on display at the MRO Europe tradeshow from October 22-24 at Fira Barcelona, Hall 3, Stand 6208. ●

1. The full cabin interior coating portfolio from Mankiewicz offers fast and durable surface repairs 2. ALEXIT® WingFlex gives a long-lasting high-gloss performance for the upper and lower wingbox

**i** For more information about Mankiewicz, visit: [mankiewicz.com](https://mankiewicz.com)



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# BUILT ON DATA AND ANALYTICS

Ahead of the 2024 Predictive Aircraft Maintenance Conference in Dublin in November, *MRO Management* asked **Boris Wolstenholme** from Sentry Aeroespares, who will be speaking at the event, his thoughts on the landscape of predictive maintenance

## In what ways do you think predictive maintenance solutions can revolutionise MRO activity?

For MRO activity to be effective and aligned with an airline's operational requirements, it needs to be scheduled as part of planned operations. Maintenance driven by unscheduled removals or failures causes disruptions, increases costs and potentially leads to passenger dissatisfaction. The drive to reduce unscheduled removals through predictive aircraft maintenance must influence behaviour at every stage of the aircraft's defect, maintenance, repair and replacement lifecycle. Improvements in each of these areas will increase the number of predicted events and, consequently, those that can be scheduled in line with the operator's plan. Eventually, we should see predictive aircraft maintenance activities aligned with inventory planning, logistics solutions and aircraft dispatch reliability. However, the most significant leap in MRO capability will be the development of workscopes for components that have not yet failed but have been removed because they are likely to.

At Sentry Aeroespares, we focus on data and analytics that impact the supply chain, supporting unscheduled removals with a view to minimising any disruption to the operator by ensuring high-quality, critical spares are constantly available in strategic locations. The opportunity to further develop the data and analytics that drive our organisation will revolutionise our efficiency in supporting critical and AOG spares requirements.



“  
**WE FOCUS ON DATA AND ANALYTICS THAT IMPACT THE SUPPLY CHAIN**  
”

**BORIS WOLSTENHOLME**

chief executive,  
Sentry Aeroespares

## How would you describe the current state of predictive maintenance in the MRO market, and are there any exciting trends shaping its future?

In the aircraft MRO market, predictive aircraft maintenance is prevalent and well developed for new product platforms, APUs and certain engine types. However, much progress is still needed for out-of-production and legacy platforms, particularly at the component level.

Predictive aircraft maintenance requires significant investment in technology, hardware and human resources, and it is still in its early stages when it comes to understanding

the causes of component failures. Exciting developments are emerging from new technologies and the opportunity to leverage artificial intelligence (AI) capabilities to interpret the vast amounts of data available to us.

However, the biggest challenges still to come are improving workscopes, supply chain transparency, 'back to birth' history and overcoming the fact that much of the required data is siloed. Through our own analytics, we have already seen massive improvements in inventory turnover and the service levels we deliver to our valued customers.

## How is Sentry Aeroespares already benefiting from predictive/innovative solutions?

Sentry Aeroespares focuses on areas where we can positively impact the supply chain through the quality and global distribution of our inventory. We have always been a company built on analytics. Our core principle of AOG support requires us to analyse and identify the components likely to cause operational disruptions. Modern technology and software have enabled us to develop a data-rich platform, allowing us to refine and develop our inventory while optimising service levels for our customers.

We are focusing on the opportunities new technologies provide to harvest and incorporate external data sets. If we consider the potential to analyse transactional data with AI, the future looks very exciting indeed.



◀ Sentry Aerospares was created following the 2022 merger of Aerospares 2000 and Sentry Aerospace

## “ OUR CORE PRINCIPLE OF AOG SUPPORT REQUIRES US TO ANALYSE AND IDENTIFY THE COMPONENTS LIKELY TO CAUSE OPERATIONAL DISRUPTIONS ”

### What are the primary hurdles the industry must overcome to propel forward with predictive maintenance?

There are several hurdles, but these are the ones I believe primarily affect our customers: legacy and out-of-production aircraft platforms are not supported by systems capable of predicting component-level failures. These aging fleets are also the aircraft types that create the greatest operational challenges. The information held by OEMs and authorised repair facilities is not in easily digestible formats and often resides in siloed environments between the MRO, operator and service provider. On-condition components are not monitored on a TSN (Time Since New) or TSI (Time Since Inspection) basis, so their reliability is recorded only in the context of MTBUR (Mean Time Between Unscheduled Removals). Additionally, we lack a way to record operational conditions that may impact a component's reliability.

These are just a few of the significant challenges. However, when addressed, the effectiveness of scheduling maintenance events driven by predictive aircraft maintenance will depend on the supply chain that supports the industry.

Currently, there is a lack of transparency regarding production and supply chain delays, leading to extended repair turnaround times and longer delivery times for new components. At Sentry Aerospares, we continuously strive to address the critical demand generated by these hurdles.

### How do you foresee predictive maintenance in the MRO industry evolving over the next decade?

The MRO industry will need to work closely with operators and OEMs to align and share the available data that will enable predictive aircraft maintenance. There will need to be significant advancements in platform capabilities to allow for transparency across these various stakeholder environments. The tools and resources required for predictive aircraft maintenance will also need to become more accessible to all operators, particularly smaller organisations.

Sentry Aerospares has a comprehensive, strategic plan to evolve within this environment and will continue to maintain the most relevant inventory to support AOG and critical demand in this constantly evolving landscape. ●

## PREDICTIVE AIRCRAFT MAINTENANCE 2024

➤ On 13–14 November, MRO Management and its parent company Real Response Media will host the Predictive Aircraft Maintenance (PAM) Conference 2024 at the Radisson Blu Royal Hotel Dublin, Ireland, bringing together senior level executives from airlines, OEMs, MRO specialists and big data experts to explore the future of predictive maintenance.

Attendees will discover how to get the best out of predictive maintenance while overcoming the greatest challenges. Case studies will highlight best practices and how companies are successfully collaborating with industry partners, while panel discussions will explore the major topics from the perspective of all stakeholders.

Thank you to our Gold Sponsor, Sentry Aerospares, for supporting PAM 2024.

For more information and how to register to attend, visit [predictiveaircraftmaintenance.com](https://predictiveaircraftmaintenance.com)

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- » B737 NG
- » A320 Family (CFM 56&V2500)

## WORKSHOPS

- » C5 - Batteries
- » C6 - Seats
- » C 14 - Landing gears, wheels & brakes

# DUBLIN HOSTS PREDICTIVE AIRCRAFT MAINTENANCE 2024

Get ready for the Predictive Aircraft Maintenance 2024 conference, where industry leaders will converge in Dublin to explore cutting-edge technologies and strategies

**T**aking place on 13-14 November at Dublin's Radisson Blu Royal Hotel, *MRO Management's* Predictive Aircraft

Maintenance 2024 conference will gather industry experts and thought leaders to explore the latest technologies and strategies revolutionising aircraft maintenance practices.

As a global hub for the airline industry, Dublin is an ideal venue for this year's conference. Attendees will gain valuable insights into predictive maintenance techniques and discover how data-driven approaches can improve aircraft reliability, reduce downtime and optimise maintenance scheduling.

## THE IMPORTANCE OF PREDICTIVE AIRCRAFT MAINTENANCE

The aviation industry has long been at the forefront of technological innovation, and the Predictive Aircraft Maintenance 2024 conference is a testament to this ongoing commitment to progress. As aircraft become more sophisticated, the need for advanced maintenance strategies has become increasingly crucial. Traditional reactive maintenance no longer meets the demands of modern air travel. Unplanned downtime can lead

to significant financial and operational disruptions, undermining the efficiency and reliability of airlines.

This is where predictive maintenance offers a transformative solution. By using data-driven insights and cutting-edge technologies, predictive maintenance allows aviation professionals to anticipate and address potential issues before they escalate. Through the analysis of sensor data, maintenance logs and operational patterns, predictive models can identify early warning signs of impending failures, enabling proactive interventions and targeted maintenance actions. This reduces the risk of unexpected breakdowns, optimises maintenance schedules and maximises fleet availability.

## BENEFITS OF ATTENDING

The Predictive Aircraft Maintenance 2024 conference will bring together a diverse array of aviation professionals, including maintenance engineers, airline executives, technology providers and regulatory authorities. This cross-pollination of ideas and experiences will foster valuable discussions and the exchange of best practices. Attendees can leverage these connections to stay abreast of the latest trends, identify potential partners and explore innovative solutions to their challenges.

Moreover, the conference's comprehensive program will provide attendees with a deep dive into the technical and operational aspects of predictive maintenance. From case studies showcasing successful implementations to in-depth panel discussions, the conference will shine a spotlight on industry transformation



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1. Richard Brown, managing director of Naveo Consultancy, returns as chairman
2. The conference agenda provides attendees with a deep dive into the technical and operational aspects of predictive maintenance

and address the challenges that need to be overcome. Attendees can expect to leave the conference with a renewed understanding of how to harness the power of predictive maintenance to enhance aircraft reliability, reduce costs and improve overall operational efficiency.

## AGENDA AND TOPICS

The Predictive Aircraft Maintenance 2024 conference features a comprehensive two-day agenda designed to keep participants engaged with thought-provoking presentations and interactive panel discussions.

Day one will feature case study presentations from industry giants such



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**“The conference will shine a spotlight on industry transformation and address challenges”**



▲ In-depth panel discussions form a key part of the conference agenda

## “This is an excellent opportunity to engage directly with experts”

as Airbus, Boeing, Revima, Liebherr Aerospace & Transportation, and AFI KLM E&M.

The participants in the first panel discussion, ‘Providing Actionable Insights For Airlines’, will include easyJet’s Craig Lynch, Scandinavian Airlines’ Matias Bjerregaard and Alice Belcher from Delta Air Lines. This panel will explore how predictive maintenance equips airline decision-makers with the tools to optimise maintenance operations and maximise aircraft availability.

Additional panels on day one include discussions on enhancing airframe reliability and streamlining engine maintenance through new technologies.

Christopher Dixon and Kak Wong, data specialists from Delta Tech Ops, will present a session on how ‘Otto’, their custom Large Language Model (LLM), helps technicians find relevant documentation quickly and accurately. They will also discuss the future of data science in aviation maintenance and why off-the-shelf LLMs fall short in the technical aviation environment.

Day two will feature sessions from EirTrade Aviation, Gamit, Lufthansa Technik, Sentry Aerospares and StandardAero. A key panel discussion will focus on managing the complex lifecycle of aircraft, from decommissioning to dismantling, while ensuring environmental compliance and

operational excellence. Other panels will explore predictive maintenance in cabin MRO, strategies for preventing Aircraft on Ground (AOG) situations and the importance of regulatory compliance in predictive maintenance systems.

Matias Bjerregaard will also share his insights on the financial and contractual challenges of implementing predictive maintenance. His session will highlight innovative strategies for overcoming recruitment difficulties and the success of an ambassador programme that empowers technicians with predictive maintenance tools.

Delegates will have ample opportunities during the conference sessions to ask questions and engage with presenters and panel participants, ensuring a rich, interactive experience.

### NETWORKING

One of the standout features of the Predictive Aircraft Maintenance 2024 conference is the networking opportunities. From dedicated networking breakfasts, lunch and coffee breaks to social events, attendees will have many chances to make new connections, catch up with colleagues and exchange insights. A pre-conference welcome on the evening of 11 November and a social evening activity the following night will create a relaxed atmosphere, encouraging open dialogue and the exchange of ideas.

The exhibition area will serve as a hub of activity where conference sponsors, industry vendors and solution providers will showcase their latest innovations. This is an excellent opportunity to engage directly with experts and explore the technologies and services that can enhance predictive maintenance capabilities, leading to fruitful collaborations and tailored solutions to address specific maintenance challenges.

### REGISTRATION

The Predictive Aircraft Maintenance 2024 conference is a must-attend event for all aviation professionals committed to staying at the forefront of the industry. Registration is now open, and you are encouraged to secure your spot as soon as possible.

Whether you’re an airline executive seeking to optimise your maintenance operations or a technology provider looking to showcase your latest offerings, this conference is the perfect platform for you. Airlines and operators can secure their tickets for free. All tickets include access to conference sessions, exhibition areas and networking opportunities.

Don’t miss this chance to be a part of the future of aircraft maintenance and shape the direction of the industry. To secure your place, visit [predictiveaircraftmaintenance.com](https://predictiveaircraftmaintenance.com).

*Many thanks to this year’s conference sponsors and exhibitors: EirTrade Aviation; GE Aerospace; Sentry Aerospares; Airbus; Bolloré Logistics; AFI KLM E&M; Gamit; StandardAero; Revima; Killick Aerospace; ReGEN; Liebherr Aerospace & Transportation; Lufthansa Technik; IAC/Eirtech; CRS Techniks; and CEVA Logistics. We look forward to welcoming the industry to Predictive Aircraft Maintenance 2024. ●*



The Revima logo features a stylized 'R' with a small orange square at its base, followed by the word 'evima' in a white, sans-serif font. The background of the entire page is a warm, golden sunset scene with a person's long hair on the left and a butterfly on the right.

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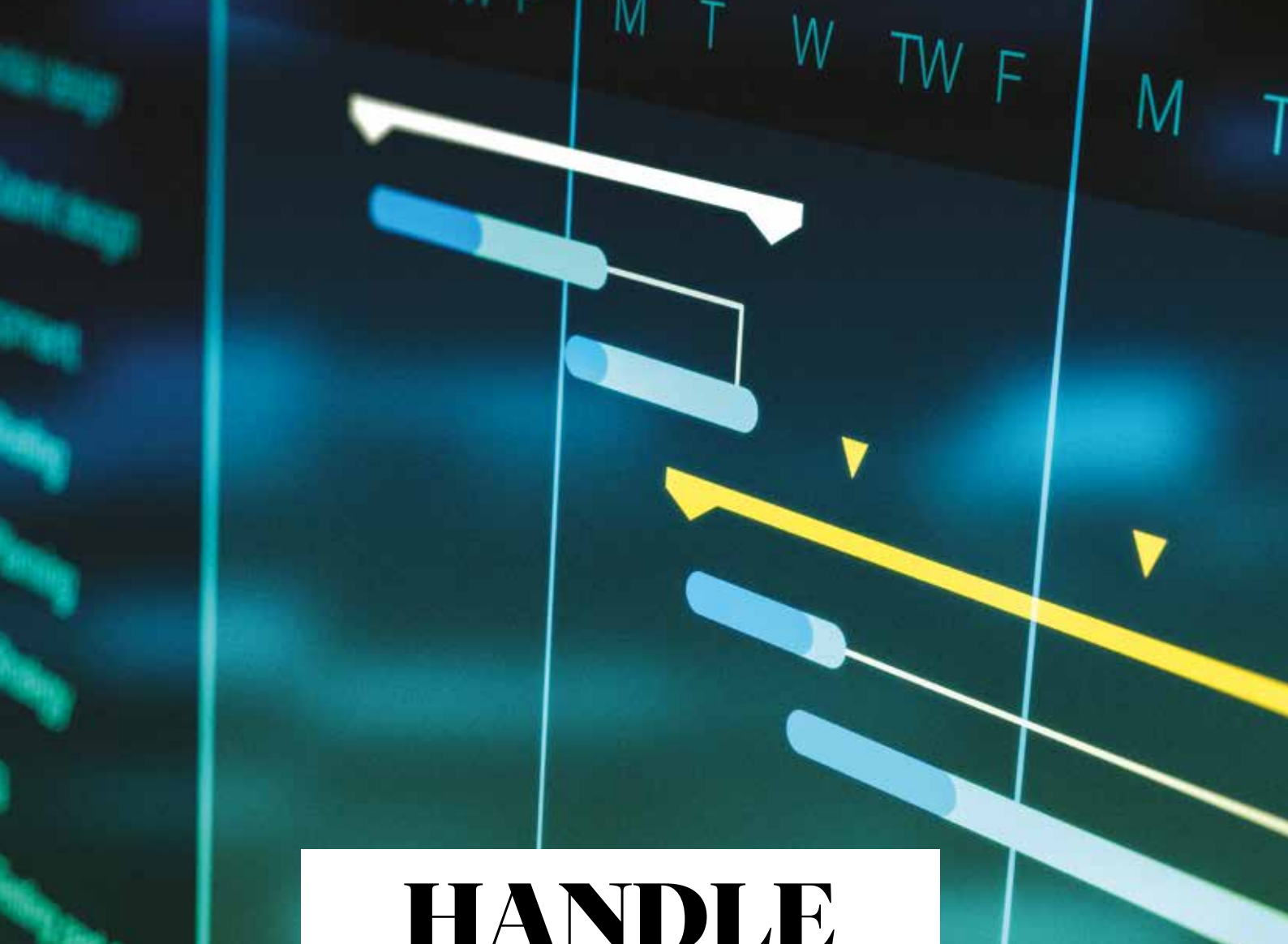
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# HANDLE WITH CARE

Machine learning (ML) and artificial intelligence (AI) are bringing opportunities – but users must tread with some caution when amassing data. **Kevin Rozario** reports

**T**he need for improved efficiency, resource allocation, cost-effectiveness and regulatory compliance in MRO and CAMO (Continuing Airworthiness Management Organisation) has never been greater given the current constraints around supply chains and staffing bottlenecks.

In this environment, planning and scheduling software has become increasingly important in enabling MROs to shed light on system time-lags or glitches in order to maintain or ramp up productivity.

Suppliers in the sector are confident that integrated planning and scheduling software has become a ‘must have’, especially as machine learning (ML) and artificial intelligence (AI) bring a new level of insight to bear on the MRO business.

Cloud-based MRO software already provides enhanced scalability, accessibility and data sharing capabilities to enable better collaboration between MROs and airlines. Meanwhile real-time data analytics tools allow MROs to identify trends, optimise workflows and improve decision-making.

A spokesperson for Airbus comments: “One of the most important things is to digitise maintenance records and ensure seamless information sharing between CAMO and MRO. Both have to collaborate to unleash the value creation of an optimised maintenance programme. Predictability is the key – anticipation of the maintenance tasks to be accomplished (both routine and non-routine) is a must considering, of course, resources.”



Dave Purfurst, global pre-sales director at aviation tech company Veryon, says: “The aviation industry is always striving for more efficiency, cost effectiveness and compliance in its MRO and CAMO operations. It is no longer about a single tool, but multiple, fully integrated solutions leveraging AI, ML and mobility. Bringing this multi-solution network into the cloud facilitates seamless integration and better collaboration between teams.”

This theoretically ensures that data is always up to date and secure. Capturing data in real time while on the move has also become key to efficient scheduling. “Now, real-time capture facilitates AI/ML algorithms to analyse vast amounts of data from aircraft systems, as well as the MRO/CAMO solutions, to predict failures before they occur, thus reducing unplanned downtime and maintenance costs,” says Purfurst.

Such multi-solution networks are replacing old ways of planning and scheduling maintenance with what Veryon describes as “condition-based predictive base maintenance”. The company’s solutions for MRO/CAMO can integrate with onboard systems and other solutions to simplify the planning and schedule of maintenance for its customers.

At QOCO Systems, founder and executive advisor Ilari Neitola highlights how staffing has become an issue. “The availability of qualified aviation maintenance professionals, such as aircraft maintenance technicians, remains a challenge, while the productivity of existing staff often suffers due to poor planning,” he says. “This is particularly true in the dynamic environment of line maintenance, where rapid changes make planning and scheduling exceptionally difficult.”

To address this, QOCO offers a package called MROTools.io Assignment, which applies modern optimisation models and AI to match personnel to the appropriate maintenance tasks. “This system dynamically allocates resources to work packages in real time, ensuring that technicians are assigned based on skill, availability, and work-order priority, thus boosting overall productivity and efficiency,” explains Neitola.

On the value of AI, the QOCO Systems founder adds: “It is playing a critical role not only in improving the outcomes of planning but also in simplifying the user experience. For example, natural

## “LOOKING AHEAD, EVEN BY 12 MONTHS, SOFTWARE SUPPLIERS SEE FURTHER CHANGE, WITH AI PLAYING AN INCREASINGLY PIVOTAL ROLE”

language queries allow users to ask direct questions and receive quick, actionable answers. Previously, such insights would have required time-consuming report development. This reduces complexity and accelerates decision-making, making planning more efficient and intuitive.”

