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Keeping the world's fleets flying

# MRO Management

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# WELCOME...

Asia-Pacific (APAC) is a region that everyone in MRO is watching closely. Growth is undeniable, but demand is already outpacing capacity. Supply chain delays, workforce shortages, deferred checks and swelling fleets are combining to create real pressures – pressures that airlines, MROs and OEMs across the region are having to navigate on a daily basis.

The numbers are striking. Boeing forecasts that Southeast Asia and South Asia will see the fastest traffic growth in the world, while the wider APAC fleet is set to almost match that of North America by the mid-2040s. At the same time, aircraft are staying in service for longer, with the proportion of jets over 25 years old steadily rising. With turnaround times lengthening, the need to adapt has rarely been greater.

Yet this is also a story of resilience and innovation. As we find out in our APAC Region Outlook feature on page 38 in this issue, organisations such as HAECO, SIAEC and Airbus are expanding facilities, trialling robotics, introducing predictive data platforms and forming new joint ventures in India, China and Southeast Asia. The centre of gravity for global MRO seems to be shifting eastward – and with it comes opportunity for those ready to embrace new ways of working.

That is why the timing also feels so apt for the first APAC edition of the **Predictive Aircraft Maintenance (PAM) Conference**, taking place in Singapore on September 15-16. Organised by *Aviation Business News (ABN)* in association with *MRO Management*, the event will showcase how predictive tools are moving from theory to practice, helping the region's operators reduce disruption, increase utilisation and strengthen safety. We're looking forward to seeing experts from Singapore Airlines, Malaysia Airlines, All Nippon Airways (ANA), Korean Air and others take the stage to share how they're adopting predictive maintenance and to give thoughts as to how transformative it can be for the industry. Read more about the PAM Singapore conference on page 30 in this issue.

As APAC's fleets expand and technology takes hold, perhaps the real challenge now is whether the region will simply absorb growth, or channel it into reshaping maintenance into something smarter, leaner and more sustainable – a model that others around the world will look up to? ●

**Craig Waters**
**Editor**
craig.waters@aviationbusinessnews.com

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**Editor**
Craig Waters
craig.waters@aviationbusinessnews.com

**Contributors**
Bernie Baldwin / Kevin Rozario / Mario Pierobon

**Art Director**
Phil Couzens

**Sub Editor**
Heather Ford

**Group Commercial Director**
Toby Walton
toby.walton@aviationbusinessnews.com

**Group Commercial Manager**
David Hirsh
david.hirsh@aviationbusinessnews.com

**Senior Business Development Manager**
Robert Gouge
robert.gouge@aviationbusinessnews.com

**Editorial Director**
Lee Hayhurst
lee.hayhurst@aviationbusinessnews.com

**Production Manager**
Barnaby Moore
barnaby.moore@realresponsemedia.com

**CEO**
Chris Pitchford

For subscriptions & enquiries:
**Barnaby Moore**
barnaby.moore@realresponsemedia.com
**All enquiries**
**+44 (0) 20 8444 2554**

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Real. RESPONSE MEDIA

Unit 4, Cally Yard, 445 Caledonian Road, London N7 9BG

**On the cover:** Image supplied by Joramco

# Hangar Talk.

## News from across the industry


DIGITALISATION

### Porter Airlines boosts digital capabilities with flydocs solutions

Canada's Porter Airlines has become the first carrier in the Americas to adopt both flydocs' Lifecycle Asset Management (LAM) and Digital Records Management (DRM) solutions. The solutions will be used across the airline's 75-strong fleet.

The integrated platforms will provide real-time visibility of aircraft assets, helping Porter Airlines to meet lease return conditions, align asset management with engineering priorities and make data-driven decisions on maintenance planning, cost avoidance and risk reduction during aircraft transitions. Predictive analytics and scenario modelling will further support these processes.

The implementation will be carried out in collaboration with AMOS, the maintenance and engineering software from Swiss Aviation-Software Ltd., enabling seamless interoperability between the two platforms.

The integration will allow Porter Airlines to maintain digital aircraft compliance on demand while adopting a fully paperless approach to records and asset management.

flydocs' Andy Smith said: "This win isn't just about a single deal; it's about unlocking even greater value through the Digital Tech Ops Ecosystem. Together, we'll empower Porter Airlines to make smarter decisions and see real business impact from day one."

Porter Airlines' Brad Warren said: "As we continue to grow our network and fleet, we are also advancing our systems and processes to support the operation and our team members. We are confident that flydocs' commitment to market-leading dedicated records management solutions will boost our digital capabilities. Being their first LAM solution user in the Americas is certainly exciting for us in transforming our approach to asset management."

ENGINE LEASING

## Condor secures APOC Aviation CFM56-5A lease to support A320 fleet

APOC Aviation has signed a 12-month green-time lease agreement with Condor for a CFM56-5A engine, bolstering the Hamburg-based carrier's A320 fleet operations.

The 'spare' engine will remain in service for the duration of the lease. Once returned, the asset will be added back into APOC Aviation's engine portfolio, where it is slated for teardown and part-out next year.

Condor, which has served passengers for nearly 70 years and flies to around 70 destinations worldwide, is in the process of renewing its short- and medium-haul fleet with A320neo and A321neo aircraft.

APOC Aviation has been expanding its lease portfolio of CFM56-5A engines to meet rising demand driven by the continued operation of older A320 family aircraft. Limited availability and increasing prices for these engines and components are expected to sustain demand well into the next decade, despite the growing presence of newer engine types.

Condor, which is still operating A320ceo aircraft during its fleet modernisation programme, relies on its in-house maintenance arm, Condor Technik, and partners whose engine leasing capabilities align closely with its operational requirements.

## IN NUMBERS

**70**
Condor has served passengers for nearly 70 years

**€25.4M**
GetJet Aviation Holdings reported a €25.4 million net profit for 2024

**25**
Lufthansa Technik has been an MRO partner for Air Canada for over 25 years


IndiGo

LEASE RETURN SERVICES

### IndiGo boosts MRO strategy with Lufthansa Technik lease return deal

IndiGo has awarded Lufthansa Technik long-term contracts to support lease return and maintenance services for its fast-growing A320 family fleet.

The agreements cover base and single component maintenance for a substantial number of aircraft, reflecting the Indian airline's need for scalable and flexible MRO support as it continues its aggressive fleet expansion.

The new contracts build on an established relationship between the two companies and aim to provide lease return assistance amid ongoing capacity and supply chain pressures.

Under the agreements, Lufthansa Technik will perform base maintenance at its facilities in Bulgaria and Manila, and single component maintenance at its HQ workshop in Hamburg, Germany. IndiGo, which operates one of the world's largest fleets of Airbus A320neo and A321neo aircraft, is currently adding nearly one new aircraft every week. The airline's ambitious growth plan is supported by a mix of new deliveries and leased capacity, including wet- and damp-leased aircraft.

IndiGo's Parichay Datta said: "In times of capacity shortfalls due to supply chain challenges, we are placing strong emphasis on leased aircraft. These leases have proven invaluable in meeting demand and maintaining our strong market position. In this context, we are particularly excited to further expand our partnership with Lufthansa Technik, leveraging their expertise in aircraft lease return services."


Robin/Adobe Stock

ENGINE & COMPONENT SUPPORT

### Air Canada extends long-term MRO contracts with Lufthansa Technik

Lufthansa Technik and Air Canada have renewed and extended a series of exclusive maintenance agreements covering engine and component support for key aircraft in the Canadian flag carrier's fleet.

The early contract extensions strengthen a partnership that spans several decades, ensuring Lufthansa Technik continues to provide engine maintenance services for the CFM56-5B engines powering Air Canada's Airbus A320ceo aircraft until 2032. Around 80 engine shop visits are expected under the extended agreement.

In addition to engine support, Lufthansa Technik will continue to provide Total Component Support (TCS) for Air Canada's 25-strong Boeing 777 fleet, with the contract also running through to 2032. A similar exclusive TCS agreement for the airline's Boeing 737 MAX fleet has been extended until 2033, securing long-term access to critical spare parts and services to sustain high operational performance.

PAL Express

## COMPONENT SUPPORT

### Lufthansa Technik wins PAL Express A320 component support deal

Lufthansa Technik has signed a long-term component support agreement with Air Philippines Corporation, operating as PAL Express, for its entire A320 fleet, including access to its global component pool, dedicated homebase stock in the Philippines and MRO services for a wide range of parts.

The agreement extends the MRO provider's longstanding partnership with the Philippine Airlines Group, and follows a separate recent deal between PAL Express and Lufthansa Technik AERO Alzey securing PW150 engine support on the carrier's Dash 8 fleet.

## BRIEFS

- Caerdav has signed a General Terms Agreement with AerCap to carry out end of lease, transition checks, entry into service and redelivery work primarily for Boeing 737 and Airbus A320 aircraft.

- StandardAero has transitioned its UK-based Honeywell Aerospace GTCP36 APU MRO programme to its Fleetlands facility in Gosport, UK in a move to enhance efficiency.


HYDRAULICS SUPPORT

## HAECO teams up with Liebherr to enhance COMAC aircraft reliability

HAECO and Liebherr-Aerospace have entered into a new component maintenance agreement to support COMAC's C909 and C919 aircraft, strengthening their existing partnership in the Chinese Mainland.

The agreement will see the two companies collaborate on comprehensive repair and overhaul services for hydraulic components, as COMAC expands its fleet of commercial jets.

HAECO's Sandra Nieuwenhuijzen said: "We are excited to join forces with Liebherr in providing high-quality hydraulic component maintenance services for the COMAC C909 and C919 aircraft. Our profound expertise in component maintenance solutions will enhance operational efficiency and reliability for COMAC and aircraft operators."

Liebherr's Eric Thévenot said: "This strategic partnership combines HAECO's component MRO know-how and Liebherr-Aerospace's OEM capabilities in China to deliver efficient and comprehensive hydraulic component maintenance for COMAC's commercial jet aircraft. In parallel, the parties also maintain a dedicated landing gear service agreement to support the C909 fleet in the Chinese Mainland, building on their ongoing and successful collaboration."

> **"Our profound expertise in component maintenance solutions will enhance operational efficiency and reliability for COMAC and aircraft operators**


FREIGHTER MRO

## HAECO wins extension to maintain ASLB's B747-400ERF fleet

HAECO has renewed its base maintenance agreement with ASL Airlines Belgium (ASLB), extending support for the carrier's Boeing 747-400ERF fleet at its Xiamen facility from 2026 to 2029.

HAECO's Gerald Steinhoff said: "We have been providing a vast range of services to support ASLB for more than a decade, and the extension of our partnership is a strong testament to our efficient and reliable service as a premier one-stop MRO services provider."

HAECO Xiamen's Kevin Guan said: "We are deeply grateful for ASLB's continued trust in HAECO as a long-term partner. It is our privilege to support their operations, and we remain steadfast in our commitment to providing high-quality maintenance services."

## BRIEFS

- FL Technics is now an official Honeywell Aerospace Technologies channel partner for business and general aviation, authorised to deliver engine and APU products and provide OEM-backed installation and support through its MRO centres.

- GetJet Aviation Holdings has reported a €25.4 million net profit for 2024, driven by strategic growth across aviation asset management, MRO, and component trading. The Group continues to rank among the most profitable globally in ACMI and maintenance services.

- Ramco Systems has implemented its integrated Aviation Software at Indamer Technics, replacing legacy systems within 45 days.