### DATA ACCURACY AND RELEVANCE

While the new tech sounds good, the crucial thing is that the data being picked up is precise, accurate and relevant. At India’s Ramco Systems, Saravanan Rajarajan, director of aviation solution consulting, comments: “AI/ML-based maintenance planning is forcing MROs to revisit data platforms and data quality.

“The first step in AI-based maintenance planning is assessing the data capabilities and quality of the source systems. Existing infrastructure should have a clear process and workflow to collect the right data, and collected data should be governed by the right workflow controls.

“The second step is training the AI systems in different data types, the data context and the relationships between structured and unstructured data sets. For example, task data available in the AMM (aircraft maintenance manual) in digital formats, and available in PDFs from the customer, must be correlated meaningfully through training. Accuracy issues require constant intervention from the data engineers and business until the planning systems bring in real value.”

This is doubly important at a time when MROs are seeing higher demand due to more aircraft coming back into service and older aircraft remaining in action longer due to new aircraft deliveries being held up. They are also seeing higher utilisation due



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to passenger and cargo demand which makes accurate planning and scheduling to determine any maintenance schedules all the more critical.

Rajarajan says: “They are also facing the severe challenges of an overloaded supply chain and acute labour shortages. It means the need to optimise resources has become critical to avoiding scaling back on growth.” Ramco’s maintenance planning modules integrate data on customer contracts, work scope, manpower availability, tools and parts availability, as well as historical data and leverage ML-based algorithms to produce tailored maintenance plans.

This type of smart deployment of planning and scheduling software is becoming more common in the current climate.

## INCREMENTAL GAINS

QOCO Systems’ Neitola says: “The key to managing supply chain disruptions and workforce shortages is to start by understanding your current processes and then implement improvements incrementally. If you’re collecting data manually, the first step is to adopt a system that consolidates inputs from flight operations, maintenance schedules and staff availability into a single interface.

“This system should also visualise the information in a way that makes it easy to quickly identify potential bottlenecks in resource availability, helping planners

react faster to disruptions. Once your data is centralised, the next step is to implement automation. With automation in place, planners can shift their focus to higher-value tasks and strategic decision-making, driving productivity gains even in constrained environments. It’s important to have a clear vision and end goal in mind, even when starting small.”

The rapid advancement in AI means that it is essential to focus on what an ideal solution would look like, regardless of whether existing software can meet that need. Neitola comments: “The fast pace of technology will likely bring that vision within reach sooner than expected. Moreover, setting KPIs and measurements from the outset is crucial. Start measuring key metrics right away to ensure you’re heading in the right direction.”

Veryon believes that employing an integrated MRO system that combines inventory management with maintenance scheduling helps to manage spare parts efficiently, even during supply chain disruptions. “But that is not always enough,” says Purfurst. “An organisation will need complementary solutions that are integrated to help get you the insight you need and the gain you are striving for.”

One of the key features within the Veryon Diagnostic solution is a guided troubleshooting module to help a less experienced workforce gain the knowledge they need to get an aircraft back to airworthiness status. While this does



▲ Ilari Neitola, founder and executive advisor, QOCO Systems

**“SUPPLIERS IN THE SECTOR ARE CONFIDENT THAT INTEGRATED PLANNING AND SCHEDULING SOFTWARE HAS BECOME A ‘MUST HAVE’”**

1. QOCO Systems’ MROTools.io Assignment package uses AI to match personnel to appropriate maintenance tasks

2. The Veryon Diagnostic solution is a guided troubleshooting module

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# END-TO-END AIRCRAFT MANAGEMENT PLATFORM

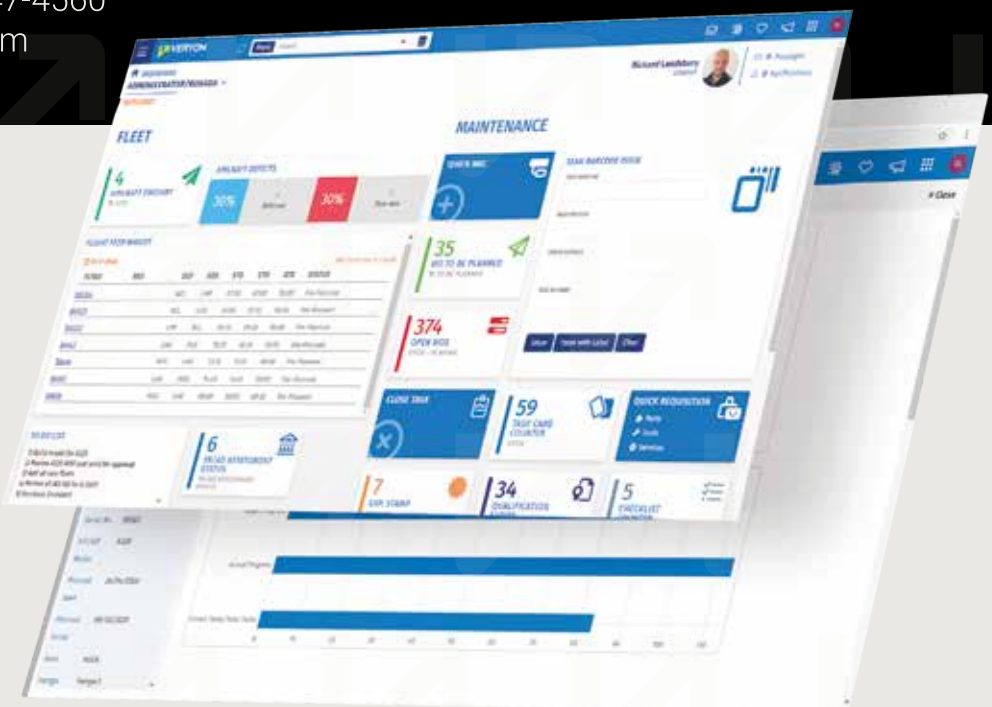
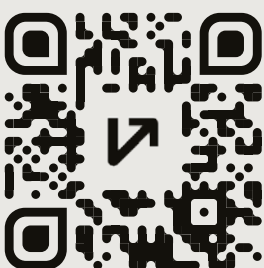
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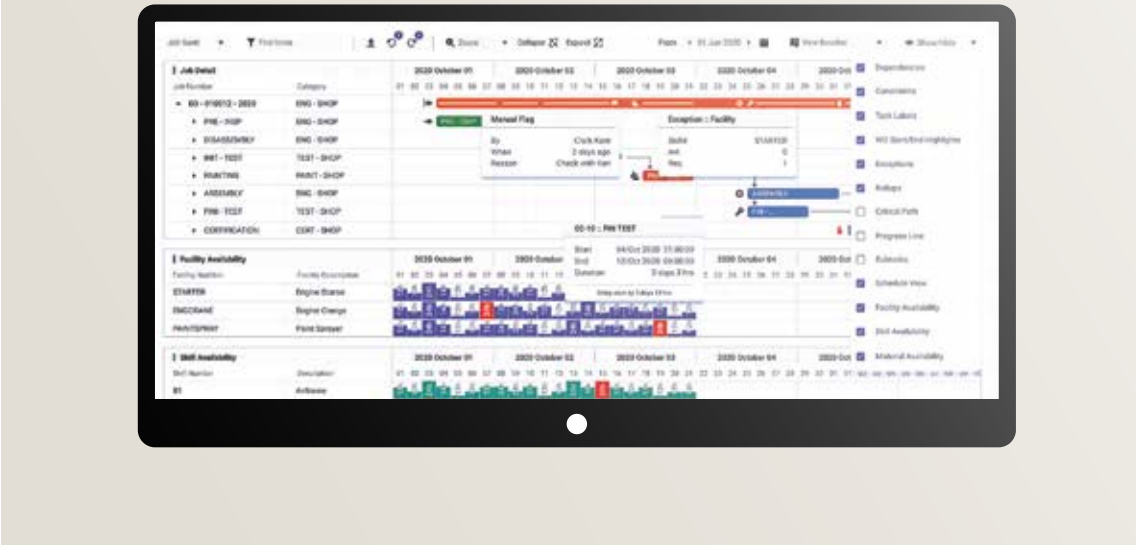
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not solve the workforce shortage it can plug some gaps due to lack of experience.

AI may get to do the heavy lifting before long. Ramco's Rajarajan says: "Intelligent automation and decision-making capabilities can reduce the highly intensive manual labour involved in planning, thereby improving productivity. For example, once the input work scope is given, the planning system should provide optimised sequencing of access panel tasks and MPD tasks, plus automated assignments of the rostered staff possessing the right skills for given tasks."

Another area where Ramco is leveraging historical data extensively is on non-routine effort and parts estimations during planning stages. This has significantly reduced order holds due to non-availability of manpower, parts and tools, claims the company.

PLANNING AND SCHEDULING SPREADS ITS WINGS

Looking ahead, even by 12 months, software suppliers see further change, with AI playing an increasingly pivotal role. Veryon envisages MRO/CAMO solutions will become foundational. "Complementary solutions that are fully integrated will provide insight, streamlining processes and decision-making. This will move the industry into a more condition/predictive base maintenance practice," says Purfurst.

QOCO Systems' Neitola also sees some broader reach. He explains: "We see planning and scheduling expanding into areas we may not have anticipated. However, even within the same domain, different customer environments will demand highly tailored solutions." He cites the Mixture of Experts (MoE) model as presenting a compelling opportunity here.

"This model allows us to create specialised, cost-effective AI solutions that can be fine-tuned

to meet the unique needs of individual customers. An additional benefit of the MoE model is improved data privacy and security. By dividing tasks among different experts, sensitive information is handled more compartmentally, limiting data exposure," notes Neitola.

Such a structure allows experts to be updated independently, minimising the need to access full datasets and ensuring compliance with privacy regulations. This way, organisations can gain protection in their AI workflows while improving efficiency.

As these technologies evolve, QOCO Systems anticipates even greater efficiency gains and enhanced data security in an increasingly complex environment.

Ramco also sees planning creep as more sophisticated AI/ML algorithms are deployed alongside massive amounts of data. Rajarajan comments: "Planning software shall extend beyond the boundaries of the organisation, connecting ecosystems like suppliers and customers and OEMs and leveraging their data."

Ramco recently launched Aviation Software 6.0 for smarter aircraft management. The software leverages AI and ML to drive transformation in M&E and MRO operations. Rajarajan says: "The entire process of managing the kitting and marshalling operations is streamlined with the Kitting Hub; the automated planning takes into consideration the part demand data and suggests the possible options to meet the demand or highlight the risks."

Expect further software packages to hit the MRO market soon. Led by AI and ML, they are likely to lead to further systems integration – and hopefully better decision-making – giving MROs a more comprehensive view of maintenance activities, and how to tackle them earlier. ●



▲ Dave Purfurst, global pre-sales director at aviation tech company, Veryon

▲ Ramco maintenance scheduling

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# ENHANCING SAFETY AND INCREASING EFFICIENCY

Makro Aero's Tanju Taskiran discusses how the company is positioning itself as an emerging player in the aircraft access solutions and docking systems market

**F**or over a decade, Makro Aero has been a key player in the aviation industry, specialising in the design and manufacture of equipment for MRO companies and airlines. Our focus areas include aircraft access stands, platforms and docking systems – critical infrastructure for safe and efficient maintenance operations.

The Covid-19 pandemic caused a significant slowdown in the aviation industry, presenting a true test of our company's values and resilience. Through it all, Makro Aero remained steadfast, demonstrating that we are built on a foundation of solid principles and operational integrity.

## EXPANDING GLOBAL PRESENCE

While our core customer base is concentrated in Europe and the Middle East, we are rapidly growing our presence in North America and Africa. Our reach, however, knows no borders. We often remind potential clients: "Examine our equipment, compare our pricing and experience our dedicated support. The benefits of working with Makro Aero will speak for themselves."

## COMMITMENT TO EXCELLENCE

Makro Aero's success is built on a foundation of unwavering commitments, which include:

- Delivering high-quality, functional equipment
- Ergonomically optimised designs
- Cost efficiency, with a focus on 'delivering exactly what's needed'
- Streamlined delivery lead times
- Maximising operational availability



“  
**WE DON'T JUST  
SEE OURSELVES AS  
SUPPLIERS – WE ARE  
SOLUTION PARTNERS**  
”

### TANJU TASKIRAN

business development  
manager, Makro Aero

- Minimising downtime with user-friendly, low-cost sustainment solutions
- Prioritising safety – for personnel, aircraft, equipment and facilities.

Our objective isn't merely to provide a product; it's to deliver optimal value. Customisation is central to our approach, ensuring our customers receive equipment tailored specifically to their unique requirements, rather than settling for off-the-shelf solutions.

## SAFETY AND EFFICIENCY

In the aviation industry, safety and efficiency are inseparable. Every piece of equipment we design adheres to

stringent ISO standards, ensuring reduced risk during maintenance tasks.

While budget constraints sometimes force MROs to use outdated or makeshift solutions, this approach is neither safe nor sustainable. Effective maintenance requires the right tools, and failing to equip a workforce properly introduces avoidable risks.

Our mission is to help our customers achieve greater efficiency through the right access solutions – solutions that not only improve operations but also deliver a strong return on investment (ROI). We encourage our clients to embrace innovation and involve end-users in the selection process to ensure their equipment is fully aligned with operational needs.

## A TRUSTED PARTNER

Our extensive experience and proven track record in aircraft access solutions underscore our expertise and commitment. We don't just see ourselves as suppliers – we are solution partners. We are passionate about delivering the best possible solutions to our customers.

At Makro Aero, we're not just about selling equipment. We're about fostering long-term partnerships built on trust, quality and innovation. ●



▲ Narrowbody aircraft nose docking platforms



For more information about Makro Aero, visit [makroaero.com](https://makroaero.com)



#### Who we are:

Pioneer Aero Supply provides total spares support including Outright Sales, Exchanges, Loans, Leasing, and Repair Management. Building upon decades of experience in the aviation industry, we have developed a customer base that includes the top commercial airlines, cargo carriers, regional operators, OEMs, MROs, and other re-distributors. We are thrilled to announce that we have been recognized for the second year in a row in the Inc. 5000 fastest growing companies in 2024, ranked as #768.

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- ✓ We have the resources, manpower, and strong industry partnerships to provide the highest level of service to operators and brokers of any size. We have served airlines all over the world.
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- ✓ We have over 10,000 unique line items on hand, in stock and ready to go.

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- ✓ Rotable Parts Sales
- ✓ Engine Parts Sales
- ✓ Inventory consignment
- ✓ Inventory Acquisition
- ✓ Initial Provisioning Recommendations
- ✓ Rotable (Repair) Mgmt.
- ✓ 24/7/365 AOG Support
- ✓ APU and APU parts sales



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# RINSE & REPEAT

Automated aircraft exterior cleaning systems are elevating safety standards, reducing physical strain and cutting down on operational costs

**S**afety and well-being are at the core of the aviation industry, especially when it comes to the crucial task of protecting aircraft technicians and ground personnel. One of the most challenging aspects of this responsibility is the cleaning of aircraft, a task traditionally fraught with hazards.

However, the introduction of automated aircraft cleaning systems has revolutionised this aspect of aviation, offering a safer, more efficient alternative to the labour-intensive methods that have long posed significant risks to workers.

## THE CHALLENGES OF MANUAL AIRCRAFT CLEANING

Manual aircraft cleaning is a demanding task that requires workers to navigate a variety of physical and environmental hazards. Cleaning the exterior of an aircraft typically involves the use of cherry pickers or scaffolding to reach the aircraft's towering surfaces.

These elevated positions increase the risk of accidents, including falls from heights, which can result in serious injury or even death. Additionally, the presence of water and detergents creates slippery conditions, further exacerbating the dangers.

The physical strain of manual cleaning is another significant concern. Repetitive movements, often in awkward positions, can lead to chronic musculoskeletal issues. According to a 2017 study conducted in the US, the frequency of non-fatal accidents among ground handling staff is notably higher than in other areas of the aviation industry. This highlights the urgent need for improved safety measures.

Veronika Andrianovaite, chief commercial officer of Nordic Dino Robotics AB, underscores the inherent dangers of manual aircraft cleaning. "You are either working in a cherry picker or on platforms built around the aircraft. It's inherently risky. The slippery conditions due to water and detergents add to the danger," she explains.



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## THE REVOLUTION OF AUTOMATED CLEANING SYSTEMS

Automated aircraft cleaning systems have emerged as a groundbreaking solution to these challenges. These systems, which can be remotely controlled with devices that resemble gaming consoles, take over the most strenuous tasks involved in cleaning an aircraft. This technological advancement drastically reduces the need for workers to be in precarious positions, thereby minimising the risk of accidents.

"With robotic solutions, you're operating from a safe distance. There's no need to work at dangerous heights," Andrianovaite notes.

By allowing workers to stay on solid ground, automated systems not only enhance safety but also alleviate the chronic physical strain associated with manual cleaning.

Beyond the obvious safety benefits, automated systems offer a range of other advantages such as significantly reducing the time required to clean an aircraft, which enhances operational efficiency.

This time-saving aspect allows airlines to reallocate their workforce to more complex and engaging tasks, ultimately improving overall productivity. Furthermore, the automation process



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## A SAFER, MORE SUSTAINABLE FUTURE

Automated aircraft cleaning systems represent a major advancement in the aviation industry's commitment to worker safety. By reducing the need for manual labour, minimising exposure to hazardous conditions, and providing intuitive training, these systems create a safer and more efficient working environment for ground personnel.

As the aviation industry continues to prioritise safety and efficiency, the adoption of innovative solutions like automated cleaning systems is crucial. These systems not only protect workers but also contribute to a more sustainable and cost-effective future for the industry. Embracing such technological advancements is essential in ensuring the continued well-being of those who keep the aviation industry running smoothly. ●

**1.** Automated cleaning systems can be remotely controlled **2.** Veronika Andrianovaite, chief commercial officer, Nordic Dino Robotics AB **3.** Automated cleaning processes require fewer personnel

systems use a controlled mixture of 90% water and 10% detergent and minimise exposure to these substances.” This controlled use of cleaning agents reduces the risk of chemical exposure, further protecting workers' health.

## ECONOMIC BENEFITS OF AUTOMATION

The adoption of automated cleaning systems also brings significant economic benefits to the aviation industry. By enhancing operational efficiency and reducing the time required for aircraft cleaning, airlines can lower their operational costs. Additionally, by minimising the physical strain and hazardous conditions that lead to workplace injuries, these systems help reduce the risk of injury-related lawsuits and associated legal and medical expenses.

The reduction in workplace injuries and related costs represents a substantial financial saving for airlines, further highlighting the value of automated systems.

requires fewer personnel, typically just one operator with a remote control and a couple of helpers for hard-to-reach areas. Another critical advantage of automated systems is their ability to minimise exposure to potentially hazardous cleaning agents. “Our robots save time and reduce the number of people required for the washing process,” Andrianovaite explains. “Automated

3

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# TRAINING FOR TOMORROW

CAE's **Shaun Kuldip** tells us how technology-driven learning, including AR and VR, is revolutionising the way aircraft maintenance technicians are trained

**C**AE, the world's largest provider of pilot training, has long been a leader in both pilot and aircraft maintenance training. With over 70 civil aviation training centres worldwide, including 13 specifically focused on business aviation, CAE continues to expand its footprint. The company's new facility in Savannah, Georgia is marking a significant step forward in its relationship with Gulfstream.

## A NEW CENTRE

"Savannah is a key location for us," says Shaun Kuldip, global leader of CAE's Maintenance Training Centre of Excellence. "This new centre signifies

an expanding partnership between CAE and Gulfstream. At Savannah, we'll be offering both pilot and maintenance technician training to Gulfstream operators, further strengthening our support for the business aviation sector."

Kuldip emphasises the importance of Savannah's location as part of CAE's broader strategy. Of the 13 business aviation training centres, five are in the US, underscoring the company's commitment to the North American market. This latest addition in Savannah not only supports pilot training but also includes comprehensive maintenance technician training, ensuring CAE remains at the forefront of servicing the industry.

## ADDRESSING THE MAINTENANCE TECHNICIAN SHORTAGE

The aviation industry faces a critical shortage of maintenance technicians, a challenge that CAE has been tracking closely. The company's 2023 Aviation Talent Forecast estimates a need for 402,000 new maintenance technicians over the next decade, with 74,000 of those needed in the business aviation sector alone.

"There are several factors driving the demand for technicians," explains Kuldip. "We're seeing an ageing workforce, with waves of retirements accelerated by the Covid-19 pandemic. This loss of experienced personnel is difficult to replace. A single veteran technician in

## “CAE is committed to staying ahead of the curve in maintenance technician training”

business aviation might be certified across multiple aircraft types, while it can take years for a new technician to gain the same level of expertise.”

Kuldip also points to a broader issue with recruitment. “The aviation industry, unfortunately, isn’t seen as attractive to younger job seekers. We’ve noticed that the graduation rates at technical schools aren’t keeping pace with the retirements we’re seeing. The reality is most future technicians aren’t in training yet, and that’s a problem.”

To address these challenges, Kuldip advocates for early exposure to aviation careers. “We need to promote aviation maintenance to teens and young adults before they reach college. In the short term, the industry must also focus on retaining experienced technicians and attracting veterans from the military who may not be aware of the opportunities available to them.”

### REVOLUTIONISING TECHNICIAN TRAINING

CAE’s maintenance training programmes cover the spectrum of learning, from entry-level courses to in-depth initial training courses on specific aircraft. “This includes the latest and most technologically advanced business aircraft being built today,” explains Kuldip. “Courses range from a three-day course to five-plus weeks for a full aircraft tip-to-tail initial course.”

In addition to aircraft-specific training, CAE offers professional development courses aimed at enhancing leadership skills among technicians. Kuldip highlights the company’s Ready For Work programme, which prepares new technicians for the workforce by ensuring consistent training standards across operators. “Our goal is to create a pipeline of skilled technicians who are ready to contribute on day one,” he says.



1. Maintenance technician training will use VR 2. Inside the new CAE full-flight simulator at the Savannah facility

Furthermore, the company’s Master Technician Programme allows technicians to attain advanced certifications in two distinct tracks – specialist and people leader. “With this programme, we aim to help technicians reach master status faster than traditional career development



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programmes, ensuring that they can advance in their careers more efficiently,” Kuldip notes.

The company is also exploring innovative learning methodologies, such as just-in-time training, which breaks complex topics into digestible modules. “This gives technicians time to apply their skills in the field before returning for more advanced training, creating a predictable career path.”

## VR IN MAINTENANCE TRAINING

CAE is pioneering the use of virtual reality (VR) in technician training, particularly in its Gulfstream maintenance programmes. “VR is a game-changer,” Kuldip asserts. “It allows us to bring an entire aircraft into the classroom, showing technicians detailed systems and components in ways that were never possible before.”

By immersing technicians in a virtual environment, CAE can simulate real-world scenarios and provide

hands-on experience without the risk of damaging expensive equipment. “Technicians can practice tasks as many times as they need in a completely safe environment, which is particularly useful for safety-sensitive or cost-prohibitive procedures,” Kuldip explains.

CAE’s deployment of VR for Gulfstream aircraft models such as the G500, G600 and G650 allows technicians to work on maintenance tasks in various teaching modes, including an evaluation mode where they can measure their skills independently. “VR is not just a tool for learning but a means to accelerate it. With the use of simulation, we can show how aircraft systems behave under normal and malfunctioning conditions. This adds a layer of realism that greatly enhances training.”

Looking ahead, Kuldip sees even more potential for emerging technologies. “The convergence of AI and VR represents a transformative synergy for the aviation industry. As



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## “CAE is pioneering the use of virtual reality (VR) in technician training”

these technologies evolve, they will reshape how we train and develop technicians, pushing the boundaries of what’s possible.”

## MEETING EVOLVING INDUSTRY DEMANDS

CAE is committed to staying ahead of the curve in maintenance technician training. “We’ve been investing heavily in technology and career development programmes over the past several years,” says Kuldip. “As aircraft technology advances and workforce challenges persist, we’re adapting to meet those needs.”

With an eye on the future, CAE continues to enhance its course offerings and integrate advanced simulation and VR into its training programmes. “Our focus is on making training more accessible, more efficient and more effective. Whether it’s through VR, cloud-based learning, or new methodologies like just-in-time training, we’re pushing the boundaries of what’s possible in aviation maintenance education,” Kuldip concludes.

As the industry grapples with technician shortages, CAE is leading the charge with innovative solutions designed to attract and develop the next generation of aviation professionals. ●

1. The new full-flight simulator at CAE’s Savannah facility

2. Maintenance training with AR



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# TAKING OFF TOGETHER

Vallair and College de Paris International aim to equip the next generation of aircraft technicians with top-tier skills and certifications

**M**ulti-disciplinary MRO and mature aircraft asset specialist Vallair has announced a strategic partnership with College de Paris International to advance aeronautical skills training and certification.

The collaboration, formalised through a Memorandum of Understanding (MoU), will see the development and delivery of comprehensive training programmes by Aircraft Academy, a Vallair Group company.

The partnership aims to address the growing demand for skilled aircraft technicians by providing extensive training opportunities across various aeronautical disciplines. Vallair's president, Grégoire Lebigot, emphasised the unique position of the Vallair Group in offering a broad spectrum of expertise under one roof. "We have always prioritised training across our capabilities, and our senior team is committed to passing on their knowledge to the next generation of engineers," he explains. "With the global need for skilled aircraft technicians, it is our responsibility as an aeronautical company to ensure a steady supply of well-trained professionals."

Vallair's facilities in Châteauroux and Montpellier are equipped with maintenance hangars for both narrowbody and widebody aircraft, complemented by dedicated aerostructure and engine shops. These facilities also support disassembly programmes and aircraft mechanic training through Aircraft Academy.

**"This partnership represents a significant step forward in enhancing the global pool of skilled aircraft maintenance engineers"**

Lebigot highlighted that this partnership with College de Paris, the second-largest private education provider in France, aligns with Vallair's goal to expand their influence within the aviation industry in France and promote their capabilities to a broader audience.

Guillaume Finck, director general of College de Paris International, noted the significant impact this partnership will have on the College de Paris network, which includes higher education institutions and professional training organisations. "Our goal has always been to offer our 25,000 candidates in France and abroad exciting global employment opportunities," he explains. "This collaboration allows us to target international candidates with technical diplomas who aspire to become aircraft mechanics or avionics technicians. The Structured On-Job Training (SOJT) provided by Vallair at their MRO facilities is a unique advantage that we are eager to offer our trainees."

Armel Jezequel, chief executive of Aircraft Academy, outlined the training programmes set to commence in Q4 2024. Aircraft Academy will provide EASA Part 147 theoretical and practical training, catering to individuals, MROs, airlines and military organisations worldwide. "Our focus is on delivering high-quality, adaptable training rather than sheer quantity," he explains. "We attract discerning students at all levels, from those seeking Part 66 Basic Training to licensed engineers needing practical experience. Aircraft Academy's course structure is designed to equip technicians with the necessary skills to thrive in today's challenging MRO environment, offering flexible and cutting-edge maintenance training solutions."

This partnership represents a significant step forward in enhancing the global pool of skilled aircraft maintenance engineers, ensuring that the aviation industry continues to thrive with well-trained professionals. ●



# 25K

*The goal of the College de Paris International has always been to offer its 25,000 candidates in France and abroad exciting global employment opportunities*



◀ Vallair and College de Paris International representatives



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# SAFETY FIRST

For EASA Part 145 organisations, the effectiveness of a Safety Management System (SMS) goes beyond meeting regulatory standards – it demands active engagement, robust competence and a culture of continuous improvement to truly safeguard operations and achieve excellence

**A** question that now arises in the context of EASA Part 145 organisations is “Is your Safety Management System (SMS) truly effective, or are you simply meeting the minimum regulatory requirements?”

This question cuts to the core of safety management within an MRO environment because, as we’ve seen time and again, underperformance in safety management often correlates with a lack of engagement as well as an increased risk profile.

Steve Bentley FRAeS, chief executive of Sofema Aviation Services and Sofema Online, comments: “While many organisations strive to meet regulatory standards, some unfortunately take a box-ticking approach to SMS, which can be a missed opportunity. The goal should be to not just comply but to embed safety into the culture and everyday operations of the organisation.”

## UNDERSTANDING SMS IN AN EASA PART 145 CONTEXT

In EASA Part 145 organisations, the SMS is designed to systematically identify hazards, assess risks and implement safety measures. This framework, mandated by regulation, is essential, but its effectiveness hinges on more than just compliance. A robust



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SMS should actively manage safety risks and drive continuous improvement across all levels of the organisation.

Bentley adds: “The true test of an SMS is not how well it satisfies auditors but how effectively it prevents incidents and enhances safety performance. This requires a shift from viewing SMS as a compliance task to seeing it as a strategic tool for operational excellence.”

## THE ROLE OF COMPETENCE IN SMS EFFECTIVENESS

Just as competence management is crucial in ensuring operational efficiency, it plays an equally vital role in SMS effectiveness. Competent personnel are better equipped to identify potential safety

risks, understand the implications of their actions and contribute to a safer work environment. Training should encompass not only technical skills but also safety awareness and risk management.

“In my experience, organisations that invest in comprehensive training programmes – not just for the sake of compliance but to genuinely enhance competence – see better safety outcomes,” Bentley explains. “Underperforming in this area can have serious consequences, both in terms of safety and financial performance.”

## FOSTERING A SAFETY CULTURE THROUGH COMPETENCE DEVELOPMENT

Richard Branson famously said, “Train people well enough so they can leave, treat them well enough so they don’t want to.” This philosophy is particularly relevant to safety management.

Employees who feel valued and well-trained are more likely to take ownership of safety within their roles.

# “DATA IS THE LIFEBLOOD OF AN EFFECTIVE SMS”

1. Training should encompass not only technical skills but also safety awareness and risk management 2. Steve Bentley FRAeS, chief executive, Sofema Aviation Services and Sofema Online 3. Aircraft engineers utilise camera probes as part of their work repairing and maintaining aircraft jet engines

This ownership is key to fostering a proactive safety culture, where potential hazards are identified and addressed before they escalate.

Bentley adds: “Whilst safety ownership is essentially a top-down process, a safety culture isn’t something you can impose from the top down; it must be nurtured from within. Continuous competence development is at the heart of this process – without it, safety can quickly become an afterthought rather than a priority.”

### CHALLENGES IN MAINTAINING SMS EFFECTIVENESS – COMMUNICATION IS KEY

One of the main challenges in maintaining SMS effectiveness is ensuring that safety practices are consistently applied across all levels of an organisation. This requires strong leadership, clear communication and a commitment to continuous improvement.

Safety management cannot be seen as the sole responsibility of safety officers but as a shared responsibility across all departments. Each business area owner and leader is responsible for the success of the SMS within their respective areas.

Data is the lifeblood of an effective SMS. Without it, you’re flying blind. But data alone isn’t enough – you need the right people with the right competencies



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via Sofema/Getty Images/Stockphoto

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to interpret it and take action. Without accurate and timely data, it becomes difficult to make informed decisions and improve safety outcomes.

### BEST PRACTICES TO ENHANCE SMS EFFECTIVENESS

When establishing a strong and proactive SMS, the following key strategies should be considered:

- Embed safety in every role: Ensure that safety responsibilities are clearly defined for every role within the organisation. Safety should be a core component of job descriptions, performance evaluations and daily operations.
- Provide ongoing training: Regular training is crucial to keep employees updated on current safety rules, technologies and best practices. Customise training for each department to ensure it is relevant and engaging.
- Conduct regular audits and assessments: Regularly assess the effectiveness of your SMS through internal audits, safety performance evaluations and feedback from employees.
- Encourage a reporting culture: Foster a culture where employees feel comfortable reporting safety concerns

without fear of retribution. An open reporting culture is crucial for identifying and addressing potential hazards.

### CONCLUSION

In EASA Part 145 organisations, the effectiveness of a SMS is a critical factor in ensuring both safety and operational success. By integrating SMS into all aspects of the organisation, continuously developing competence and fostering a culture of safety, organisations can not only meet regulatory requirements but also achieve long-term excellence in safety and performance.

Bentley concludes: “Safety management is an ongoing journey, not a destination. It requires commitment, collaboration and a relentless focus on improvement. By prioritising SMS effectiveness, EASA Part 145 organisations can safeguard their operations, enhance efficiency and build a stronger, more resilient future.”



For more information about Sofema Aviation Services and Sofema Online, visit [sassofia.com](https://www.sassofia.com) and [sofemaonline.com](https://www.sofemaonline.com)



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# LEADERSHIP RESHUFFLE

Lufthansa Technik has announced several changes within its key management positions, with new appointees coming from within the company

**L**ufthansa Technik has unveiled a series of leadership appointments across key divisions, promoting long-serving executives to support its 'Ambition 2030' growth strategy, a move that the company says underscores its commitment to innovation and operational excellence.

In May, Michael Kirstein was appointed vice president of the Transformation Office, where he is now leading the charge on the Ambition 2030 programme. The initiative aims to expand Lufthansa Technik's global reach and leadership in aircraft maintenance and repair. Kirstein, who previously headed operations in the company's engine services, expressed his enthusiasm to *MRO Management* for the new challenge: "Everyone is part of this transformation, and that's great. As a team, we will embrace change, turn challenges into opportunities and ensure our organisation remains future-ready,

delivering world-class services that create lasting value for our customers."

Simultaneously, Derrick Siebert, former vice president of commercials engine services, transitioned into the role of vice president operations engine services, while Dr Georg Fanta became vice president commercials in the same division. Lufthansa Technik says these changes reinforce its focus on bolstering its engine services division as a key component of its growth.

Thomas Illner, formerly the chief executive of BizJet, a Lufthansa Technik subsidiary, was named managing director and head of region Americas for Lufthansa Technik Component Services as of 1 July. Illner told *MRO Management*: "I am excited to be part of our growth journey in the Americas for Aircraft Component Services. Recently, we already took another significant step in expanding our portfolio in the region by acquiring an 80% majority stake in

ETP Thermal Dynamics, a specialist in MRO services for heat exchangers. This acquisition enhances our capabilities and strengthens our supply chain security."

Further reinforcing its leadership in the Americas, Lufthansa Technik announced the promotion of Berit Plewinsky to vice president commercials aircraft component services on 8 July. Plewinsky, formerly senior director product sales and fulfilment in Lufthansa Technik's aircraft component division, told *MRO Management* she is committed to driving digital transformation within the company: "As a leading global MRO, we are pushing our digital transformation further and establishing innovative products that allow our customers to benefit from maximum aircraft availability. I genuinely believe that by embracing our diversity and global reach, we can actively shape the aviation industry toward a sustainable and successful future."

# "IN ORDER TO CONTINUE OUR JOURNEY OF SUCCESS, EMBRACING CHANGE IS ESSENTIAL"

Soeren Stark, chief executive, Lufthansa Technik

Lufthansa Technik continued its management reshuffling on 1 August, when Tim-Oliver Fedeler, previously head of digital innovation, was appointed managing director of Lufthansa Technik Component Services Asia Pacific. He now also serves as senior director product sales and fulfilment for the region. Fedeler emphasised to *MRO Management* the importance of customer proximity and technological expertise: "The combination of our deep understanding of aircraft technologies, a global footprint that ensures customer proximity and an unrivalled partnership with major OEMs makes our Aircraft

Component Service the partner of choice for more than 500 airlines worldwide."

In addition, Jens Michel, formerly head of legal affairs for EMEA, became vice president sales North East Asia, and Dr Alexander Sixt, who led the Global Competence Centre for Warehouse and Aircraft Maintenance Solutions, took on the role of managing director at Lufthansa Technik Intercoat.

Later in August, Fabian Nagel, who was senior director procurement engines and airframe, assumed the role of vice president sales VIP and special aircraft services. He succeeded Wieland Timm, who retires after a distinguished 20-year

career with the company. Nagel, in his new position, expressed excitement to *MRO Management* about maintaining Lufthansa Technik's legacy of high-quality service for special aircraft: "For more than 65 years, our company has turned our customers' imagination into reality. I look forward to meeting our esteemed customers and to designing, manufacturing, and delivering best-in-class VIP, Head of State, and Special Mission Aircraft of unrivalled quality."

Reflecting on these leadership changes, Soeren Stark, chief executive of Lufthansa Technik, affirmed the company's confidence in its internal talent: "In order to continue our journey of success, embracing change is essential. I am pleased that we can fill these crucial positions from within our own ranks, a testament to the tremendous talent within our company." ●

1. Thomas Illner 2. Berit Plewinsky  
3. Fabian Nagel 4. Tim-Oliver Fedeler  
5. Michael Kerstein



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# TWO DECADES OF EXCELLENCE

With a unique focus on Airbus fleets and a commitment to developing skilled AMTs, the Iberia Maintenance Training Centre remains a vital contributor to the global aviation industry

◀ An Iberia Maintenance AMT at work



**“THE CENTRE IS HELPING TO ENSURE A STEADY PIPELINE OF SKILLED TECHNICIANS TO MEET THE INDUSTRY’S FUTURE NEEDS”**

**T**he Iberia Maintenance Training Centre has recently celebrated its 20th anniversary as an EASA 147-approved training facility. The recognition, which comes from the Spanish Aviation Safety and Security Agency (AESA), allows the centre to provide specialised type training to professionals holding Aircraft Maintenance Licences in the categories of Mechanics (B1) and Avionics (B2). This type of training is crucial for these professionals, as it allows them to add new type ratings – specific to different aircraft fleets and engines – to their licences. Such qualifications are necessary for technicians who wish to become authorised aircraft certifiers, a critical role responsible for certifying the airworthiness of an aircraft following maintenance work.

**A UNIQUE POSITION IN SPAIN’S AVIATION TRAINING LANDSCAPE**  
The Iberia Maintenance Training Centre holds the unique distinction of being the only training facility in Spain approved to provide EASA 147 training on the Airbus A320 and A350 families. This includes not only the A320 and A350 models but also the A330 and A340 fleets, covering all their associated engines. This specialisation positions the centre as a critical contributor to the MRO sector in Spain and beyond.

The centre’s advanced training capabilities are further enhanced by its access to classroom simulation devices, licensed by Airbus. These devices provide a realistic training environment that closely mirrors real-world conditions, making the Iberia Maintenance Training Centre one of the few in Europe to offer such sophisticated technology.

Moreover, trainees benefit from access to a full aircraft simulator specifically for taxiing courses, as well as the opportunity to practise on actual aircraft being overhauled at Iberia Maintenance’s facilities.

These hands-on experiences are invaluable for students, providing them with practical skills that are directly applicable in their professional roles.

#### **A LEGACY OF TRAINING EXCELLENCE**

Since receiving its initial approval in 2004, the Iberia Maintenance Training Centre has trained over 10,000 students. Currently, the centre employs 16 instructors who hold the EASA 147 approval, ensuring that the training provided is both up-to-date and in line with the highest industry standards.

But the centre’s influence extends beyond EASA 147 training. It also coordinates and provides technical training across various maintenance business areas, including engines, aircraft and components. These services

are offered not only to Iberia’s internal teams but also to third-party customers, further cementing the centre’s role as a leader in the aviation training sector.

The centre’s workforce is composed of more than 50 instructors, support staff, and content developers who work across the different training areas. In 2023 alone, the centre delivered over 150,000 student training hours across various modalities, demonstrating its capacity to meet the growing demand for highly skilled aviation professionals.

“We are proud to celebrate the 20th anniversary as an EASA 147 centre. During these two decades, we have achieved our goal: to support the evolution of the MRO sector and facilitate the professional development of people through highly qualified training,” said Ignacio de la Iglesia, manager of the Iberia Maintenance Training Centre. He further emphasised the centre’s unique position within Iberia Maintenance’s production units, which allows for seamless integration between training and practical work.

“One of the strengths of our training centre is that it is integrated into Iberia Maintenance’s production units, which makes it easier to have the best instructors with extensive real-world experience, and employees who wish to continue studying can do so without having to leave their place of work,” de la Iglesia added.