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### EMBRAER

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E175
E190
E195
E190-E2

- EASA Part 145
- 30+ Additional National Approvals
- 22 Parallel Lines of Wide-Bodies & Narrow-Bodies Across 6 Hangars
- Facility Expansion with Hangar 7; Adding 5 Maintenance Lines

Queen Alia International Airport - Jordan

# *In the* Spotlight.

The latest partnerships, appointments and innovations advancing the MRO sector

## AIRCRAFT LEASING

ACIA Aero Leasing (ACIA) has signed a TrueChoice agreement with GE Aerospace to provide MRO services for its CF34-10E engine fleet, a move that supports the lessor's planned expansion of its Embraer E1 platform. ACIA will offer prospective E-Jet customers a competitive MRO solution as it increases its presence in the regional jet market.


8tree

## TECHNOLOGY

Vueling Airlines, Commercial Jet and Velocity Maintenance Solutions are the latest aviation companies to integrate 8tree's DentCheck technology into their maintenance operations. The technology – described as the industry's only handheld, OEM-approved, AR-powered 3D dent-mapping tool – provides real-time, SRM-compliant damage reports, helping to reduce subjectivity and speed up decision-making.

## PEOPLE NEWS

MAAS Aviation has named Patrick Fransen (pictured below) as general manager of its MRO division, overseeing aircraft painting operations in Maastricht and Kaunas. He will manage day-to-day activities across MAAS' European MRO sites, ensuring the consistent delivery of top-quality work and best-in-class turnaround times.

Fransen is known for his people-focused leadership style and his passion for innovation.

## PEOPLE NEWS

REIDsteel has expanded its team with the appointments of Chris Evans and Edith Gil as business development managers. Evans brings 35 years' experience in steel, metals, manufacturing and construction, while Gil (pictured above) adds more than 30 years in international business development and sales. The move supports REIDsteel's strategic growth in designing and building aircraft hangars.

## WORKFORCE

Boeing's 2025 Pilot and Technician Outlook (PTO) forecasts a long-term demand for 710,000 new commercial aviation maintenance technicians over the next 20 years – underscoring the pressure on MRO organisations and training providers to build a future-ready workforce.

Boeing


## SERVICE & SUPPORT

Embraer has added Chile's Aerocardal to its authorised service centre network for executive jets. Based at Santiago's Arturo Merino Benítez International Airport, Aerocardal will provide line maintenance, unscheduled repairs, AOG support and drop-in services for local and visiting operators.

## PBH SUPPORT

Dubai-based cargo carrier SolitAir has selected Eight Wings Aerospace to provide a full suite of integrated technical and logistics services, including power-by-the-hour (PBH) support, as it scales its Boeing 737-800 freighter fleet. The agreement aims to optimise SolitAir's supply chain, strengthen its maintenance infrastructure and ensure high fleet availability as it pursues rapid growth across the Global South.


## PEOPLE NEWS

GT Engine Services has promoted Eddie O'Dwyer (pictured above) to vice president of business development. O'Dwyer joined the firm in 2020 as general manager. He was promoted to technical director in 2021, then to chief commercial officer in 2024. Across each role, he has played a key part in advancing the company's technical capability, commercial strategy and customer relationships.

# TRENDING STATS

**12,000**

Joramco's new Hangar 7 spans 12,000 sqm (from Company Profile feature, p.20)

**400**

HAECO has more than 400 airline clients (from Region Outlook Asia-Pacific feature, p.38)

**30%**

Operators using Veryon Diagnostics have reported 20-30% fewer AOG situations (from Q&A feature, p.46)

**90%**

Approximately 80-90% of an aircraft's weight can be recycled (from Aircraft Decommissioning feature, p.70)

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# Hidden hazmat risks

From squibs to batteries, aircraft systems are full of hazardous materials requiring strict handling and compliance. **Jason Dickstein** tells us more

Hazardous materials (hazmats) are found all over an aircraft's systems. They can be obvious, like fuel, or hidden, like the squibs in a fire suppression system.

The history of hazmats in aircraft is not a pretty one and includes accidents and incidents that were exacerbated by the hazmats. This history has caused the United States Department of Transportation (USDOT) to carefully regulate hazmats in aircraft.

The regulation of hazmats starts with training. Hazmat employees are required to be recurrently trained at least every three years. Since the 1990s, the Federal Aviation Administration (FAA) has taken the position that repair stations are inherent hazmat employers because of the reasonable possibility for hazmat to enter the facility, even if the repair station's business model does not include hazmats. This position ultimately led to requirements in Part 145 for hazmat training.

There are nine classes of hazardous materials. Nearly all the classes can be found in the aviation community. Many of the hazmats in aircraft are well-understood (like residual fuel in a fuel system component) or are commonly discussed (like the oxygen generators installed in the passenger service unit).

This article highlights some of the less obvious aircraft hazardous materials that a repair station might encounter.

> **"There are nine classes of hazardous materials. Nearly all the classes can be found in the aviation community"**

**JASON DICKSTEIN**
president, Washington Aviation Group

## Explosives

Most people don't realise that typical commercial aircraft have explosives built right into them.

Explosives can be found in the form of squibs. Squibs are small explosives that are used to activate emergency systems. One place where squibs are found is in fire suppression systems. The fire suppressant (like halon) is sealed in a container. The seal may be a diaphragm that can be easily sliced open. In the case of a diaphragm-based seal, the squib fires a sharp blade into the diaphragm to pierce it, permitting the halon (or other fire suppressant substance) to flow out and be deployed as needed.

Squibs are therefore found in assemblies where an explosive actuator is necessary.

In addition to the regular requirements for shipping hazmat, explosives in the US are also subject to approval by the USDOT in the form of a permit. The permit often will include additional requirements that apply to the shipping, like special packaging requirements. The shipper needs to follow the special requirements of the applicable permit, as well as any other regulatory requirements. Therefore, it is important to obtain a copy of the explosives permit.