## THE CRITICAL ROLE OF AMTS

Aeronautical Maintenance Technicians (AMTs) are the backbone of the aviation industry, playing a crucial role in ensuring the safety and airworthiness of aircraft.

At Iberia Maintenance, these professionals are integral to the company's operations, which is why ongoing training and the recruitment of new talent are priorities.

"For an aircraft or engine to be able to fly after a repair or overhaul, a certifier must sign that all the established procedures have been complied with, following the approved manuals and leaving traceability of all the tasks carried out," explained de la Iglesia. This responsibility underscores the importance of rigorous training and certification processes, which are essential for maintaining the highest safety standards in aviation.

Currently, Iberia Maintenance employs more than 2,500 AMTs across its various production areas. These technicians possess a diverse range of skills, with training profiles that include basic EASA 147 training, aeromechanics, avionics, structure assembly, machining, composite materials, verification, painting and electromechanics, among others. This broad spectrum of expertise allows Iberia Maintenance to meet the complex and varied demands of the aviation sector.

In recent months, Iberia Maintenance has seen a significant increase in its AMT workforce, with nearly 450 new professionals joining the team. This rapid expansion is indicative of the growing demand for skilled maintenance technicians, a trend that is expected to continue as the global fleet of aircraft is projected to grow by 28% over the next

decade. To meet this demand, the industry will require approximately 33,000 new professionals annually, highlighting the critical need for training centres like Iberia Maintenance to continue developing top-tier talent.

## LOOKING AHEAD: CHALLENGES AND OPPORTUNITIES

While the future looks bright for Iberia Maintenance and the broader aviation industry, there are challenges that must be addressed, particularly in workforce renewal and increasing diversity within the sector.

In Spain, for example, only 33.7% of students are enrolled in vocational training, and of these, a mere 4.8% choose a career in vehicle maintenance. Even more concerning is the fact that only 0.4% of these students are women, pointing to a significant gender imbalance that needs to be rectified.

Iberia Maintenance is committed to addressing these challenges through its support of vocational training programmes. Currently, more than 30% of its new recruits are students who have completed their training at the Iberia Maintenance Training Centre. By continuing to invest in education and training, the centre is helping to ensure a steady pipeline of skilled technicians to meet the industry's future needs.

As the Iberia Maintenance Training Centre marks its 20th anniversary, it stands as a testament to the importance of high-quality training in the aviation sector. With its advanced facilities, experienced instructors and a commitment to excellence, the centre is well-positioned to continue playing a pivotal role in the development of the next generation of aviation professionals. ●



*Iberia Maintenance is committed to addressing workforce renewal and diversity challenges through its support of vocational training programmes. Currently, more than 30% of its new recruits are students who have completed their training at the Iberia Maintenance Training Centre*

▲ Iberia Maintenance interns



# AOG 24/7 Support

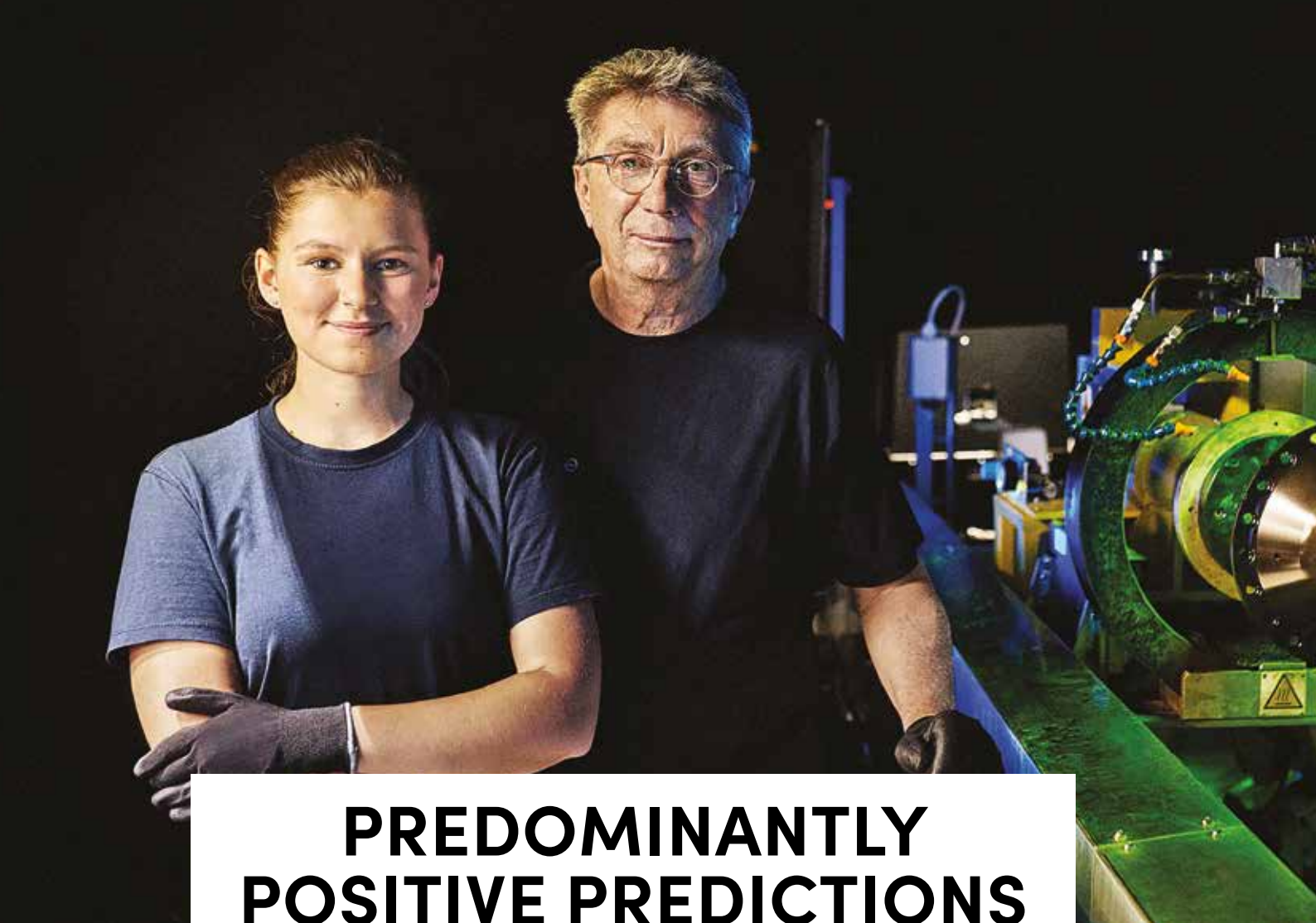


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# RETURNING YOUR AIRCRAFT TO SERVICE



# PREDOMINANTLY POSITIVE PREDICTIONS

**Bernie Baldwin** reports on the outlook for MRO in Europe over the next couple of years, including current and expected challenges and the ways they may be overcome

**A**ssessments of the MRO market in Europe in recent years have almost always incorporated an element relating to the emergence of the industry from the effects of the Covid-19 pandemic. However, reference to that period is decreasing, as the traffic figures reported by airlines are mostly now ahead of 2019's figures.

To get an overarching assessment of the current position of the MRO market in Europe, it is necessary to take account of many factors, including one in particular which was exacerbated by the pandemic, namely supply chain pressures. Adam Guthorn, managing director at Alton Aviation Consultancy, offers his take on how Europe's MRO departments and independent providers are being affected by such factors and how they are addressing them.

## MAINTENANCE PERSONNEL

"Across the MRO industry – and particularly in Europe – a shortage of skilled labour is adversely

impacting the growth ambitions of MRO suppliers," he begins. "Continued strong demand for air travel coupled with supply chain challenges for aircraft OEMs is leading to lower than expected deliveries of new aircraft. As a result, airlines are flying older, more maintenance-intensive aircraft longer, and therefore require more maintenance personnel to support operations."

Guthorn continues: "Airlines and MRO suppliers are competing for the same pool of skilled labour, and airlines often win on compensation and benefits, leading MRO suppliers to invest in digital technologies and expand operations into relatively less labour-intensive segments such as engine and component maintenance (vs labour-intensive airframe heavy maintenance) as well as investing in training to secure a pipeline of skilled labour."

## OLDER AIRCRAFT, FLYING LONGER

Daniel Hepworth, senior sales director for Western Europe at Lufthansa Technik (LHT), highlights two



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major elements to the European maintenance arena. “On one hand, the MRO market is still experiencing a challenging supply chain situation in many areas, affecting turnaround times (TATs) and disrupting planning windows,” he notes. “The pressure results from several factors – a lack of material in the system, a lack of people, the retirement of highly experienced staff, longer OEM delivery times due to longer lead times on raw materials and a supply competition between new production aircraft and the aftermarket.

“On the other hand,” he continues, “older aircraft are flying for longer, leading to higher maintenance demand. New generation aircraft, however, also have significant in-service issues, especially on the engines, but also on some airframe component systems, causing huge disruption and affecting aircraft availability.

“At the same time, significant cost pressures on labour and material are eating away at margins and driving higher prices. OEM consolidation has not helped as now there is often a lack of competition and choice. There are many instances of single sources for certain critical parts which needs to be looked at by the airframe OEMs,” Hepworth advises.

“At Lufthansa Technik, we are tackling these challenges head-on with a wide range of actions. First, we have initiated a huge recruitment and training drive that is already bearing fruit. Globally, we recently surpassed the 23,000-employee mark again and are planning to employ at least another triple-digit number of people by year-end.

“In doing so, we put strong emphasis on making aviation an attractive industry to work for all generations and genders – from the more than 300 young apprentices that have just recently started their career with us to our ‘senior experts’, the retirees helping us to retain precious knowledge in the company by regularly getting back to share their enormous experience with younger colleagues,” he adds.

“Secondly, we put strong emphasis on our repair development and in-house repair capability; we are the leading repair developer, harnessing our vast experience and skills to find cheaper, faster, more reliable alternatives to the original OEM repair. In fact, many OEMs partner with us for exactly that reason, helping to improve their products.

“Thirdly, the advancement of information technology is paramount, and we continue to invest significantly in digitalisation, process management and efficiency, predictive maintenance and connectivity,” Hepworth emphasises. “Finally, we leverage our size. With our know-how and experience, we make sure that we are at the forefront of all major new engine and airframe types with the most comprehensive licensing agreements, such as our CFM Branded Services Agreement with CFM International on LEAP engines.”

## GROWTH VS CHALLENGES

Mikail Akbulut, chief executive of Turkish Technic, believes Europe’s MRO market is currently characterised by both opportunities for growth and significant challenges. “Market



▲ Daniel Hepworth, senior sales director for Western Europe, Lufthansa Technik

1. The industry needs more maintenance personnel of all ages to support operations

2. Lufthansa Technik LEAP-1B engine services



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## “Investing in advanced technology is a must in order to be competitive”

*Mikail Akbulut, chief executive, Turkish Technic*



▲ Mikail Akbulut, chief executive, Turkish Technic

growth is being driven by steady demand for maintenance activities due to increasing numbers of aircraft, passenger traffic, airline operations and ageing fleets. However, all these opportunities bear potential challenges,” he points out.

“Among the biggest challenges for MRO providers are the supply chain issues, such as late delivery of new parts, increasing TATs, increasing cost of material and longer logistic days,” Akbulut explains. “One of the most significant challenges is OEM-related problems. We are seeing bottlenecks, especially on the production side, having a disruptive effect and negatively affecting airline operations.

Akbulut continues: “In response to these issues, MRO companies are implementing several strategies. Working on alternative methods to reduce dependency on a single source, investing in advance technologies to provide better management of MRO operations, local sourcing of related parts or services to reduce TAT, operational costs and logistics to name a few.

“Investing in advanced technology is a must in order to be competitive. Technologies such as IoT (Internet of Things), AI (artificial intelligence) tools, predictive maintenance, parts repair and management tools and real-time data tracking tools are helping MRO providers.”

### STRATEGIES TO OVERCOME PRESSURES

A major player in the supply chain sector is AJW Group. Chief commercial officer Scott Symington offers the strategy his company is taking to counter supply chain pressures. “We’re adopting a multifaceted approach and addressing both immediate concerns and long-term sustainability. We’re investing in inventory

and enhancing collaboration among stakeholders,” he begins. “By expanding our European MRO facility, AJW Technique Europe, and growing our regional support hubs, we have mitigated many of the issues that have arisen to offer our customers reduced TATs and improved efficiency while facing the challenges related to geopolitical unrest in the region.”

Also working on responses to the supply chain situation is MTU Maintenance, according to Andreas Kalina, the company’s vice president of marketing and sales Europe, Africa, Baltics and CIS. “We have a number of solutions to counter volatile supply chain dynamics,” he confirms. “Our procurement departments and our leasing and asset management outfit in Amsterdam, MTU Maintenance Lease Services, have the task of trawling the market for new and used material on an ongoing basis. Whenever necessary and possible, we collaborate with industry partners to purchase decommissioned aircraft in order to harvest the parts.

“We also aim to conduct repairs in-house as much as possible, because it beats replacement. While MTU Maintenance Hannover has a broad range of repair capabilities and leads the network as the centre of excellence for the development of new repair procedures, MTU Maintenance Serbia (our latest location just outside Belgrade) specialises in seven repair clusters for high-value parts for several engine models. Having repair capabilities both in Europe and throughout our global network mitigates our dependence on the supply chain,” Kalina remarks.

### TEARDOWN AND USM MARKET

Related to the supply chain, and already mentioned by the MTU vice president, is the

1. Lufthansa Technik LEAP-1B engine services
2. Drone inspection is becoming more and more popular

## “We’re investing in inventory and enhancing collaboration among stakeholders”

*Scott Symington, chief commercial officer, AJW Group*

teardown market and used serviceable material (USM) supply. He assesses the market’s vibrancy and the expectations for aircraft and engine availability for future supply.

“There is a lot of competition on the used parts market, with a lot of buyers but too few parts to fully satisfy demand. The scarcity has driven up prices, especially for current and older generation engines, such as the CFM56, V2500, CF6-80 and GE90-110/115B,” Kalina observes.

“In the wake of slower than expected deliveries of new aircraft, current generation engines are not being retired at the rate that was originally anticipated. Engine operators now avoid teardowns by having their existing assets rebuilt with serviceable parts. That way, they can still squeeze out as many flight hours out of the engines and cover the demand.

“Despite this situation, MTU is still in a very good position because we prefer to strategise and forecast our USM stock levels well in advance. By doing so, we can compensate for market

volatilities. Action is, of course, always better than reaction,” Kalina states.

Alton’s Guthorn has a similar observation. “The teardown and USM market continues to be white hot, with demand for assets outstripping supply, and prices being bid up with fierce competition on any sales, particularly for current generation narrowbodies (737NG and A320ceo),” he comments.

“Years of low retirements (around 300-350 aircraft per year 2021-2023, down from 460 in 2019) due to growing air traffic demand and service/delivery issues with next generation aircraft, have restricted teardown feedstock and USM supply, so parts traders are having to look for creative sourcing solutions. This includes moving up the value stream to purchase lease-attached assets or making future purchases to lock-in supply of assets,” Guthorn adds.

At Turkish Technic, Akbulut also sees the teardown market in Europe as very dynamic. “It will continue its growth in the coming years thanks



▲ Scott Symington, chief commercial officer, AJW Group

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## “The teardown and USM market continues to be white hot, with demand for assets outstripping supply”

Adam Guthorn, managing director,  
Alton Aviation Consultancy



# 20K

*The market for CFM56-5B, CFM56-7B and V2500-A5 engines is set to expand, with around 1,500-2,000 shop visits expected, as half of the 20,000-strong fleet has yet to undergo major maintenance*

to aircraft retirements, as airlines update their fleets with new generation aircraft and retire their aging aircraft. This enables retired aircraft to enter the teardown process, which will provide a very valuable source for USM,” he notes, adding a more confident note about the sector. “As the number of retired aircraft is increasing, USM supply is getting strong. High-demand components from widely used aircraft have a more dynamic market while less common components may be harder to find.”

LHT’s Hepworth takes a somewhat different view. “The teardown market continues to be constrained due to passenger growth demand on one side, and new aircraft production delays or prevailing new engine troubles on the other, meaning that older aircraft are flying for longer,” he argues. “Here again, we use our size and buying power to make ourselves a very attractive proposition for anyone selling used aircraft. We do not expect the constraints to ease dramatically in the next two to three years.”

AJW’s Symington, too, believes there is a USM shortage for similar reasons. “The bottleneck situation at the repair shops is another key factor in the supply and demand equation and since USM prices are primarily pinned to the OEM CLP (catalogue list price), they are following the market and rising,” he explains. “While nobody can predict when the market will rebalance, basic economic theory dictates that prices are trending higher in line with increased demand, and it will take some time to alleviate the situation entirely.

“The European MRO sector is experiencing high demand for engine spare parts, particularly

affecting the narrowbody engine market,” he continues. “Engine availability is expected to remain constrained due to ongoing supply chain disruptions. Operators are increasingly turning to leasing and extending the use of existing engines to manage costs and to meet their operational needs. The market for CFM56-5B, CFM56-7B and V2500-A5 engines is set to expand, with around 1,500-2,000 shop visits expected, as half of the 20,000-strong fleet has yet to undergo major maintenance.”

Setting the immediate challenges aside, Symington offers a view of the overall market in Europe over the next 12-24 months. “Aircraft delivery delays and in-service issues are contributing to longer TATs, making it crucial for MROs to prioritise inventory strategies,” he stresses. “There is also a growing demand for USM as operators are looking for ways to overcome the OEM manufacturing delays. This trend suggests the market will continue to expand, despite the challenges.”

### DEMANDS AND EXPECTATIONS

Giving the analyst’s view of the next 12-24 months, Guthorn believes that strong air traffic demand will continue to drive fleet growth, utilisation and MRO demand. “As supply chain challenges gradually improve, airlines and independent MRO suppliers will focus on improving operations, with airlines looking to bring certain activities in house and independents exiting markets in which they can no longer compete – such as the

1. Turkish Airlines aircraft await maintenance in the hangar 2. Advanced technologies provide better management of MRO operations

recent acquisition of SR Technics' Malta heavy maintenance base by easyJet," he observes.

"Increased production of next-gen aircraft will allow airlines to continue their fleet renewal programmes, freeing mature aircraft for retirement and part-out, replenishing USM stocks and easing cost pressures for airlines. Well capitalised MRO suppliers – such as Lufthansa Technik through its announced 'Ambition 2030' – will continue to invest for growth on future platforms through facility expansion, strategic partnerships and joint ventures," Guthorn forecasts.

For LHT's Hepworth, the worst for the supply chains is over. "The overall material situation is starting to stabilise to a new normal level, albeit less optimised than the world we knew pre-pandemic," he says. "At the same time, airline expectations and maintenance planning are also adjusting to the new reality of scarcer resources.

"Europe is adjusting its capacities, supply chains and maintenance strategies to the post-pandemic world, although its fleets are growing at a slower pace compared with other geographical regions. Moreover, we are now seeing some consolidation on the airline side. Some consolidation is also likely among MRO

providers, and we do not expect a lot of new entrants to the market," Hepworth predicts.

"Europe remains the home and largest market for Lufthansa Technik. Not surprisingly, our global Ambition 2030 programme also entails plans for 'inorganic' growth, for example through acquisitions. We also plan to grow on our own in Europe, for example by establishing a whole new facility for component MRO and engine parts in southwestern Europe," he announces, adding that details will follow soon.

Turkish Technic's Akbulut is optimistic about the near future for MRO in Europe. "The demand for MRO services is booming. Airline fleet expansions will require higher maintenance needs, affecting the market in a positive way," he declares. "Merger and acquisition activities are expected to take place. For the next 1-2 years, larger MRO companies may acquire smaller or different service companies to gain competitive and also geographic advantage."

Akbulut adds: "The continuous evolution of technologies will also play a significant role in the surge of the MRO sector, directly enhancing maintenance operations. As MRO providers compete to improve efficiency, reduce TATs and explore sustainable practices, the market will continue to flourish."



▲ Adam Guthorn, managing director, Alton Aviation Consultancy



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## **“We collaborate with industry partners to purchase decommissioned aircraft in order to harvest the engine parts”**

*Andreas Kalina, vice president of marketing and sales  
Europe, Africa, Baltics and CIS, MTU Maintenance*

Kalina at MTU Maintenance is more circumspect about the coming years, arguing that the growth rate in commercial flying has cooled somewhat recently. “From an MRO service provider perspective, there are a number of challenges with which we will be dealing over the next year or two. The supply chain is still a problem, though recently it has been tending towards a better place. Because there are fewer retirements and new aircraft are behind delivery timelines, current assets are being operated longer than originally desired. This has the effect that MRO shop capacity is under pressure while demand for maintenance is on the up,” he opines.

Beyond the overarching scene, Europe’s providers of MRO are constantly improving their support programmes and capabilities, and Kalina notes some trends there too. “Today, it is all about flexibility, and one way to increase that is by harnessing the potential of large sets of engine data. That allows us even more insight into the workings of a customer’s engine and enables us to tailor our services even better than before,” he reports.

“On the operational side, on-site work has been very popular as an alternative to shop visits, especially for smaller on- and near-wing workscopes. MTU operates a global network of seven ON-SITE<sup>Plus</sup> facilities, including a range of level one shops, and staff are on call 24/7. Whenever possible, we carry out repairs on-wing or at the customer’s site. This reduces downtime

as well as total cost. It also extends the on-wing times of our customers’ engines,” Kalina states.

Alton Aviation Consultancy’s Guthorn concurs. “Mobile engine support and engine hospital shops are proliferating amongst major MRO providers as mature engine platforms begin their phaseout and next-gen engines work through technical issues and shorter time-on-wing intervals than their predecessors,” he notes. “As airlines look to avoid costly overhauls and associated months of engine downtime, targeted repairs can be performed on-wing or lighter workscopes carried out in a hospital shop to maximise engine time-on-wing.”

## **DIGITALISATION AND SUSTAINABILITY**

According to Symington, MRO providers like AJW Group are focusing on offering tailored maintenance services. “This reflects the growing demand for more customised solutions, such as our power-by-the-hour-type programme,” he elaborates. “More predictive maintenance is another trend, allowing airlines to enhance efficiency and reduce downtime by anticipating issues before they arise. Workforce challenges, however, remain a significant concern as the industry struggles to attract and retain skilled technicians.

“There is a big focus on sustainability across all global industries, not just aviation. As such, AJW is incorporating eco-friendly practices and solutions into its operations, and we have embraced innovation and technology to improve

1. Turkish Technik hangar facilities  
2. Lufthansa Technik ensures that armed forces and governments receive aircraft that are optimised for their missions



2

our service delivery and operational capabilities,” Symington reports.

Turkish Technic’s Akbulut sees several key developments shaping the MRO landscape. “Currently, MRO companies tend to offer comprehensive packages, which include predictive maintenance implementations, real-time data tracking, complete support and so on. The main reason is to provide tailor-made solutions to customers from A to Z and also being more flexible,” he remarks.

“This highlights how digital transformation is another important trend. MRO providers are consistently investing in advanced software solutions to streamline processes, optimise inventory management and enhance supply chain visibility,” Akbulut adds. “Automation is also becoming a prominent trend in MRO operations. Robotics and automated systems are gradually being used for tasks such as inspection, repair and parts replacement. This not only improves accuracy and efficiency, it helps in reducing labour costs and minimising human error.”

Akbulut continues: “Strategic partnerships are more critical than ever, and companies will be seeking these in aircraft maintenance, engine maintenance and component maintenance. Merger and acquisition activities are also widely expected. Last, but not least, technician education and training will play a crucial role in the market. In the coming years, the demand for technicians is expected to exceed the number of technicians available. MRO companies are therefore leaning towards training their own technicians.”

While emphasising the need for MRO providers to keep doing the basics well, Lufthansa Technik’s Hepworth foresees an increase in digitalisation, enabling associated efficiency improvements in the workflow as well as in planning and decision making. “At LHT, we aim to enhance our MRO solutions to give our customers even greater transparency, and a greater level of detail about the progress of an asset within its MRO process. This will enable better planning and quicker adjustments in customers’ own operations,” he concludes. ●

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# MRO EUROPE MAKES DEBUT AT FIRA BARCELONA FOR 2024

MRO Europe 2024 will open its doors in the Spanish city on October 22-24

**T**aking place between October 22-24 at the Fira de Barcelona, Spain, Aviation Week's MRO Europe 2024 is the leading event in the region for the commercial aviation aftermarket, combining a senior level conference and international exhibition.

Over 450 solution providers will be exhibiting at the show, attracting more than 10,000 attendees representing airlines, lessors, MROs, OEMs, suppliers and industry experts.

The event organisers say this is the largest of its kind in Europe and provides an excellent opportunity for attendees to learn about the latest trends and developments in the industry, as well as to network with other professionals.

Alongside the exhibition, there are two types of conferences available at MRO Europe 2024: a paid senior level conference and a free to attend *Go Live! Theatre* on the show floor. This means there's a wide variety of options on offer to learn from industry experts, identify opportunities in the market and engage in lively debate.

With a mix of presentations and panel discussions, and an agenda with over 30 speakers confirmed, some of the topics to be covered during the main MRO Europe conference sessions include dynamics in procurement and facility expansions, managing supply chains, updates on the teardown market, how digital technologies are transforming the industry, and how airlines can improve their maintenance and repair operations.

The *Go Live! Theatre* will focus more on showcasing the latest innovations, with case studies and product



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**“Over 450 solution providers will be exhibiting at the show, attracting more than 10,000 attendees”**

briefings taking place in the centre of all the action – right on the exhibition show floor. With sessions exploring topics such as the power of AI and ML for MRO, sustainability using serviceable material, and recruiting and training for talent retention, the *Go Live! Theatre* is set to be an exciting part of the event.

Just some of the stand out speakers set to take the conference and theatre stages during the event include: Aleksandra Juda, president and chief executive of LOTAMS; Kailash Krishnaswamy, senior vice president and chief procurement officer of Spirit AeroSystems; Dominik Nixdorf, head of corporate strategy and market analytics at Lufthansa Technik; Basil Papayoti, vice president of commercial MRO at Delta TechOps; Enrique Robledo, maintenance director at Iberia; Daniela Serafini, vice president and head of flight hour services at Airbus; Joan Roca, business development manager at SITA; and Aaron Shellie, vice president of trading at Setna iO. ●



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For more information and to register to attend, visit [mroeurope.aviationweek.com](https://mroeurope.aviationweek.com)

1. There are two types of conferences available at the event

2. The Fira de Barcelona will open its doors for MRO Europe 2024 on October 22-24



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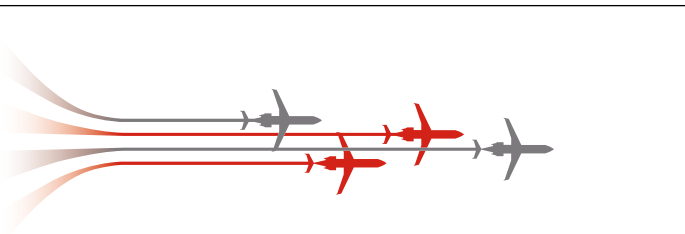


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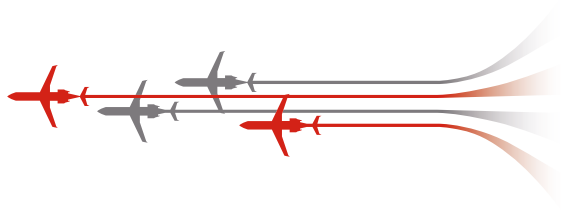
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# A DATA-DRIVEN FUTURE

Ahead of the 2024 Predictive Aircraft Maintenance Conference in Dublin in November, *MRO Management* asked **Chris Leese-Wood** from event sponsor Gamit his thoughts on the landscape of predictive maintenance

## In an ideal world, what vision do you have for predictive maintenance transforming MRO activity?

Predictive maintenance has the potential to revolutionise MRO operations by enabling data-driven, proactive systems that minimise aircraft downtime. Gamit believes that this transformation will rely heavily on the integration of IoT sensors, AI-driven analytics and historical aircraft data. By identifying failure patterns and high-risk components, airlines can better anticipate future issues and significantly reduce the need for unscheduled maintenance.

Predictive maintenance will offer the most value in enhanced safety (by predicting potential failures), improved asset management (easing the process of aircraft transitions) and sustainability (by optimising maintenance schedules to extend equipment life).

In an ideal scenario, we would have solutions that facilitate continuous improvement, with systems that are self-learning and perpetually enhancing their accuracy and performance. AI and machine learning algorithms will be crucial to this process, as they improve with more data, leading to better failure predictions and optimised maintenance practices. This approach not only enhances efficiency but also supports cost control by refining maintenance strategies over time.



“  
**THE AVIATION  
INDUSTRY STANDS TO  
GAIN SIGNIFICANTLY  
FROM PREDICTIVE  
MAINTENANCE  
TECHNOLOGIES**  
”

**CHRIS LEESE-WOOD**

chief operating officer, Gamit

## How would you describe the current state of predictive maintenance in the MRO market, and are there any exciting trends you think are shaping its future?

There is a growing interest among MROs and airlines to adopt predictive maintenance technologies due to their significant benefits. However, the primary challenge remains effectively

utilising the vast amounts of data from aircraft sensors and historical maintenance records.

Industry collaboration is increasingly focusing on developing standards for predictive maintenance solutions. These standards aim to address integration challenges and establish a common framework for MROs and operators. Adopting a 'one size fits all' approach will be crucial to accommodate the unique needs of different operators and MROs, simplifying the process and accelerating adoption.

OEMs and regulatory authorities will play a vital role in the successful implementation of these technologies. Events like the Predictive Aircraft Maintenance Conference are also essential for fostering industry collaboration and advancing innovative ideas.

## Can you tell us what the core benefits of ROAM are for airlines? Why would they choose you?

ROAM (Records Online Asset Management) offers a fresh perspective on traditional predictive maintenance technologies. Unlike conventional solutions, ROAM emphasises the historical data of aircraft, providing airlines, MROs and private operators with rapid access to comprehensive fleet records within seconds.



◀ Gamit provides support from a single aircraft up to a multiple aircraft fleet

## IT'S CRUCIAL FOR ALL STAKEHOLDERS TO RECOGNISE AND EMBRACE THE BENEFITS OF PREDICTIVE MAINTENANCE

ROAM stands out in the market due to its advanced indexing capabilities when loading maintenance records into the system. This indexing enables users to perform several automated tasks in real time, such as quickly searching full fleet data and auto-populating binders for an end of a lease contract(s) or generating compliance information in minutes.

Additional unique real-time features of ROAM include the Gap Analyser, which alerts the technical records team to missing documents in work packages, and the Duplicate Analyser, which identifies duplicate job cards, task cards or other documents within a work package.

At its core, ROAM is designed with the ethos that technology should support human efforts. This approach has already yielded success in 2024, with ROAM securing contracts with DRF Luftrettung and Air Tahiti Nui. Furthermore, we anticipate announcing several more contracts in the coming months with both commercial airlines and a major MRO organisation.

**What do you think are the primary hurdles the industry must overcome to propel forward with predictive maintenance?**

The aviation industry stands to gain significantly from predictive maintenance technologies, but several key challenges must be addressed to unlock their full potential. These challenges encompass technical, regulatory, commercial and organisational domains.

In the near term, I believe the biggest obstacle is likely to be the communication and sharing of data, given the competitive nature of the industry. While the adoption of common standards will help mitigate some of these barriers, it's crucial for all stakeholders to recognise and embrace the benefits of predictive maintenance, including enhanced safety, reduced unscheduled maintenance and improved profitability.

Equally important is the human element of the predictive maintenance journey. Maintenance organisations may initially resist systems that recommend removing components they believe to be serviceable. Overcoming this resistance will require time and compelling evidence, particularly in the form of reduced unscheduled maintenance, to build trust in these systems. ●

## PREDICTIVE AIRCRAFT MAINTENANCE 2024

➤ On November 13-14, MRO Management and its parent company Real Response Media will host the Predictive Aircraft Maintenance (PAM) Conference 2024 at the Radisson Blu Royal Hotel Dublin, Ireland, bringing together senior level executives from airlines, OEMs, MRO specialists and big data experts to explore the future of predictive maintenance.

Attendees will discover how to get the best out of predictive maintenance while overcoming the greatest challenges. Case studies will highlight best practices and how companies are successfully collaborating with industry partners, while panel discussions will explore the major topics from the perspective of all stakeholders.

Thank you to our Bronze Sponsor, Gamit, for supporting PAM 2024.

For more information and how to register to attend, visit [predictiveaircraftmaintenance.com](https://predictiveaircraftmaintenance.com)



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# METROLOGY MEETS DIGITAL

MES' Steve Beasley reveals how digital metrology is transforming MRO activities

In the ever-evolving field of MRO, precision is not just desirable; it is critical.

Metrology, the science of measurement, has emerged as a cornerstone in ensuring that aircraft maintenance is carried out with the highest levels of accuracy, efficiency and safety.

With the aviation industry under increasing pressure to reduce downtime, expedite repair processes and adhere to stringent safety regulations, the adoption of advanced metrology technologies has become essential.

## TRADITIONAL METHODS ARE NO LONGER SUFFICIENT

Metrology has always been a key element in aviation, but its role has expanded significantly in recent years. This expansion is largely driven by the increased complexity of modern aircraft, the introduction of new materials and the heightened expectations for safety and performance.

Traditional methods of measurement, such as using calipers, micrometres and gauges, are no longer sufficient to meet the demands of today's industry. Advanced metrology tools, including 3D laser scanning, coordinate measuring machines (CMMs) and optical metrology systems offer the precision and reliability needed to maintain and repair aircraft components to exacting standards.

The benefits of these technologies are manifold. For one, they allow for the detection of minute imperfections that could go unnoticed with traditional methods. These imperfections, if left undetected, could lead to component failure and, in the worst-case scenario, compromise flight safety.

Additionally, advanced metrology enables faster and more accurate assessments, which is crucial in reducing aircraft downtime – a key consideration in an industry where time is money.

The ability to quickly and accurately assess damage is particularly important



in situations where aircraft are grounded due to unexpected incidents.

For example, following a severe hailstorm in Calgary on 5 August, several WestJet aircraft sustained significant damage, including shattered windshields and dented fuselages.

WestJet itself confirmed that, as a result, 10% of its fleet remained out of service, cancelling 600 flights since the incident. More than 20,000 customers were affected.

Traditionally, assessing and repairing such damage would have required extensive manual inspections, which are time-consuming and prone to human error. However, with the advent of advanced metrology techniques, these processes can now be carried out with much greater efficiency.

## SPEED AND PRECISION

In the case of the WestJet hailstorm incident, MRO teams, including Metrology Engineering Services (MES), utilised 3D laser scanning and structural analysis to rapidly assess the extent of the damage. This technology allowed for the creation of highly detailed 3D models of the damaged components, which could then be analysed to determine the necessary repairs.



aviation industry. As airlines and MRO providers strive to improve efficiency and reduce costs, digital technologies are playing an increasingly important role. Metrology, with its ability to provide precise and reliable measurements, is at the forefront of this transformation.

### DIGITAL METROLOGY

One of the key advantages of digital metrology is its ability to integrate with other digital systems, such as maintenance management software and digital twins. A digital twin is a virtual replica of a physical asset – in this case, an aircraft or its components. By integrating metrology data with the digital twin, MRO providers can gain a comprehensive understanding of the aircraft's condition, enabling them to predict potential issues before they occur.

This predictive capability is particularly valuable in the context of preventive maintenance. By identifying potential problems early, MRO providers can schedule maintenance activities at the most opportune times, reducing

1. The ability to quickly and accurately assess damage is particularly important
2. Steve Beasley, chief executive, Metrology Engineering Services (MES)
3. Metrology has always been a key element in aviation, but its role has expanded significantly in recent years

the risk of unexpected breakdowns and extending the life of the aircraft. Furthermore, the use of digital twins and metrology data allows for more accurate and efficient repairs, as technicians have access to detailed, real-time information about the aircraft's condition.

### COLLABORATING FOR SUCCESS

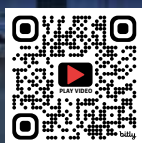
MES is setting new standards in the industry with its innovative approach to structural assessments and damage mapping, utilising best-in-class equipment operated by a highly skilled technical team to deliver rapid and precise assessments of aircraft damage. Its services, which include whole aircraft structural scanning, damage

The speed and precision of these assessments were instrumental in reducing the time the aircraft were out of service. This not only minimised disruption to WestJet's operations but also ensured that the repairs were carried out to the highest standards.

The use of advanced metrology in this context highlights its critical role in maintaining the safety and reliability of aircraft, even in the face of unexpected challenges.

The integration of metrology into MRO processes is part of a broader trend of digital transformation in the

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analysis, and the management of aircraft assessment reports, are designed to support MRO providers in reducing asset downtime and expediting repair processes. These services are essential for evaluating damage from incidents such as bird strikes, hailstorms or ground vehicle collisions.

The successful implementation of advanced metrology technologies in aviation MRO requires collaboration between various stakeholders, including airlines, MRO providers, regulatory bodies and OEMs. This collaboration is essential to ensure that metrology tools are effectively integrated into existing MRO processes and that technicians are adequately trained in their use.

### CHALLENGES

While the benefits of advanced metrology are clear, there are challenges associated with its adoption in the aviation MRO

sector. One of the main challenges is the cost of acquiring and maintaining cutting-edge metrology equipment.

These tools represent a significant investment, and not all MRO providers may have the resources to purchase them outright. Additionally, the integration of these technologies into existing workflows requires careful planning and training to avoid disruptions.

To overcome these challenges, many MRO providers are turning to specialised metrology service providers, such as MES, which offer a comprehensive suite of metrology services.

By outsourcing metrology tasks to experts, MRO providers can access the latest technologies without the need for large capital investments. This approach also ensures that the measurements are carried out by highly skilled technicians who are trained in the use of advanced metrology tools.

Another challenge is the need for standardisation in metrology practices. As the use of advanced metrology becomes more widespread, there is a growing need for industry-wide standards to ensure consistency and accuracy in measurements.

Regulatory bodies, such as the International Civil Aviation Organization (ICAO) and the European Aviation Safety Agency (EASA), play a crucial role in developing these standards and ensuring that metrology practices are aligned with global safety regulations.

### A FUTURE SHAPED BY THE PRECISION OF METROLOGY

Metrology is no longer just a support tool in aviation MRO; it is a driving force behind the industry's evolution. The precision and speed offered by advanced metrology technologies are transforming the way aircraft are maintained and repaired, making the process faster, safer and more efficient.

The recent WestJet hailstorm incident serves as a powerful example of how metrology can be leveraged to overcome unexpected challenges and maintain the safety and reliability of the global fleet.

As the aviation industry continues to evolve, the role of metrology will only become more critical. By embracing these technologies and fostering collaboration across the industry, MRO providers can ensure that they are not only meeting today's demands but are also prepared for the challenges of tomorrow.

The future of aviation MRO is being shaped by the precision of metrology, and its impact will be felt for years to come. ●

**“ADVANCED METROLOGY  
ENABLES FASTER AND MORE  
ACCURATE ASSESSMENTS,  
WHICH IS CRUCIAL IN REDUCING  
AIRCRAFT DOWNTIME”**

▲ The precision and speed offered by advanced metrology technologies are transforming the way aircraft are maintained and repaired

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# KEEPING IT IN LINE

**Mario Pierobon** explores the various types of requirements line maintenance organisations are exposed to, the main differences among the EASA and FAA regulatory systems, and best practices for documentation and record-keeping



**W**hile line maintenance may at first sight appear a simple and linear activity, the fact is that like pretty much any other type of aircraft maintenance it relies on complex regulations and compliance processes that are often dictated by multiple stakeholders and requirements.

#### REGULATORY COMPLEXITY

For countries that follow the regulatory system of the European Union Aviation Safety Agency (EASA), the EU Regulations for Continuing Airworthiness of Aircraft provides all aircraft maintenance specific requirements, highlights Jim Maguinness, quality manager at EirTrade Aviation Maintenance.