Explosives permits are usually available from the manufacturer, and historically that was the most convenient way to obtain a copy of the permit. In recent years, though, the government database for finding permits has been improved, with special attention to the search engine for that database. It is now possible to find applicable permits online through the permits search engine (*https://www.phmsa.dot.gov/approvals-and-permits/hazmat/special-permits-search*). You do not need to place all the information in the search engine –

for example you can search for just a manufacturer's name and find all the permits issued to that manufacturer.

### Radioactives

Radioactive materials historically have been found in older aircraft as control surface counterweights (which can be made of substances like depleted uranium) and in instruments in the form of radioactive paint used to help make the instrument fluoresce in the event of a loss of cabin lighting. These sorts of radioactive materials may still be an issue in some older aircraft, especially older aircraft in the general aviation community.

Regulation of radioactivity is based on the activity level of a particular isotope, so it is possible to have a radioactive isotope that is not sufficiently radioactive to be regulated. Many modern manufacturers have tried to reduce the radioactivity of their articles in order to make the articles fall below the regulated thresholds. This is why some radioactive materials, like certain exit signs, now fall below the regulated thresholds (which of course makes them easier to ship). But it is important to investigate each article that may be radioactive to ascertain whether it is regulated.

An item found in modern aircraft engines that may be regulated as radioactive is the ignition exciter. When ignition exciters contain spark gaps, the spark gap may include a small quantity of radioactive material (like Krypton-85 gas or Cesium-137 gas). This helps to make the discharge characteristics of the unit more uniform and better controlled. Such articles may be classified under UN2910 ('Radioactive material, excepted package – limited quantity of material').

### Batteries

There are a variety of battery chemistries used in modern aviation. The most traditional battery chemistries are nickel cadmium and lead acid. Both of these are


▲ Some aircraft exit signs are classified as hazmat due to containing a radioactive isotope

> **“It is wise to ensure that every employee who might ship articles has training in hazmat recognition”**

corrosives, and thus the batteries with these chemicals are regulated under hazmat class eight (corrosives). An increasing number of lithium batteries are also found in the industry and these are regulated under class nine.

You may find batteries in any sort of electronic system that is intended to have its own power, or its own back-up power. This can include integrated back-up battery systems for an aircraft, as well as internal back-up batteries in avionics, instruments and emergency equipment.

Lithium batteries will be divided into lithium-ion batteries and lithium-metal batteries. The batteries can be contained in the equipment, packed with the equipment, or shipped separately from the equipment; each of these three configurations has its own proper shipping name (for example, ‘lithium-ion batteries packed with equipment’ is a proper shipping name). The instructions for properly shipping such lithium batteries are complicated and require a careful reading of the appropriate regulations. This has become so complicated that we have created a special video supplement to the training we provide, so that our students can get a refresher on the subject whenever they need one.

## Conclusion

Improper shipments of hazmat are more than just mere regulatory violations – they jeopardise the safety of every person in that shipment’s stream of commerce.

Most hazmat and/or dangerous goods regulations around the world will require one or more employees to have training in how to ship hazmat and/or dangerous goods. This training helps to support compliance and helps to minimise risk. It is wise to ensure that every employee who might ship articles, or who might influence the shipping of articles, has training in hazmat recognition so that these employees can better prevent improper shipments, and so they can ensure that the hazmat shipping is performed by people with the right certification.

This article provides just a glimpse at the many hazmats that can be found on aircraft. For a more complete discussion on aircraft hazmats, please join our hazmat training this autumn. The class certifies personnel to ship aviation-industry hazmat under international standards, and it meets US requirements as well. ●

More details are available online at *washingtonaviation.com/hazmat.html* or *dangerousgoodstraining.net*

For more information on Joramco, visit: **joramco.com.jo**

# GEARED FOR GROWTH

Joramco chief **Fraser Currie** tells *MRO Management's* Craig Waters how the company's latest hangar expansion, workforce development initiatives and digital innovation plans are positioning the MRO for long-term growth

> **"We have to match what the customer needs today, while preparing for tomorrow"**
>
> **FRASER CURRIE**
> chief executive, Joramco

As one of the Middle East's leading independent MRO providers, Joramco has made no secret of its ambition to grow. With Hangar 7 recently completed, a strategic push to digitalise operations and a bold investment in future engineering talent, the Amman-based company continues to build and develop on what the chief executive Fraser Currie refers to as their "five-year business plan to scale capacity and capability".

At the heart of this expansion is the 12,000 sqm Hangar 7, a new A380-capable facility that will add five more maintenance bays to Joramco's existing footprint. Designed to flexibly accommodate a mix of widebody and narrowbody aircraft, it marks the first phase of a larger three-hangar vision.

"Hangar 7 is the first of three," Fraser explains. "Hangar 8 will follow with a near-identical footprint, which will take us up to 27 lines of parallel maintenance, and then we plan to build a widebody paint hangar capable of housing one widebody or two narrowbodies in parallel."

The new paint hangar, notably, will employ an innovative "air curtain" system to create two working zones within the same space – capable of handling either one widebody or two narrowbody aircraft simultaneously without physical partitioning.

Hangar 7 came online in August 2025 and represents the largest aviation infrastructure investment in Jordan. Customers eagerly awaited the opening of the hangar which is now booked out for the foreseeable future.

1

## Building the pipeline: Joramco Academy expansion

Increasing physical capacity is only one part of the equation. The company's focus on talent development is equally ambitious. The newly expanded Joramco Academy now boasts an annual intake of 300 students, and is broadening its remit beyond initial licensing to include type training, specific on-the-job (SOJT) programmes and, for the first time, a university degree.

"We've partnered with the University of Jordan to offer a five-year BSc in aircraft maintenance," says Currie. "We're training the next generation from scratch and helping licensed engineers gain hands-on experience to become fully certified."