“Compliance with these regulations for what would seem to be a simple line maintenance operation may appear complex, but EASA provides Acceptable Means of Compliance (AMC), Guidance Material (GM) and User Guides,” he says. “The organisations develop procedures and associated documents and forms appropriate to their intended operation and this is presented as a Maintenance Organisation Exposition (MOE) to the authority for its evaluation of compliance with EASA Part-145.”

Complexity is dictated by the design and content of the MOE, explains Maguinness. “It is best to keep it simple and appropriate for what is done and to follow the guidance from EASA and the authority’s airworthiness inspector. Maintenance must be within the scope of the approval, which can be later extended with the approval of the authority,” he says.

Caerdydd’s line maintenance operation based at Cardiff Wales Airport is an approved line station that falls under the approvals held at the company’s nearby St Athan base, says Richard Pitts-Robinson, commercial director at Caerdydd. “This helps to lessen potential complexities for the operation, but we still ensure we have stringent technician compliance systems in place, meaning we are able to track all work and employee currency,” he says. “When coupled with the traditional paper processes, we know that all parties understand exactly what maintenance has been accomplished and the status of the aircraft at all times.”

**“WHILE THERE ARE DIFFERENCES IN MEETING EASA VERSUS FAA REQUIREMENTS, THE OBJECTIVE REMAINS THE SAME”**

According to Urs Kunzelmann, general manager of SR Technics Line Maintenance, complexity in line maintenance activities is driven by EASA Part-145 requirements, the requirements from all foreign national authorities when additional approvals are held, and specific operator/airline requirements. “In addition, requirements are continuously increasing in complexity with safety management procedures and the upcoming IT procedures to protect cybersecurity, which are part and prerequisite of the basic maintenance approval,” he says.

Processes can become increasingly intricate when multiple civil aviation agencies are involved, affirms Dana Batarseh, director of integrated marketing and IT at Certified Aviation Services (CAS). “We navigate this complexity through adherence to three critical pillars of compliance: Code of Federal Regulations, CAS Internal Quality Assurance Requirements and Customer-Specific Requirements,” she explains. “We strictly follow the regulations set forth for repair stations, ensuring that all operations meet or exceed the stringent standards mandated by federal authorities and we uphold our own rigorous internal standards for quality assurance, reflecting our commitment to maintaining the highest levels of safety, reliability and operational efficiency. Also, we meticulously adhere to the unique specifications set by our customers, particularly air carriers, tailoring our services to meet their precise needs and regulatory demands.”



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## EASA VS FAA REQUIREMENTS

Aircraft registered in the EU must be maintained by EASA Part-145 approved maintenance organisations, while aircraft registered in the US must be maintained by FAA approved repair stations. The main difference is that EASA approves the organisation, whereas FAA approves the facility at a fixed location, affirms Maguinness. “The EU and US have developed bilateral aviation safety agreements (BASA) for coordination on the regulation of aviation safety. The Maintenance Annex Guide (MAG) provides that EASA and FAA shall accept each other’s inspections and monitoring of repair stations/maintenance organisations for compliance with their respective requirements for the issue and continued validity of certificates.”

Maguinness continues: “The detailed differences and certification procedures are given in the MAG. To apply for an FAA repair station approval, an EASA-approved organisation applies to its authority, providing an FAA supplement to the MOE and the application forms. Probably the most notable example of the coordination of differences is the changes to the EASA Form 1 and FAA Form 8130-3, where the format is now the same.”

According to Carol Chan, general manager of line maintenance (Centre of Excellence, Planning & Cabin) at HAECO Hong Kong,

while there are differences in meeting EASA versus FAA requirements, the objective remains the same. “Aircraft maintenance must be performed by qualified personnel, using the correct parts, in an appropriate environment, and documented correctly according to the OEM’s maintenance schedule. Adhering to these standards is crucial for maintaining the airworthiness and safety of the aircraft,” she explains. “We adhere to the relevant national aviation authority (NAA) requirements for our line maintenance operations, as we are audited for compliance. The NAA ensures that the airline’s air operator certificate (AOC) holder maintains their aircraft according to the original equipment manufacturer (OEM) maintenance schedule, both within its home territory and at other locations.”

CAS’ line maintenance operations must also comply with regulations from different regulatory bodies, including the FAA and EASA, affirms Steven Bybee, quality engineer at CAS. “When servicing customers whose aircraft are registered under EASA, the requirement is to adhere to EASA regulations at the specific locations where those aircraft operate. While there is significant overlap in the regulatory requirements of the FAA and EASA, there are notable differences, particularly in areas such as training requirements,” he says. “For instance, EASA requires that recurrent human factors



▲ Jim Maguinness, quality manager, EirTrade Aviation Maintenance

**“PROCESSES CAN BECOME INCREASINGLY INTRICATE WHEN MULTIPLE CIVIL AVIATION AGENCIES ARE INVOLVED”**

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## LINE MAINTENANCE



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training must incorporate organisation-specific lessons learned from the previous year into the new training being provided to technicians.”

### DOCUMENTATION AND RECORD-KEEPING

Kunzelmann observes that documentation must be kept, maintained and archived to meet NAA or operator requirements. “Recording all forms, procedures and reports in accordance with regulations requires a solid enterprise resource planning (ERP) system to ensure full traceability,” he says.

Indeed, the completion of the documents for a task is a very significant and important part of the job for the maintenance team, affirms Maguinness. “It can take some time to complete the paperwork before the aircraft can be released to service i.e. record the task, aircraft maintenance manual (AMM) and illustrated parts catalogue (IPC) references, parts, components, tools etc,” he says. “In a small organisation, the engineer may also have to carry out task evaluations, review training, competency and currency, check stores and suppliers’ records. Best practices include checklists, breaking down complex tasks into smaller steps, and independent checks for completion of records.”

Caerdav’s line maintenance customers conduct training with Caerdav’s engineers to ensure they complete all paperwork in line with their processes and requirements, affirms Pitts-Robinson. “One of our customers uses dual paper/electronic logbooks, which we are happy to support. Of course, along with much of the industry, we are trying to move towards paperless processes to increase efficiency and

clarity. However, as the use of both paper and electronic systems is still prevalent, we are happy to work in whatever way ensures that all parties have up-to-date information on the latest status of the aircraft,” he says.

In performing line maintenance services, HAECO ensures that all necessary documents are collected, checked and archived in a secure location, safe from potential damage by floods, fire and humidity, points out Chan. “This ensures the availability of these records for inspection at any time during an aircraft’s operational life, plus a designated retention period. This meticulous documentation work is handled by a dedicated support team at HAECO,” she says.

At CAS, most of the administrative tasks, including documentation and record-keeping, are managed by administrative staff or station managers at the station level, which helps minimise the additional workload on the maintenance teams, affirms Batarseh. “This division of responsibilities allows our maintenance professionals to focus primarily on their technical tasks without being overwhelmed by paperwork. Furthermore, we have a dedicated quality assurance and training team at headquarters that oversees and navigates the complex requirements of various regulatory environments,” she says.

Batarseh adds: “This team ensures that all documentation and record-keeping practices comply with the relevant standards, thereby streamlining processes and maintaining high levels of accuracy and compliance. By adopting these best practices, we effectively reduce administrative burdens on maintenance personnel while ensuring meticulous adherence to all regulatory and operational requirements.” ●



▲ Richard Pitts-Robinson, commercial director, Caerdav

1. Caerdav opened a dedicated line maintenance station at Cardiff Wales Airport in May



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# PERMIT TO FERRY: BUSTING THE COFA MYTH

The misconception that permits are only required for ferry flights if there is no Certificate of Airworthiness is false, warns Kelstar Aviation's **Jen Fleming**



“  
**AN AREA WHERE  
ISSUES OFTEN ARISE  
DURING AIRCRAFT  
TRANSITIONS IS  
WITH PERMITS**  
”

**JEN FLEMING**

aircraft transitions  
manager, Kelstar Aviation

**T**here are operators who will take a chance and fly without permits or feign ignorance of the rules and hope not to get caught. They, however, can find themselves grounded en route as a result or, as in one recent instance, forced to land with a fighter jet escort.

As the MRO or CAMO isn't overseeing the permit requirements or any operational aspect, it's hard to pre-empt operator needs. Bear in mind, however, that a widebody taking up ramp space or at your hangar isn't going to get out of your way just because you finish the last task card, work order or even sign a CRS. The aircraft needs the right permissions to move on.

How quickly the aircraft can move out of your facility will depend on whether there's a full certification of airworthiness (CofA) or instead there could be a special ferry permit (SFP) or permit to fly (PTF) – these are the same thing under different names depending on the state of registry.

There are some general rules of thumb:

- All EASA registered aircraft flying in EASA airspace (regardless of whether flying on CofA or SFP/PTF) can do so freely without permits
- Non-EASA registered aircraft flying in EASA airspace on a valid CofA do not require permission from each country/flight information region (FIR) to use their airspace so long as the state of



PHIL COUZENS

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registry is a full ICAO member. For non-ICAO members, permits are required

- All non-EASA registered aircraft flying in EASA airspace on an SFP/PTF must obtain permission from each country/FIR to use their airspace
- In addition to EASA airspace, an aircraft with a full CofA can freely operate in the US or Canada without permits. There are very few other countries where this is the case, despite rumours to the contrary
- For almost every other country, whether there is a CofA or SFP/PTF makes no difference and permits are required.

It is the duty of each individual flight information region or country to establish what the current capabilities of the aircraft are in terms of airworthiness before they agree to give permission for use of their airspace.

Some countries will review the SFP/PTF issued by state of registry and 'in good faith' assume that the state of registry has carried out a comprehensive

review before issuing an SFP/PTF. Other countries' protocols dictate that they make their own assessment in full.

In addition to the airworthiness status of the aircraft, an assessment is also made of the crew, the operator and insurance, etc. Some countries also require detailed route descriptions or at least scheduled times to FIR boundaries and entry/exit points.

Each individual Civil Aviation Authority (CAA) collects documentation to assess and decide whether to grant or deny permission. In some CAAs, multiple departments are involved. The common documents that all CAAs require are:

- Certificate of registration
- CofA or SFP/PTF including the limitations or conditions and copies of any OEM NTOs referenced therein
- Certificate of insurance.

Some CAAs may ask for:

- Radio licence (to show there is suitable nav/comms equipment for the airspace)
- Noise certificate (for compliance with noise abatement policies and/or to check the MTOW to work out the relevant nav and terminal charges to levy which are usually based on MTOW)
- CRS/RTS tech log statement confirming that the aircraft has been released to service, that all scheduled checks have been performed, etc.

In some cases, there are multiple teams involved in this process (especially if a CAA does not have a dedicated permits team) so you might see, for example:

- Flight operations department will review routing
- Airworthiness department will review the CofA or SFP/PTF
- Personnel licensing department will review the pilot qualifications
- Flight safety department (risk analysis) will review insurance, etc.

However, this can all take considerable time to coordinate.

Some countries process permit applications online, while others require specific forms, email or AFTN. Some



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## “IN SOME CASES, THERE ARE MULTIPLE TEAMS INVOLVED IN THIS PROCESS (ESPECIALLY IF A CAA DOES NOT HAVE A DEDICATED PERMITS TEAM)”

respond within 24 hours, while others don't acknowledge requests until processing is complete.

Most CAAs operate Monday to Friday, with lead times for the review process typically 3-5 days. Some process applications in 1-2 days, while countries like Austria, Hungary and Spain take five days. Japan requires 5-10 days and 16 documents. Although permits may arrive sooner, these are the standard timelines.

The US has no published lead time for processing a permit application and it is totally unpredictable which office or person therein will manage your permit application – they can take up to three weeks, if you're unlucky.

The UK is of course outside of EASA now so, unless the aircraft is an ICAO member state on a full CofA, a permit is required. Officially there is expedited processing available which you can pay extra for, but they often reject expedited applications due to workload. Most UK applications just have to wait five working days.

Sometimes you need to apply for a permit to use the airspace and then separately for ATC coordination (e.g. Singapore) or for use of the airfield itself (e.g. Indonesia).

There really is a lot involved in getting overflight permits. As an MRO/CAMO there's not a huge amount that can be done to pre-empt this or to assist, but making sure that the leasing company or aircraft owner has hired a good ferry operator like Kelstar Aviation can go a long way to helping you get the aircraft dispatched and out of your facility more quickly.

At Kelstar Aviation we understand the process, we're familiar with all the CAAs and agents in each country and will always ensure we're ready to meet their unique requirements. Permits don't need to be the showstopper that they often become. 🟡

1. Ferry flights are a crucial part of buying or selling an aircraft and require careful planning
2. An aircraft needs the right permissions to move on from a facility

# GOING SWIMMINGLY

A growing number of international airlines are adopting Lufthansa Technik's innovative AeroSHARK surface film technology as part of their sustainability strategies

**A**eroSHARK technology is designed to reduce fuel consumption and carbon emissions and is being implemented on various Boeing 777 aircraft across the globe, with Austrian Airlines, EVA Air and All Nippon Airways (ANA) leading the charge.

Starting in winter 2024, Austrian Airlines will equip four of its 777-200ERs with the AeroSHARK film, a move projected to result in substantial environmental benefits. Over the next four years, this technology is expected to save approximately 2,650 metric tonnes of fuel for the airline and reduce CO<sub>2</sub> emissions by over 8,300 metric tonnes. This is equivalent to the emissions from about 46 round-trip flights between Vienna and New York.

The 'sharkskin' film works by reducing the frictional resistance of aircraft during flight. While the fuel savings of 1% per aircraft might seem modest, Austrian Airlines' chief operating officer Francesco Sciortino noted that this efficiency translates into thousands of tonnes of CO<sub>2</sub> saved annually.

The airline sees this investment as part of its long-term plan to meet carbon reduction targets, even as the 777-200ER nears

**"The 'sharkskin' film works by reducing the frictional resistance of aircraft during flight"**

retirement. The full modification of Austrian Airlines' fleet is expected to be completed by March 2025.

Elsewhere, EVA Air has become the first Asian carrier to implement AeroSHARK technology, targeting its entire cargo fleet of nine 777Fs. EVA Air's first freighter with AeroSHARK is already back in service, and the full fleet is scheduled to be equipped by 2027.

By covering large portions of the aircraft's fuselage and engine nacelles with the riblet film, EVA Air anticipates annual savings of more than 2,500 metric tonnes of fuel and over 7,800 metric tonnes of CO<sub>2</sub> emissions across its nine 777Fs. This aligns with the airline's long-term goal of achieving net-zero carbon emissions by 2050.

In Japan, All Nippon Airways (ANA) has also embraced the technology, modifying its first 777F with the drag-reducing film. ANA is the first airline to use AeroSHARK on both passenger and cargo variants of the 777, with the first modified freighter having entered service in September. The airline plans to extend this modification to a passenger 777 by spring 2025.

Kohei Tsuji, executive vice president of ANA's Engineering and Maintenance Center, described the move as a critical milestone in the airline's sustainability journey.

## GROWING GLOBAL ADOPTION

Lufthansa Technik, which holds supplemental type certificates (STCs) for AeroSHARK modification on several Boeing 777 models, is optimistic about the technology's potential.

Already, approximately 20 long haul aircraft worldwide have been equipped with AeroSHARK, with that number expected to rise as more airlines invest in the technology to improve operational efficiency and meet environmental goals. ●



# 2,500

*EVA Air expects annual fuel savings of more than 2,500 metric tonnes across its nine 777Fs*



◀ EVA Air's first freighter being modified with AeroSHARK



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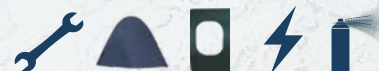
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# BALTIC ROOTS, GLOBAL REACH

**Aleksandr Celiadin**, founder of GetJet Aviation Holdings, speaks to us about the dynamic story behind GetJet Airlines' rise in the ACMI market, highlighting its challenges, key strategies and future prospects

**S**ince its inception in 2016, GetJet Airlines has emerged as a significant player in the ACMI (Aircraft, Crew, Maintenance and Insurance) market, earning a reputation for its adaptability and premium service.

The airline's journey, marked by both challenges and triumphs, is a testament to the vision and determination of its founder, Aleksandr Celiadin, whose passion for aviation was ignited in his childhood.

## A PASSION BORN AT THE AIRPORT

"I grew up in Vilnius, Lithuania, right next to the airport," Celiadin recalls. "My father was an aviation engineer and later became the technical director

at Aurela Airlines. This proximity to the aviation world sparked my interest early on."

This early exposure to the aviation industry laid the foundation for Celiadin's future career. His professional journey began at Aurela Airlines, where he worked as a sales associate while completing his MBA. "I witnessed this first Lithuanian privately owned airline evolve and eventually go bankrupt, which was an invaluable first-hand challenge that paved my way into aviation," he shares.

By 2016, armed with seven years of industry experience, Celiadin was ready to launch GetJet Airlines. The company quickly positioned itself as a flexible and responsive ACMI provider, a niche that has proven crucial to its success.



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## OVERCOMING CHALLENGES WITH STRATEGIC ADAPTABILITY

GetJet Airlines has faced its share of challenges, with the Covid-19 pandemic being one of the most significant. "We had to scale down our fleet from 25 to around 10 aircraft and transform from a passenger airline to a cargo airline almost overnight," explains Celiadin.

The company repurposed its widebody A330 to carry medical supplies, becoming the first to bring Covid-19 vaccines to Lithuania. "Our ability to adapt quickly allowed us to bounce back stronger," he adds, noting that the airline now operates a fleet of 15-18 aircraft, a size optimised for its current needs.

## THE PILLARS OF SUCCESS

Celiadin attributes much of GetJet Airlines' success to two key principles: assembling an outstanding team and maintaining a straightforward strategy.

"Early on, I understood that, as the founder, I am not necessarily the best chief executive, so I focused on finding



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the best managers to do the job,” he explains. This approach has paid off, with a team that Celiadin describes as “talented, committed people who are the backbone of our high-quality service and customer satisfaction.”

Strategically, GetJet Airlines prioritises flexibility and quick response times, allowing the company to adjust its services and fleet to meet the market’s

changing demands. “This clear focus on agility and premium service not only sets us apart from our competitors but also drives our ongoing growth and strong financial results,” Celiadin notes.

### DIVERSE FLEET FOR A DIVERSE MARKET

One of GetJet Airlines’ strategic decisions is its operation of both Airbus A320/A321s and Boeing 737s, rather than focusing on a single aircraft type.

“As a crewed aircraft lessor with full in-house maintenance capabilities and a variety of aircraft types, we can serve a broader range of clients,” says Celiadin.

This diversity allows the company to select the best aircraft for specific customers and markets, making GetJet an attractive employer and maintaining its robust market presence.

### FAR EXTENDING REACH

Though GetJet Airlines is based in Vilnius, Lithuania, its reach extends far beyond the Baltics. “Being based in Lithuania plays to our strengths,”

1. GetJet Airlines is an attractive employer for a wide range of aviation professionals  
2. Aleksandr Celiadin, founder, GetJet Aviation Holdings  
3. GetJet Airlines is a Lithuanian charter airline company founded in 2016

Celiadin explains. The location’s central position between East and West Europe enables efficient operations and quick response times, while lower operational costs compared to Western Europe allow the airline to maximise its resources.

However, Celiadin emphasises that the most significant advantage of being based in Lithuania is the people. “We’ve been lucky to gather a team in Lithuania that’s grown right alongside the company. They’re top-notch – some of the best in Europe,” he says, highlighting the crucial role of his team in delivering reliable and high-quality service.

### NAVIGATING CHALLENGES

The aviation industry is currently grappling with various challenges,

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◀ GetJet Airlines' C-suite

including operational disruptions and supply chain issues exacerbated by the Covid-19 pandemic.

GetJet Airlines is proactively addressing these challenges by investing in self-sufficiency, particularly in training its own crews and enhancing fleet maintenance capabilities.

"We've already begun servicing our own aircraft by renting out a hangar at Riga Airport and are further investing in a comprehensive maintenance base in Lithuania," Celiadin shares.

Financial prudence also plays a role in GetJet Airlines' strategy. By securing aircraft leases before market prices soared, the company has positioned itself to offer competitive and reliable services, even as other airlines struggle with rising costs and logistical hurdles.

#### STANDING OUT

In the competitive ACMI market, GetJet Airlines distinguishes itself through its agility and premium service. "We are

renowned as the most premium crewed aircraft leasing company," Celiadin states proudly. He likens GetJet Airlines to a sports car that is "capable of rapid acceleration and nimble turns", in contrast to larger ACMI companies that "move like freight trains – powerful but on fixed tracks and slow to accelerate".

GetJet Airlines' client list includes industry leaders such as Wizz Air, Transavia, Iceland Air, Vueling, airBaltic and TUI, but Celiadin explains the company is always on the lookout for new opportunities. He says: "We focus on delivering high-quality, premium services. This approach ensures that our clients receive the best possible service, tailored to their specific needs in any geographical location."

#### AMBITIOUS GOALS AND FUTURE EXPANSION

"GetJet Airlines primarily focuses on the pan-European market," says Celiadin, "but we also operate in North

and South America and parts of Asia." To illustrate this expansion logic, Celiadin explains that GetJet Airlines Latvia, a smaller sister airline of GetJet Airlines Lithuania, has recently secured the Part 129 Operation Specification approval from the Federal Aviation Administration (FAA), allowing it to operate in the US.

"Moreover, we are exploring opportunities of entering markets with no previous ACMI history," he explains. "We have recently signed clients in Azerbaijan and Uzbekistan, having been among the first ACMI companies in these countries."

Looking ahead, GetJet Airlines has ambitious plans for both vertical and horizontal expansion. "Our primary goal is to continue our vertical expansion and enhance our value proposition," Celiadin says. "Key initiatives include establishing our own maintenance facilities, which will allow us to control quality and costs more effectively."

"Over the next few years, we're planning to attract an investment of €150 million in external capital to diversify our capabilities, aiming for a €1 billion turnover by 2030. This expansion will make GetJet Aviation Holdings a comprehensive ACMI provider, offering more services such as aircraft asset management, spare parts trading, fleet support, base maintenance and personnel training."

Celiadin adds: "Horizontally, we're also focusing on fleet renewal, ensuring our aircraft are modern and efficient, with plans to maintain a fleet age of no more than 5-7 years old."

As GetJet Airlines continues to grow, its commitment to agility, quality and strategic foresight will undoubtedly remain at the core of its operations, guiding the company through the dynamic and challenging landscape of the global aviation industry. ●

**"IN THE COMPETITIVE ACMI MARKET, GETJET AIRLINES DISTINGUISHES ITSELF THROUGH ITS AGILITY AND PREMIUM SERVICE"**



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the Airbus A319/A320/A321, A330, A340, A350 and A380, the Boeing B737 (Classic, NG and MAX), B747, B757, B767, B777 and B787 as well as the Embraer E-Jet's, ERJ 145, E170/190 (E1 and E2), the Bombardier Q's (De Havilland Dash-8), Bombardier CRJ's, ATR42, ATR 72 and of course Fokker 50, 70 and 100 Aircraft

# ENHANCED BY AI/ML

Ahead of the 2024 Predictive Aircraft Maintenance Conference in Dublin in November, *MRO Management* asked **David Harper** from GE Aerospace, who will be speaking at the event, his thoughts on the landscape of predictive maintenance

**What do you consider to be the most significant advancements in predictive maintenance technology within the industry in recent years; what impact have they had?**

The growth in computing system capability from 'under desk' to 'on premise' to the 'cloud' has meant more reliable, scalable and secure systems to protect the fleet. We've been able to manage the rapidly growing amount of data, not just from more engines flying, but also because the modern engines have more sensors and provide richer data sets. It is the exponential growth in computing power, combined with the growth of even richer data sets, which continues to expand our capabilities with predictive maintenance.

In parallel with these trends, the analytics themselves have become more powerful, with artificial intelligence (AI) and machine learning (ML) becoming part of the tool kit. The use of AI/ML is enabling engineers to configure systems more readily without requiring computer science expertise.

Finally, we're also seeing young engineers graduating from universities today with a stronger data science background who recognise the importance of data analytics and are bringing fresh ideas to transform the industry.

**GE Aerospace has made significant strides in applying AI/ML to predictive maintenance. Can you highlight the key milestones achieved during this journey, the lessons learned along the way, and the current state of these initiatives?**



“  
**MORE DATA IS HELPFUL  
BUT ONLY IF IT IS OF HIGH  
QUALITY AND COMES IN  
A TIMELY MANNER**  
”

**DAVID HARPER**

fleet support director,  
GE Aerospace

Indeed, we've been using AI/ML to great effect for more than a decade in our engine health monitoring solution. Our ProDAPS software, highlighted at the 2023 PAM conference, can detect issues 60% earlier and reduce false alerts by 50%. The capability of the system has improved over the years with the rapid growth in computing power and the increasingly rich data set from engines around the world, especially the modern engines such as GENx or CFM LEAP. It has also confirmed that engineering domain expertise is key to success, from choosing the right parameters to monitor and providing

supervised learning to determining the best recommendations before we issue an alert to the airline.

**As predictive maintenance solutions grow more sophisticated, data volume has surged. How can the industry enhance data quality and accuracy in the face of this rapid expansion?**

Indeed, more data is helpful but only if it is of high quality and comes in a timely manner. We've seen big strides in the automatic transmission of data in near real-time, which reduces the risk of errors and allows a recommendation to be made earlier. Use of common standards across the industry, such as S5000F, will allow for easier data exchange which is why GE is involved in this effort. Breaking down data silos between legacy systems is important and industry platforms such as Skywise help overcome those barriers. Using standards and platforms will also ensure data is managed consistently in accordance with new laws and regulations coming from governments around the world. Planes fly all over the world and so we need to have a common approach.

**To what extent do you believe industry collaboration poses a challenge to the advancement of predictive maintenance? Has GE Aerospace undertaken any initiatives to foster greater collaboration across the aviation ecosystem?**

As we saw last year at the PAM conference, collaboration is the key word for better predictive maintenance and GE Aerospace is at the forefront of that.



PHIL COUZENS

“  
**WE SEE PREDICTIVE MAINTENANCE  
 BECOMING MORE PERSONALISED IN WAYS  
 THAT ALLOW US TO OPTIMISE MAINTENANCE  
 FOR SPECIFIC AIRLINE OPERATIONS**  
 ”

We work closely with airlines to share information and learnings to enhance our support, always being careful to respect each airline's data and privacy. Our Software-as-a-Service (SaaS) business is one of the founding partners of the Digital Alliance together with Airbus and Delta, each bringing their expertise to a joint effort to help airlines achieve higher productivity. We are also working with our suppliers to share data where it can help them improve the quality of their products.

**What emerging trends in predictive maintenance excite you the most, and how do you envision the landscape evolving over the next 5-10 years?**

With the increasing application of AI and ML, we see predictive maintenance becoming more personalised in ways that allow us to optimise maintenance for specific airline operations. It's somewhat analogous to the notion of personalised medicine in health care, where health care treatments become more tailored to an individual patient.

AI and ML will enable maintenance to become more personalised by improving ways to find anomalous data and to find solutions to more complex multi-variable problems. This will

allow for optimising maintenance per individual airline operations.

As we increase the application of AI and ML, we're more committed than ever to making sure we bring the right domain expertise and right data to inform our predictive maintenance technology. Also, AI and ML will continue to be a way for us to augment and enhance the productivity and quality of service our engineers deliver.

Predictive maintenance also will benefit greatly from future aircraft having even more sensors than today gathering data. This increase in available data is happening as data transmission capabilities also are growing exponentially, as global satellite systems become more accessible. You can see how this impacting In Flight Entertainment (IFE) systems, where huge amounts of data can now be streamed to every passenger. For predictive maintenance, this will mean more data to work with to detect things earlier and take even better actions.

On the other hand, we also need to ensure we manage data properly, respecting ownership, rights of access, and always providing the highest levels of security so that we can all trust each other. As we said last year, industry collaboration is crucial to achieve that level of trust and accelerate adoption of technologies. ●

**PREDICTIVE  
 AIRCRAFT  
 MAINTENANCE  
 2024**

➤ On 13-14 November, *MRO Management* and its parent company Real Response Media will host the Predictive Aircraft Maintenance (PAM) Conference 2024 at the Radisson Blu Royal Hotel Dublin, Ireland, bringing together senior level executives from airlines, OEMs, MRO specialists and big data experts to explore the future of predictive maintenance.

Attendees will discover how to get the best out of predictive maintenance while overcoming the greatest challenges. Case studies will highlight best practices and how companies are successfully collaborating with industry partners, while panel discussions will explore the major topics from the perspective of all stakeholders.

Thank you to our Gold Sponsor, GE Aerospace, for supporting PAM 2024.

For more information and how to register to attend, visit [predictiveaircraftmaintenance.com](https://predictiveaircraftmaintenance.com)



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# MRO ASIA-PACIFIC 2024 ROUND-UP

MRO Asia-Pacific took place in Singapore in September. Here's a round-up of just some of the news announcements to come from the show

## CERTIFICATION

### Fokker Services Asia appointed as an Embraer Authorised Service Centre

Fokker Services Asia has now been awarded the official certification of Embraer Authorised Service Centre to provide maintenance services for the E-Jets first-generation family, with a focus on E190 aircraft.

Frank Stevens from Embraer Services & Support said about the partnership: "This will potentially provide more capacity, capability and help us to keep expanding Embraer's Authorised Service Centre footprint in Asia-Pacific."

Thomas Kennedy of Fokker Services Asia said: "This Embraer certification will further enhance Fokker Services Asia by establishing a comprehensive new line of work for Embraer aircraft maintenance in the region. The presence of the first Embraer aircraft from Alliance Airlines (Australia) already in our hangar is a testament to our readiness and commitment."

Embraer's first-generation E-Jets fleet in Asia Pacific are operated by airlines in Australia, India, Myanmar, Japan and China.



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## INVENTORY MANAGEMENT

### PDQ Airspares signs surplus management deal with GMF AeroAsia

FDH Aero announced a new surplus management programme, 'Surplus2Revenue', in partnership with Garuda Maintenance Facility (GMF) AeroAsia. The programme, between FDH's PDQ Airspares and GMF, aims to manage GMF's surplus materials while increasing inventory availability across the Asia-Pacific region.

Building on a previous consignment agreement, the new three-year partnership will see PDQ selling GMF's surplus stock to its customer base, strengthening PDQ's role in the region.

## COMPONENT SUPPORT

### Cebu Pacific and Lufthansa Technik sign new airframe components services contract

Lufthansa Technik Shenzhen (LTS) is to provide airframe related components services for the Airbus A320ceo and A321XLR fleets of low-cost carrier Cebu Pacific. The agreement specifically covers MRO and spare unit support for engine nacelle components including inlet and fan cowlings, thrust reverser and nozzle.

Lufthansa Technik's Dennis Kohr said: "A big thanks goes out to Cebu Pacific



1. HAECO and Boeing agree parts deal
2. Turkish Technic facilities
3. Fokker and Embraer colleagues
4. Cebu Pacific A320ceo

for choosing us – once again – as their trusted partner. Our valued customer will benefit from our global MRO operations with a strong local footprint in Asia-Pacific. We are committed to continue delivering exceptional support and look forward to expanding our already strong partnership with Cebu Pacific through this new agreement."

## COMPONENT SUPPORT

### Turkish Technic and Garuda Indonesia agree component support deal

Turkish Technic signed a multi-year component support agreement with Garuda Indonesia, the flag carrier airline of Indonesia, to cover its Airbus A330 and Boeing 777 fleets of Garuda Indonesia. The airline will benefit from Turkish Technic's vast inventory of components and comprehensive solution services. This agreement ensures operational excellence with complete component support for Garuda's fleet, building on the strong foundation of this new partnership.

Garuda Indonesia's Irfan Setiাপutra said: "As Garuda Indonesia shows a significant growth demand recently aligning with our extensive network plans, our focus solemnly refers to maintaining the highest safety standard in our fleets.



1



3

Thus, the reliable services provided by Turkish Technic are believed to bolster the excellence of our flight operations preparations without any hassle.”

#### PARTS SUPPLY AGREEMENT

#### **HAECO and Boeing agree new comprehensive parts supply agreement**

HAECO and Boeing announced the signing of a new agreement to cover spares and consignment parts supplied by Boeing to support HAECO's global MRO services.

The newly signed comprehensive agreement consolidates previous separate agreements across various Boeing and HAECO business units under a single agreement. ●



Cebu Pacific

4



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# MICROBIAL MENACE

Conidia Bioscience's **Jay Patel** explains the vital role of regular testing for microbial contamination in safeguarding jet fuel integrity

**M**icrobial contamination poses a significant threat to jet fuel integrity, affecting all sectors reliant on this critical resource. Microorganisms can infiltrate fuel systems through contact with air, water (both sea and fresh) or soil, and start proliferating at the fuel-water interface inside fuel tanks. Once microbial growth is established, 'biofilm' starts forming at the water and fuel interface, which over time can start attaching to surfaces such as tank walls, fuel filters, strainers and sensors.

Microbial biofilms manifest as a stringy, web-like substance that ranges in colour from grey to brown. Once biofilms take hold, they lead to numerous issues such as corrosion of fuel

tanks, fuel quantity indicating system (FQIS) malfunctions, fuel system blockages and damage of flight control units. It is important to note that these issues are not caused by free floating microbes in fuel (planktonic microbes) but rather by biofilms. Once established, biofilms provide microbes with remarkable resilience against any toxic and biocidal attacks, enabling the acids formed within the biofilm to attack tank surfaces. Once biofilms have become established it is difficult to dislodge them, even with the use of biocides.

Water is a crucial factor in the proliferation of microbial growth within fuel systems. Where water is present (even small traces), microbes will get a foothold unless a biocide is present. Whilst



## “JET FUEL CONTAMINATION PRESENTS A SIGNIFICANT FINANCIAL RISK TO AVIATION BUSINESSES, WITH SEVERE CONSEQUENCES THAT CAN GROUND AIRCRAFT AND DISRUPT OPERATIONS”

initial contamination levels are often low and do not pose immediate operational risks, the potential for significant damage remains if microbial growth is left to establish into mature biofilms.

For those responsible for managing fuel systems, ASTM D6469 and the IATA Guidance Material on Microbiological Contamination in Aircraft Fuel Tanks are essential references for understanding and addressing microbial growth in fuels.

The most effective strategy for minimising microbial contamination involves regular sampling and testing, coupled with consistent water drainage. Establishing the frequency of these activities through risk analysis is crucial, as each situation is unique and influenced by a range of environmental, operational and structural factors.

### THE HAZARDS OF JET FUEL CONTAMINATION

Jet fuel contamination presents a significant financial risk to aviation businesses, with severe consequences that can ground aircraft and disrupt operations.

Microbial contamination levels which require the use of a biocide must be performed using an industry protocol using a calibrated injection system to avoid the mishandling and overdosing of the biocide in regard to the aircraft fuel systems. In 2020, Flight Global reported its misuse caused a dual engine malfunction which forced an emergency landing at London Gatwick Airport.

As global aviation demand surges, particularly in rapidly growing economies such as China, India and Brazil, the frequency of flights in high-risk zones increases. This heightens the need for early detection of fuel contamination to prevent costly operational issues.

Among the most common contaminants in jet fuel are particulate matter, environmental debris, water, organic insoluble material and microbial growth. While all forms of contamination can compromise fuel quality – especially in stored products – microbial contamination is often the most challenging. The principal reason for this is that once microbial growth takes hold it can spread to other parts such as filters and can be very difficult to eradicate.

Microbial contamination can lead to costly operational disruptions, particularly if it necessitates the grounding of an aircraft, resulting in significant revenue loss. In normal flight operations – where aircraft are utilised seven days a week for up to 10 hours daily – issues typically arise first with Fuel Quantity Indication System (FQIS) probes and filters. However, in hot and humid regions, microbial growth can accelerate rapidly, potentially starting the process of fuel tank corrosion within a week.

When an airline grounds an aircraft, the primary concern is often corrosion, though FQIS probe and filter issues can also arise as the engines circulate biomass from the contamination throughout the system. For example, if an airline experiences an FQIS probe failure at a remote airfield with no replacement available, the aircraft may remain grounded for days, awaiting a new unit. This delay could necessitate deploying a substitute aircraft, if available, or risk flight cancellations and the associated revenue loss.

Additionally, the activation of Fuel Filter Bypass warning lights due to boost pump blockage and the spread of contamination through water scavenge systems further exacerbate the risks of delays and operational disruptions.



# 20

*In just 20-30 minutes, FUELSAT® test kits deliver a full quantitative contamination value*

▲ Microbial contamination can cause costly disruptions, especially if it grounds aircraft



1

## “THE MOST EFFECTIVE STRATEGY FOR MINIMISING MICROBIAL CONTAMINATION INVOLVES REGULAR SAMPLING AND TESTING, COUPLED WITH CONSISTENT WATER DRAINAGE”

### METHODS OF DETECTING CONTAMINATION IN JET FUEL

In the realm of aviation fuel quality, the detection of particulates such as rust, scale and dust, is typically initiated through visual inspection of the fuel sample. However, to identify particulates that evade visual detection, advanced chemical analysis is employed, providing a more precise understanding of the contamination levels.

When it comes to detecting water in aviation jet fuel, multiple methodologies are available, with the most prevalent being the water tablet test. This rapid test offers a quick indication of whether the free water content exceeds the critical threshold of 30 ppm, the maximum permissible limit. Beyond this, the industry is equipped with a variety of sophisticated products and analysis tools designed to accurately assess water contamination in jet fuel.

Addressing microbial contamination in jet fuels involves several testing techniques, each with its own strengths. The Colony Forming Unit (CFU) methods, while thorough, often requires sending fuel samples off-site, leading to turnaround times of up to 10 days. In contrast,

Adenosine Triphosphate (ATP) testing delivers results the same day but can be complicated and cumbersome to perform due to the significant number of steps involved in the test procedure.

Lateral flow tests, however, represent a significant advancement in on-site microbial detection. These tests are designed for immediate, on-the-spot use, requiring minimal training and no specialised equipment. They deliver results within 20 to 30 minutes, offering a user-friendly format that is easy to interpret, making them an invaluable tool in maintaining fuel integrity in real time.

The new FUELSTAT® One test kit represents a significant advancement in the rapid detection of microbial contamination in jet fuel, designed to mitigate operational downtime and enhance safety. This innovative solution can be deployed across the entire fuel supply chain, from storage terminals to aircraft wing tanks, providing a comprehensive assessment of fuel quality.

The test is a straightforward, quick lateral flow test that can be performed on either free water or fuel phase samples, capable of detecting a broad spectrum of microorganisms. In just 20-30 minutes, it delivers a fully quantitative contamination value, offering immediate insights into fuel integrity.

Mirroring the simplicity of Covid-19 lateral flow tests, FUELSTAT® test kits identify markers of bacteria, yeast and fungi with precision. Their on-site applicability is crucial for maintenance teams, enabling them to conduct tests without causing delays, thus ensuring that aircraft remain on schedule. Complying with ASTM D6469 guidelines for detecting contamination within 24 hours, these tests eliminate the need for laboratory involvement, thereby reducing both time delays and associated costs.

The free integrated result app is unique amongst microbial contamination fuel tests, enhancing the kit's utility by providing instant test results and generating PDF reports that can be shared globally. Registered users can manage and monitor test results conducted by their teams worldwide in real-time, all from a single platform, ensuring a seamless and efficient approach to fuel quality management. ●

1. Jay Patel, head of innovation, Conidia Bioscience
2. Mirroring the simplicity of Covid-19 lateral flow tests, FUELSTAT® test kits identify markers of bacteria, yeast and fungi with precision



2



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## A BALANCING ACT

World Aero's Phil Randell talks of the challenge of striking a balance in MRO



“  
WE INSPECT WITH A  
'GLASS HALF-FULL'  
APPROACH  
”

**PHIL RANDELL**

owner and chief  
executive, World Aero

**M**RO stands for maintenance, repair and overhaul. There's no mention of simply making things brand new.

The role of an MRO, be it heavy maintenance or a component workshop, is to inspect, repair and release aircraft and their parts for continued service. Organisations are granted approvals to perform work, and a part of this approval is an undertaking that the organisation will use approved maintenance data and skilled personnel to determine what is acceptable.