The academy's mission aligns closely with wider industry concerns around skills shortages and the need to attract younger, more diverse talent – particularly women. "We've got to talk


**1.** The Joramco Academy boasts an annual intake of 300 students
**2.** Joramco's facilities can handle a wide variety of aircraft

2

> **"We're training the next generation from scratch and helping licensed engineers gain hands-on experience to become fully certified"**

to 11- and 12-year-olds, not just school leavers," Currie urges. "If we wait until they've already chosen another path, it's too late. This is a long-term play."

## Going paperless: digitalisation with a purpose

Joramco's continuing operational transformation includes a company-wide shift towards paperless processes, with clear benefits for both engineers and customers. Digital maintenance tools are already improving productivity, streamlining sign-offs and reducing human error.

"We're rolling out tablets that guide engineers through tasks step-by-step. It's not just about efficiency – it takes pressure off the team by ensuring compliance is built into the process," Currie explains. "This will be a game changer for us going forward."

One example is the recent introduction of 8tree's dent-mapping technology, which automates the assessment and reporting of structural damage. "DentCheck shows that we are committed to adopting advanced solutions that streamline operations and provide our clients with the highest possible quality standards," explains Currie.

With integrated augmented reality (AR), DentCheck empowers the aircraft technician with instant, actionable measurements for critical airframe damage while boosting consistency (18x), accuracy (20x), efficiency (90% time savings) and eliminating human subjectivity, compared to traditional manual inspection methods. Currie adds: "What used to take two days can now be done in seconds, with instant data sent to the OEM. That's a huge leap forward."

## Strategic partnerships and fleet adaptability

Beyond bricks, mortar and digital applications, Joramco is also consolidating its position through long-term partnerships and fleet diversification. The company has signed new maintenance agreements with IndiGo, Pegasus, Gulf Air, DHL, Tim Aerospace, ATS Group and Qatar Airways – expanding its support for both legacy and new-generation aircraft.

"What makes us stand out and keeps us moving forward and popular for clients is our balance between being able to work on legacy airframes to new generation airframes," explains Currie. "We're seeing more 787-8/9s, 737s (classic, NG and MAX) and A320neos. But we've still got A340-200s/300s in the hangars too. The key is most definitely flexibility. We have to match what the customer needs today, while preparing for tomorrow."

That preparation includes ramping up capabilities for the A350 and the addition of Embraer E190/195-E2s, both of which reflect Joramco's customer fleet strategies – including those of Royal Jordanian which has signed up Joramco to perform maintenance checks on its new E195-E2 aircraft. Currie says: "Royal Jordanian has been a long-time partner of Joramco, so we are extremely proud of the trust they place in our deep expertise, and we are pleased to continue our relationship."

## Looking ahead: regulation, collaboration and resilience

Asked what's next for the industry, Currie points to three imperatives: harmonised regulation, stronger government partnerships and continued innovation. "We need regulators like the EASA and the FAA to become more aligned," he says. "I find it frustrating that we've got engineers out there who can't work across borders."

Joramco's advantage, he suggests, is its ability to move fast and work closely with Jordan's supportive government. "In smaller progressive countries like Jordan, it's easier to make things happen. But wherever you are, the MRO sector can't go it alone. Government backing is essential to scale training, innovation and sustainability."

Eight years into its post-acquisition transformation under Dubai Aerospace Enterprise, Joramco is no longer just a regional success story – it's a global contender with serious momentum.

As Fraser puts it: "The incremental steps we are focused on all feed into the same goal: build capacity, build people, build the future." ●

# DIGITAL DAMAGE DETECTIVES

Traditional inspection techniques are being outpaced by digital, data-driven tools designed for modern aircraft structures. **Mario Pierobon** reports

As global fleets continue to age and operators extend aircraft lifecycles to maximise return on investment, the maintenance world is confronting complex inspection requirements while simultaneously grappling with the unique characteristics of modern composite materials that now characterise aircraft manufacturing.

Traditional inspection methodologies, largely dependent on manual processes and subjective visual assessments, are proving not fully adequate for the demands of contemporary aviation maintenance. The emergence of digital inspection technologies represents a fundamental shift toward data-driven maintenance practices that promise to address these multifaceted challenges.

## Aging aircraft

As aircraft age, they become more susceptible to cumulative structural wear, including dents, corrosion and surface deformation, particularly in high-traffic and fatigue-sensitive areas, according to the surface inspections specialist, 8tree, which manufactures dent-mapping tool dentCheck. A spokesperson from the company explains: "Wear and tear increases the frequency and complexity of inspections, often requiring more detailed surface damage mapping and documentation to meet regulatory compliance and lease return terms. While we do not directly manage maintenance programmes, we support operators in simplifying and standardising damage inspections for aging fleets. Tools like dentCheck significantly reduce the time and subjectivity required to document recurring damage, such as dents and deformation."

By digitising surface inspections and instantly generating structural repairs manual (SRM)-compliant damage reports, dentCheck enables maintenance teams to accelerate decision-making and minimise aircraft downtime – a feature particularly useful in older fleets, where inspection windows are narrower and findings are more

**"The next decade in airframe maintenance will be characterised by a continued evolution toward digitalisation, automation and data-driven decision-making"**

frequent, according to 8tree. "From a cost management perspective, digitalised inspection workflows help reduce rework, improve audit readiness and optimise fleet lifecycle planning, giving operators greater control over the operational and financial trade-offs of maintaining aging assets," the company's spokesperson says.

## Composite airframe materials

Unlike metal surfaces, composites do not always show visible signs of damage. "Maintenance operators are introduced to the concept of 'Barely Visible Impact Damage' (BVID), where the limitations of reliable visual detection impact the necessary inspection and repair actions," the spokesperson continues. "In this case, a more detailed inspection using non-destructive testing methods becomes necessary."

The dentCheck technology addresses these challenges by offering the digital inspection of any type of material, according to Leonard Buck, marketing and business development manager at 8tree. "If a defect is visible on the surface, dentCheck provides instant 3D measurements with visual overlays that allow technicians to quickly detect and quantify surface damage," he explains. "Additionally, dentCheck instrument operators collaborate closely with NDT departments to streamline subsequent NDT inspections. By eliminating guesswork and integrating digital standardisation into the workflow, dentCheck enables MRO teams to inspect composite structures with the same speed and accuracy they expect from traditional materials."

◀ 8tree's dentCheck is a handheld portable, completely wireless 3D scanner tool with integrated AR that is purpose-built for the aviation maintenance industry

## Predictive analytics

As a portable inspection tool, dentCheck serves as a digital enabler that ensures standardisation and repeatability. "The tool complements structural health monitoring (SHM) systems by capturing detailed, traceable inspection data at every maintenance touchpoint," 8tree's spokesperson reports. "Rather than relying on paper records or subjective visual estimates, our users gain 3D digital information about the condition of structural surfaces, contributing to broader MRO digitisation efforts and maintenance records."

Howard Chung, applications engineering manager at 8tree, observes

**1.** Vueling Airlines has adopted the dentCheck tool to enhance its aircraft surface inspection capabilities
**2.** Swiss International Air Lines (SWISS) is using the dentCheck tool as an integral part of its airframe maintenance activities

**"The shift from manual, subjective inspection methods to precise, digital measurement systems is addressing critical challenges that have long plagued MRO operations"**

that as MROs evolve toward data-driven decision-making, digital tools are a crucial bridge. "They provide teams with repeatable, high-resolution surface data that not only improves the accuracy of ongoing inspections but also informs historical trend analysis and predictive planning across the entire fleet," Chung says. "In this context, we contribute to the growing emphasis on predictive analytics by ensuring that surface damage data is accurate, objective and auditable, critical to any advanced maintenance strategy."

## Emerging trends

The next decade in airframe maintenance will be characterised by a continued evolution toward digitalisation, automation and data-driven decision-making, according to the team at 8tree. "With the standardisation of advanced composite structures, additive manufacturing, and next-generation materials, MRO operators are expected to respond with equally advanced, accurate, rapid, and digitally traceable inspection methods," the company states. "As a solutions provider, we are seeing a growing demand for tools that not only improve inspection efficiency but also integrate seamlessly with digital MRO ecosystems. Technologies like dentCheck enable MRO operators to adopt end-to-end digital workflows, replacing paper logs and manual transcriptions."

Another rapidly growing trend is the shift toward data standardisation and portability. "Operators want digital damage data that can be fed directly into maintenance monitoring systems, supporting audits and driving predictive maintenance initiatives across the entire fleet," the spokesperson explains. "With tools like dentCheck, inspection results are instantly projected onto the aircraft surface and simultaneously captured digitally, making the inspection process faster, more transparent and ready for real-time reporting. As maintenance strategies evolve, the emphasis will be on reducing aircraft downtime while increasing inspection reliability."

## Summing up

The digitalisation of airframe inspection represents more than a technological upgrade; it embodies a fundamental transformation in how the aviation industry approaches maintenance, compliance and fleet management. In this context, the shift from manual, subjective inspection methods to precise, digital measurement systems is addressing critical challenges that have long plagued MRO operations.

The convergence of aging fleets and advanced composite materials has created an environment for the affirmation of sophisticated inspection capabilities that traditional methods do not provide as effectively. Digital inspection tools are proving essential not only for managing the increased frequency and complexity of inspections required by older aircraft but also for detecting and quantifying damage in composite structures where visual inspection alone may be insufficient. ●




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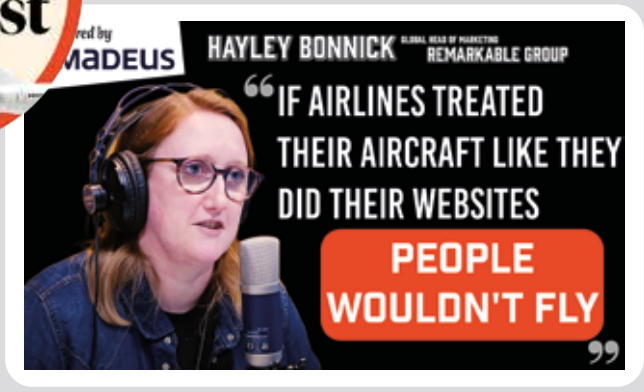


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Q&A

# Future-ready technicians

CAE's David Bienvenu shares how virtual reality, modular learning and digital tools are transforming aircraft technician training

> "The team at CAE works closely with our regulatory, OEM and MRO partners to continually refine our course materials"

**DAVID BIENVENU**
global leader maintenance training, CAE

**CAE's website says "Tomorrow's future of flight starts with today's technicians". How does this belief influence the way the company designs and delivers maintenance training, and what does it say about the evolving role of the technician in modern aviation?**
From our innovative approach to incorporating new virtual reality (VR) technologies in class to expanding our ability to deliver top-notch training around the world via remote live learning, CAE is evolving the training landscape to better prepare technicians for their roles.

The changing dynamics of aviation require techs that can respond to the demands of the workplace differently, and we believe training in new ways improves our ability to help our customers meet those demands maintaining their aircraft.

Our approach to training design and delivery takes key inputs from our OEM and MRO partners to mirror the ever-changing environment in the maintenance hangar, making training programmes more valuable and outcome driven for the needs of the technician. Aviation never stands still, and neither will the training at CAE.

**What are the most transformative technologies CAE is currently integrating into its maintenance training programmes, and how are these reshaping the way technicians learn and retain knowledge?**
The maintenance training team is constantly reviewing new technologies and their impact on the learning environment. Technology can change the learning experience for technicians and reflect the changing ways new techs learn. New technologies in 3D modelling and VR allow our instructors to bring a virtual aircraft into the classroom, making learning a hands-on experience.