During a repair or overhaul, it would be very easy to just replace everything; anything with so much as a blemish, a stain, a minor deformation, a little discolouration perhaps. Make it all brand new, how lovely. But at what cost?

Sure, there are some components whereby a piece part must be pristine, with even the most superficial imperfection rendering it scrap (some engine parts and minuscule components of mechanical gyros come to mind). But, for most parts, a realistic MRO must remember that they are 'used' and will never be quite as perfect as a factory fresh item. And that's often acceptable, with limits of permitted imperfections detailed by the vendor in their CMM.

On the other hand, if cost is the main driver, one could put on the dark sunglasses, pass items that are not up to standard in order to keep costs low, to keep customers happy – short-term at least.

Both are eventually catastrophic for the MRO; either seeing their customers flee when the repair quotes repeatedly come through high due to overzealous inspection standards or, in the other extreme, facing the very real threat of approval suspension or, as a minimum, a bad reputation if standards are allowed to slip.

The real skill in MRO is down to maintaining a quality product at a reasonable price. It's a balancing act, made complicated by the fact that technicians have a subjective view, guided by what is often vague inspection criteria from the vendor's CMM.

At World Aero we inspect with a 'glass half-full' approach where we ask ourselves "Can we safely pass this?" rather than "How can we fail this?" when assessing components. We don't only pass parts that are good enough to last until the end of time, we also pass items that are good enough to ensure a safe and reliable service until the next scheduled inspection; that's what limits and guidance are for.

In our 25 years of MRO, like our industry colleagues and competitors, we're aware that without customers or approvals we're out of business. We've long since chosen our position in a world of leading maintenance providers and we're proud to put our certificates on that. ●

 For more information about World Aero, visit: [worldaero.co.uk](http://worldaero.co.uk)

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# INNOVATION & GROWTH

With significant parts stock and a new engine division, CAS sets its sights on global expansion

**F**or over eight years, Composite Aeronautic Specialists (CAS) has been a trusted name in the MRO industry, focusing on nacelles, flight controls and airframe parts.

Since its inception, CAS has demonstrated steady growth, fuelled by a commitment to innovation and excellence, becoming a vital partner for aviation companies around the world.

## INTEGRATING NEW TECHNOLOGIES

At CAS, staying at the forefront of industry trends and technological advancements is key. The company has invested heavily in digital innovations, not only to optimise repair processes but also to enhance the quality of service it provides. These innovations aim

to streamline workflows, reduce lead times and ultimately save customers time and money – an essential factor in today's fast-paced and competitive aviation environment.

"We're always looking for ways to improve our services," says a CAS spokesperson. "By integrating new technologies and improving our internal processes, we can offer faster turnaround times without compromising on the quality our customers expect."

## BOEING APPROVAL

This commitment to quality and efficiency has paid off. CAS has recently been approved as a repair supplier for Boeing, a major milestone that showcases the company's dedication to maintaining high standards. Boeing's approval is

not just a mark of recognition but a testament to the excellent craftsmanship and technical expertise that CAS offers across its wide range of services.

## SIGNIFICANT STOCK

CAS offers comprehensive repair services and maintains a significant stock of parts for major aircraft manufacturers, including Airbus, Boeing, Embraer and many more. By stocking these parts, the company ensures it can meet the demands of its customers quickly and efficiently, minimising aircraft downtime. This focus on customer satisfaction has been a driving factor behind CAS's continued growth and success in the industry.

## NEW: CAS ENGINES

Adding to its suite of services, CAS is excited to announce the opening of its new division, CAS Engines. This new arm of the business specialises in engine teardowns and repairs, expanding CAS's already impressive capabilities into engine maintenance – a vital service for many of its clients.

## GROWTH TRAJECTORY

With its eye on global expansion, CAS is also working on partnerships to establish an MRO facility for nacelles and flight controls in Europe. "We see a lot of opportunity in the European market," explains the company spokesperson. "By opening a facility there, we'll be able to provide even more value to our customers with localised support and services."

CAS's growth trajectory, combined with its commitment to innovation, positions the company as a forward-thinking leader in the MRO space.

As the company continues to expand its capabilities and reach, it remains focused on its core mission: delivering high-quality, efficient and innovative repair solutions to the global aviation industry. ●

“STAYING AT THE FOREFRONT OF  
INDUSTRY TRENDS AND TECHNOLOGICAL  
ADVANCEMENTS IS KEY”



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# SCALING UP SAF

**Alexander Kueper**, vice president of renewable aviation business at Neste explores some of the key drivers that can help the ramp up of SAF production and encourage usage

**T**he aviation industry's carbon emissions goals cannot be reached without substantial scaling of sustainable aviation fuel (SAF) production.

Recent projections from the International Air Transport Association (IATA) shows that SAF production is poised to reach 1.9 billion litres (1.5 million tonnes), which would account for 0.53% of aviation's fuel need in 2024 – still far from what is needed to reach the industry's net-zero emissions goal by 2050.

As the largest SAF producer, Neste began producing SAF in 2011 and today provides SAF to many major airports and is used by many major airlines.

## REGULATORY SUPPORT

Higher cost is often regarded as the largest barrier to SAF adoption today. Compared with regular fossil jet fuel, SAF is often two to three times more expensive, making it a challenge for airlines operating in a highly competitive market to adopt. Over time, factors such as maturing technology and increasing supply might be able to narrow the cost gap. However, in the near term, supportive policy is crucial to create a level playing field and gain industry momentum.

For SAF producers, long-term, stable incentive programmes like the RFS in the US or Canada's Clean Fuel Regulation, which mirrors US state-level Low Carbon Fuel Standard programmes, are generally preferable to shorter-term, more limited tax credits. The SAF Blenders Tax Credit (BTC) in the Inflation Reduction Act is a positive development that recognises the role SAF will play in decarbonising aviation.

Outside of California, an increasing number of states are also considering policy frameworks that support the use of SAF. In July 2023, the State of Illinois enacted the SAF purchase tax credit, enabling airlines to earn \$1.50 purchase

credit per whole gallon of SAF purchased for use in Illinois.

Following this supportive policy framework, in July 2024, Neste announced the supply of up to one million gallons of SAF to United Airlines for its use at Chicago O'Hare International Airport, enabling the airline to be the first to purchase SAF for operational use at the airport and making air travel in Illinois more sustainable.

SAF adoption in Europe is also expected to accelerate on the heels of the RefuelEU Aviation Regulation, which is part of the EU's 'Fit for 55' package. The programme requires fuel suppliers to deliver minimum volumes of SAF as part of the total volume of jet fuel supplied. This starts with a mandate of 2% SAF in 2025 and increases to 6% in 2030 and 70% SAF in 2050.

# 1.9

BILLION

*Recent projections from IATA shows that SAF production is poised to reach 1.9 billion litres, which would account for 0.53% of aviation's fuel need in 2024*



1

# “HIGHER COST IS OFTEN REGARDED AS THE LARGEST BARRIER TO SAF ADOPTION TODAY”

## COLLABORATION WITH INDUSTRY PARTNERS

One of SAF's greatest advantages is that it's a 'drop-in' solution, meaning that it can be used in existing engines and fuel infrastructure, opening up the world's vast existing energy infrastructure, such as pipelines, storage tanks or terminals that carry fossil products to be easily used for SAF – making airlines or business aviation companies have easier access to this lower-carbon fuel. This is what Neste has been doing.

In 2022, Neste's SAF was delivered to New York's LaGuardia Airport through the Colonial and Buckeye pipeline systems – two essential pieces of American energy infrastructure.

In 2023, Neste commissioned terminal capacity at Vopak's Los Angeles terminal in California for storing SAF. This partnership further expanded the availability of Neste's renewable fuels in the Southern California region.

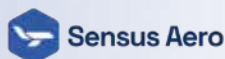
Furthermore, fast-forward to 2024, Neste commissioned terminal capacity at ONEOK's terminal in Houston, Texas for blending and storing SAF. This is a major step in further expanding the availability of Neste's SAF to airlines also operating from airports east of the Rocky Mountains all the way to the East Coast.

It is also key to get access to the airport fuel infrastructure to be able to service airlines who want to use SAF across their operations. It is not always easy to get access but examples show that it works – using the new integrated supply chain into Singapore Changi Airport, Neste delivered its first locally produced SAF to Singapore Airlines, quickly followed by a similar delivery at the airport to Emirates. Collaboration with energy industry partners is an essential part of making SAF more widely available.



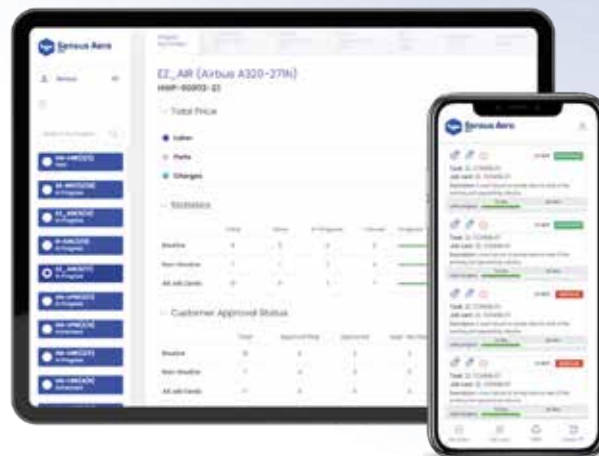
▲ Alexander Kueper, vice president of renewable aviation business, Neste

1. SAF adoption is also driven by other parties including airlines and big corporations



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Vincenzo Pace/geovincenzo.com

# “WASTE AND RESIDUE MATERIALS SUCH AS USED COOKING OIL ARE STILL THE MAIN RAW MATERIALS FOR TODAY’S SAF PRODUCTION”

### COMMITMENT TO SUSTAINABILITY DEMONSTRATED BY AIRLINES AND BUSINESS AVIATION

In addition to support on the regulation side, SAF adoption is also driven by other parties in the aviation industry, including airlines and big corporations.

Neste supplies SAF to many major airlines and business aviation users around the world. These entities are demonstrating their commitment to sustainability by including SAF in their energy solutions portfolio, which will not only help to ramp up SAF production but also to generate more public awareness of the benefits related to SAF. Together, these groups are painting a future where SAF becomes a preferred solution for all travellers who’d like to enjoy flying but with a smaller carbon footprint.

Right now, SAF can be blended at up to 50% with traditional jet fuel, but a number of pilot programmes using 100% SAF to fuel different types of planes have been conducted in both Europe and the US. There is a near future

where SAF can be used in its neat form, which will significantly help the aviation industry reduce emissions further.

### KEEP RAMPING UP SAF PRODUCTION

Currently, Neste has a global production capability of more than one million tonnes per annum.

Neste is expanding its SAF production capacity to 1.5 million tonnes of SAF (515 million gallons) in 2024 and to 2.2 million tonnes (750 million gallons) in 2026.

Waste and residue materials such as used cooking oil are still the main raw materials for today’s SAF production. Though the availability of waste and residues are sufficient to ramp up SAF production in the near term, Neste is also excited to see the potential of tapping a new generation of raw materials and is engaged in developing such new pathways including algae, lignocellulosic, or even power to liquid. These technologies hold the potential of replacing all of the fossil jet fuel with SAF. ●

# 2.2m

TONNES

*Neste is expanding its SAF production capacity to 1.5 million tonnes of SAF in 2024 and to 2.2 million tonnes in 2026*

▲ Neste will supply up to one million gallons of SAF to United Airlines for its use at Chicago O’Hare International Airport

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The way ahead



# A HIGHER POWER

**Mike Slack**, senior technical account manager at Ansys, says aviation's future will rely on more than one technology

**M**any nations have committed to achieve net-zero greenhouse gas (GHG) emissions or significantly reduce their detrimental contribution by 2050. This will require us to reduce our dependence on fossil-based fuels. New sustainable, environmentally neutral fuel types are being considered and developed and will be adopted for domestic, transport and industrial use.

One of the most complex sectors to decarbonise is aviation. Currently, the aerospace sector contributes 3.5% of the world's CO<sub>2</sub> emissions. As of today, most of the world's population still do not fly, but this is changing. By 2050, it is estimated that, as more and more people from developing nations start to

take to the air, passenger numbers are set to increase by 68%. This demand will disproportionately impact the short- and medium-range markets, which are typically served by narrowbody aircraft types. Consequently, the effort to make this type of travel as sustainable as possible will have a profound impact on our overall ability to make aviation sustainable.

In civil aviation we have aircraft formats that have evolved incrementally over the past century and air transport infrastructures have been developed and extended in conjunction with the aircraft types and the business models that they enable. Through certification and the development of engineering and operational standards, a very safe and reliable aviation sector has been created.

## FLYING VEHICLES

As we now consider new forms of propulsion and fuels, this can also have a knock-on effect on the format of these aircraft and the airport infrastructures needed to sustain them. The use of flying vehicles is also evolving – for example, we already see an increasing number of use cases for short-range vertical take-off and landing (VTOL) autonomous drones. Propulsion systems powered by sustainable aviation fuels (SAF) will likely play a big part in the first phase of the aviation industry's transformation.

SAF refers to a manufactured hydrocarbon fuel made from plant materials or CO<sub>2</sub> capture. It is being increasingly blended with conventional kerosene and several airlines have

◀ Archer's Midnight Hero eVTOL aircraft

demonstrated flying with pure 100% SAF. It is seen as a transition fuel as bio SAF is limited by crop production and power to liquid. PtL SAF uses captured CO<sub>2</sub> + Hydrogen and an industrial process to combine and extend the carbon chains. From an energy-efficiency perspective, it would be better to use sustainable generated electricity directly or through electrolysis to create and use liquid hydrogen in our aircraft propulsion system.

Electric propulsion systems will be the first technologically to mature. However, the range of an all-electric system will be limited to small short-range aircraft due to the energy density of the batteries and the trade-off between, range, weight, cargo or passenger capacity.

Nonetheless, it's likely to play a key role in short-range autonomous systems. The battery size can be reduced and range increased by creating a hybrid system which converts a higher density fuel into electricity to power propulsion and/or a battery. This could be achieved by a generator or a fuel cell.

## **“As the commercial aviation sector transitions towards a decarbonised future, the demands on industry players will rise significantly”**

There is clearly an architectural trade-off here between power and energy density which influences the range and transport weight that can be achieved. Flight requires a high energy intensity for take-off, and any losses mean heat which presents a risk and needs to be managed. This thermal management adds weight, so it needs to be optimised. This means aircraft designs will need to eke out as much efficiency as possible.

Highly optimised electrified aircraft bring many new challenges to an aviation sector that is highly regulated. For certification, the safety cases require redundancy in the system and its controls. These aircraft will also have electrical distribution at power and voltage levels not seen before in aviation. Given the scale and complexity of all the interdisciplinary dependencies, to bring

these new systems to market in viable timescales will only be possible through digital engineering practices.

### **TECHNICAL CHALLENGES**

A first challenge for engineers associated with hybrid-electric systems is selecting the architecture of the engine's powerplant system. This, in turn, will influence the design of the airframe and different aircraft concepts will need to be evaluated. Safety will be key and system vulnerabilities need to be exposed and mitigated through design, redundancy, or control systems.

This approach considers the many different trade-offs involved in the design process, all of which present different demands. For example, designing a system that has a higher power capacity for take-off requires more

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## **“Highly optimised electrified aircraft bring many new challenges to an aviation sector that is highly regulated”**

thermal management, contributing to its weight and therefore affecting the products range. If these considerations are not factored in early enough in the design process, they can make systems integration much more difficult.

Ideally there should be a system model which captures the product complexities and identifies those dependencies and risks so they can be mitigated. The system model needs to evolve its fidelity to provide confidence in the concept as early as possible as this avoids the need to redesign later in the lifecycle which adds both cost and time.

Should changes be needed, the ideal position is to have automated workflows in an integrated tool chain, potentially benefiting from AI optimisation, which will allow the system design dependences to self-adapt to the required changes.

### **DIGITAL ENGINEERING SOLUTIONS**

Digital engineering helps to move siloed single disciplines to a multidisciplinary way of engineering. If work from multiple engineering disciplines is integrated into

the design process too late, the likelihood of errors increases drastically.

Particularly problematic is the fact that many of these errors may not be picked up on until a physical prototype has been created and tested. This approach is susceptible to significant delays and increases in costs. An aviation company that relies on prototyping and testing alone to navigate engineering trade-offs is likely to struggle to keep project costs down and meet deadlines.

Digital engineering solutions enable engineers to perform deep analysis of the key considerations much earlier in the design process. Factors such as system safety, multiphysics, performance, control and subsystem interoperability can all be monitored immediately. This allows teams to improve design decisions and optimise system architectures, reducing the need to create costly and time-consuming prototypes.

When it comes to sustainability and highly complex engineering systems, those companies that satisfy requirements earlier in the development cycle will have a distinct advantage when bringing new aircraft to market.

### **THE JOURNEY AHEAD**

As the commercial aviation sector transitions towards a decarbonised future, the demands on industry players will rise significantly. Companies must develop new aircraft formats that accommodate the sustainable propulsion systems needed to reduce the industry's adverse environmental impact.

In the past, traditional product development approaches may have sufficed for aviation firms developing different iterations of aircraft and engines. However, the sheer complexity of the zero-emission design challenge means that innovative solutions are needed to manage both the intricacy and the multidisciplinary nature required for development.

As engineers strive to optimise these systems, digital engineering solutions provide the capabilities to accelerate the design process, reduce costs, and quicken time-to-market. ●

▲ SAF is being increasingly blended with conventional kerosene

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# The need for absolute circularity

Mastermelt's **Matthew Davis** highlights how recycling jet engines recovers valuable materials and promotes sustainability in aviation



“  
**WE ARE CHAMPIONING  
A FUTURE WHERE  
ABSOLUTE CIRCULARITY  
IN AVIATION IS THE NORM**  
”

**MATTHEW DAVIS**

global business development,  
Mastermelt Group

**J**et engines are the crown jewels of aviation, embodying engineering excellence. A new single-aisle jet engine is valued at about \$15 million, while a dual-aisle version is worth \$20 million. Despite meticulous maintenance, their value declines with age and flight cycles, leading to relaxed maintenance protocols.

Even the most reliable engines eventually reach the end of their serviceable lives. Some are cannibalised for Life Limited Parts (LLPs) to keep older fleets flying in less affluent regions, while others become obsolete due to age, wear or technology. In rare cases, engines are declared Beyond Economical Repair (BER) due to incidents or safety concerns, and when an engine or its components can no longer be utilised, they are recycled.

Mastermelt America is the sole company globally with the capability to fully recycle a jet engine. Our process

maximises the value of each component. We meticulously disassemble the engine into parts – nuts, bolts, blades, rotors, shafts and housings – and use advanced X-ray fluorescence (XRF) technology to sort and segregate them by alloy.

A critical part of our process is recovering precious metals from components in the high and intermediate pressure turbine sections, which often contain platinum, platinum-aluminium, gold, silver or palladium coatings or brazing. Our proprietary technologies refine these to 99.9% purity, ensuring no value is lost. We also process remaining non-precious metals to vacuum quality, removing thermal barrier coatings, inserts, pads and pins, and preparing pure alloys for reprocessing.

The importance of reintroducing this ‘revert’ into the aviation sector cannot be overstated. These superalloys, which contain 8-12 rare elements, are engineered to endure extreme conditions – temperatures up to 1,100°C and speeds of 18,000 RPM – while

maintaining their structural integrity and performance.

Given the complexity of these superalloys and the rarity of their constituent elements, it would be environmentally irresponsible to rely solely on mining for new materials. In fact, recycled alloys constitute almost 25% of all metals used in aviation.

Engine materials are much easier to recycle compared to other aircraft components. This is why aircraft bodies often languish in graveyards, while jet engines rarely share the same fate.

At Mastermelt America, we are not just recycling jet engines, we are championing a future where absolute circularity in aviation is the norm. Our work ensures that valuable engine materials are recovered, refined and reintroduced into the aviation industry, reducing the need for new mining and preserving the planet's resources.

In an industry where every component counts, our commitment to sustainability makes a world of difference. ●



▲ Mastermelt America works to ensure engines don't languish in graveyards



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