1

New methodologies are also being explored for asynchronous and micro-learning, giving technicians access to learning on demand and as close to the point of execution as possible. By continuing to explore new technology and methodologies, the learning


2

experience at CAE will keep changing along with the rest of aviation.

**How is CAE evolving its training methodology to not just improve technician efficiency, but also to enhance their adaptability across multiple aircraft platforms and evolving OEM systems?**

CAE is bringing new concepts to the market as a part of our evolution to our training methodology, including modular training and new-hire training solutions.

We are currently teaching the modular training concept with Bombardier Business Aircraft Service (BAS) centres in the US by breaking larger courses into individual modules, allowing technicians to take modules in any order. This modular approach, delivered on-site at BAS centres, offers many benefits. It shortens the immediate time off the floor; makes training more available to technicians by being in the hangar when their workflow allows them to attend training; and allows different specialties to train together such as mechanical and avionics technicians both attending an electrical/avionics module. This modular approach also allows technicians to practice what they learn and then return for more training when they are ready.

**1.** Incorporating new VR technologies in class is expanding CAE's ability to deliver training around the world via remote live learning
**2**. CAE provides flexible training courses and programmes

Coming later next year, our new training innovations for new hires will focus on the technician who has recently joined the business aircraft world. Our new collection of asynchronous computer-based learning courses provides new entrants to aviation with the training they need to be effective team members as efficiently as possible.

Some examples include courses covering multiple training objectives such as fleet type-specific familiarisation and how human factors influence maintenance operations. Available online, these short-format courses are designed to be taken in the workplace during a normal shift – the programme is flexible and can scale to cover multiple locations at any time of day. This maximises a new hire's time, allowing learning without the operator needing to develop a burdensome training plan that takes the technician off the

> **"New technologies in 3D modelling and VR allow our instructors to bring a virtual aircraft into the classroom, making learning a hands-on experience"**

◀ CAE's training team is constantly reviewing new technologies and their impact on the learning environment

floor or forcing a senior technician take time away from their duties to oversee training.

CAE's goal is to create effective training that focuses on the path to billable hours faster with fewer quality escapes for new technicians.

**With fleets constantly changing and regulatory landscapes evolving, how does CAE ensure that technician training remains both current and compliant, without compromising operational readiness?**

Successful maintenance training is no accident. The team at CAE works closely with our regulatory, OEM and MRO partners to continually refine our course materials to reflect what has happened within the previous 12 to 18 months. These close ties allow CAE to receive the latest updates and fleet performance data, changes or updates to regulations and maintenance trends as they become available.

Updates to courses are available to technicians who may have taken an initial maintenance course years ago or who work on a limited number of aircraft. These courses are designed to give the technician access to fleet wide information that they normally wouldn't engage with. The result is an experience that broadens and refreshes a technician's knowledge on the aircraft and enables them to take the information into their work returning an aircraft to service.

**Can you share examples of where CAE's programmes have significantly impacted a customer's maintenance operation?**

We stay close to our customers and have discussions with them on whether the training outcome met the desired purpose they sent their technicians to train for. We have seen maintenance organisations change how they operate to meet the demands of their business, and they in turn offer insight as to how to modify our training programmes to continue to support them optimally.

One example is our REALCase Update courses, which are revised every 12 to 18 months to give aircraft technicians the latest fleet information. Topics include recent production changes, trends, recent service bulletins, airworthiness directives and troubleshooting examples of recent faults. These courses give technicians exposure to examples beyond their specific aircraft tail number and open them up to fleetwide information, effectively giving them access to knowledge they wouldn't have access to in their workplace.

It also gives technicians an opportunity to network with other operators of the aircraft, providing the ability to reach out to others in case they have part needs, questions about what is happening in different regions, or how they met a certain challenge.

Technicians can return to work with a greater understanding of the aircraft's operation and network resources, enabling them to return the aircraft to service correctly and efficiently.

CAE's close ties with OEMs and customers on what is happening with the fleet is invaluable for operators who know what an effective maintenance team can do for their business. ●

> **"Our approach to training design and delivery takes key inputs from our OEM and MRO partners to mirror the ever-changing environment in the maintenance hangar"**

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# PREDICTIVE MAINTENANCE LANDS IN SINGAPORE

*MRO Management's* PAM conference makes its APAC debut in Singapore this September

▲PAM Singapore 2025 will take place at the Marina Bay Sands complex

The aviation industry is under increasing pressure to maximise fleet availability, reduce maintenance costs and minimise disruption – all while facing labour shortages, fluctuating supply chains and evolving regulatory demands.

Against this backdrop, predictive maintenance has moved from a promising concept to a critical operational strategy. Airlines and MROs across the Asia-Pacific region are now embracing data-driven approaches to anticipate faults before they occur, streamline maintenance schedules and optimise asset utilisation.

It is within this climate of rapid technological advancement and operational necessity that the first ever APAC-focused Predictive Aircraft Maintenance (PAM) Conference will be taking place in Singapore on 15-16 September 2025.

Organised by *Aviation Business News (ABN)* in association with *MRO Management*, the event brings together a diverse line-up of airline leaders, OEMs, MRO providers, technology innovators and independent experts for a day and a half of in-depth discussion and practical insights into how predictive tools are transforming aviation maintenance.

Taking place at the Marina Bay Sands complex, the conference will open with a welcome from conference chairman and managing director of NAVEO Consultancy Richard Brown. The agenda will blend high-level panel discussions with detailed case studies and solution showcases, ensuring delegates gain both strategic perspectives and practical, real-world takeaways.

**“The value of PAM Singapore lies not just in the knowledge gained, but also in the opportunities to connect with peers”**

## Airlines in focus

One of the most anticipated sessions is the panel ‘Beyond the Break-Fix Mentality’, which will examine how APAC airlines are moving away from reactive and ‘recreational’ maintenance in favour of targeted, just-in-time interventions. With rising operational demands, this shift is no longer optional – it is vital to reduce unnecessary downtime and costs while maintaining safety and compliance. Industry leaders including Dr Nithia Kumar, senior manager maintenance, airline engineering at Malaysia Airlines, Joan Ng, data analytics and digitalisation executive at Singapore Airlines and Boeing Global Services’ Mark Mazarek will share how data refinement, regulatory engagement and stronger OEM-MRO partnerships are helping operators make this transition.

## Engine health in focus

Engines, often the costliest and operationally critical aircraft components, will receive focused attention in the ‘Engine Health Unlocked’ panel. Here, speakers including Derek Cedillo, director – remote operating and technical operations at GE Aerospace, Barry Flynn, VP Technical, Engine Lease Finance Corporation (elfc) and Yukifumi Ueda, vice president and general management of engine/component/supply-chain at All Nippon Airways (ANA) will discuss how artificial intelligence (AI), analytics and real-time diagnostics are revolutionising powerplant health management. With airlines seeking to extend time-on-wing and avoid unplanned removals, predictive capabilities are increasingly central to engine maintenance strategies.

PREDICTIVE AIRCRAFT MAINTENANCE 2025

To learn more about the programme, speakers and sponsors of the Predictive Aircraft Maintenance (PAM) Conference Singapore, and to secure your delegate ticket, please visit **predictiveaircraftmaintenance.com/pam-singapore** or scan the QR code below

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## Case studies

Delegates will also hear first-hand from carriers such as Korean Air, All Nippon Airways (ANA) and Peach Aviation about their predictive maintenance journeys. Korean Air will reveal how it built and operates an in-house predictive programme from the ground up, while ANA will present its methodology for analysing flight data and developing predictive models. Peach Aviation, in partnership with Lufthansa Technik, will outline the tangible results achieved using the Aviatar platform.

Technology providers will be on hand to showcase the tools enabling these successes. GE Aerospace, AirNxt, Boeing, Veryon, StandardAero, Gamit, Strade, Airbus, Collins Aerospace and Teledyne Technologies will present solutions ranging from AI-driven fleet reliability insights to legacy data access innovations. These presentations highlight the growing maturity of predictive systems, as well as the need for interoperability and collaboration to achieve measurable operational gains.

**"The event brings together a diverse line-up of airline leaders, OEMs, MRO providers and technology innovators"**

## Gain insight and interact

While predictive maintenance solutions remain a core theme, PAM Singapore will also address related challenges shaping the maintenance landscape. A panel with representatives from EirTrade Aviation and Strade on end-of-life assets will explore the tightening supply of used serviceable material (USM) and the need for early planning to meet demand. Another panel will turn to lifecycle efficiency, discussing how data can optimise component repairs, aircraft storage and continuing airworthiness management across the supply chain.

For delegates, the value of PAM Singapore lies not just in the knowledge gained, but also in the opportunities to connect with peers facing the same pressures and ambitions. The networking breakfasts, lunch sessions and evening events are designed to encourage open discussion and potential collaboration – an increasingly important aspect of implementing predictive strategies at scale.

## Join the conversations

Predictive maintenance isn't just for tech-minded engineers anymore – it's firmly on the radar of airline boards and decision-makers. Across the APAC region, operators are moving away from rigid, time-based overhauls and towards maintenance driven by the actual condition of their aircraft. The payoff? Fewer surprises, more flying hours and healthier bottom lines.

PAM Singapore 2025 is a chance to see that shift happening in real time, hear directly from the people making it work, and get a feel for the tools and ideas that could define the future of aircraft maintenance. ●

Just some of the speakers at PAM Singapore (L-R): Tsubasa Yamada, general manager, engineering department, Peach Aviation; Sadanari Shigetomi, predictive maintenance engineer, All Nippon Airways (ANA); Jonghoon Oh, general manager, head of predictive maintenance, Korean Air; Jaemin Kim, manager, predictive engineer, Korean Air; and Joan Ng, data analytics and digitalisation executive, Singapore Airlines

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# Empowering maintenance operations

Ahead of the first-ever APAC edition of the Predictive Aircraft Maintenance (PAM) Conference in Singapore in September, *MRO Management* asked **Mahmoud El Sawah**, from event sponsor AirNxt, his thoughts on the landscape of predictive maintenance

> **AirNxt's predictive capabilities deliver clear, actionable insights directly into existing workflows**

**MAHMOUD EL SAWAH**
founder/chief executive, AirNxt

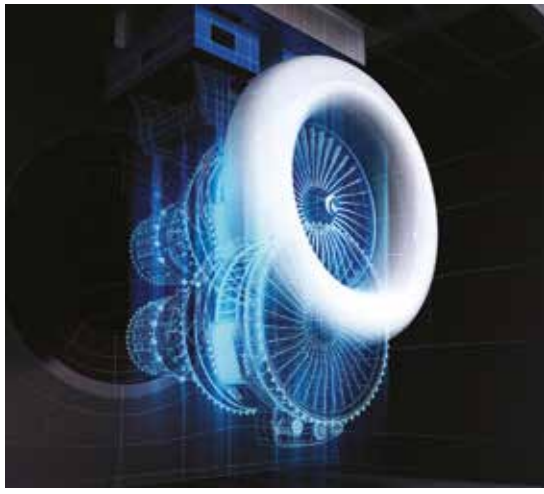
**In an ideal world, what is your vision for how predictive maintenance and innovation will transform MRO activities?**

Predictive maintenance will fundamentally transform maintenance operations from reactive procedures to intelligent, proactive decision-making. In this world, aircraft systems, maintenance logs, operational data and regulatory frameworks seamlessly communicate in real-time, enabling precise and quick actions. Instead of addressing issues after they arise or adhering to rigid schedules, maintenance teams will intervene early, guided by accurate insights reflecting each aircraft's actual operating conditions.

Tasks will no longer depend on arbitrary thresholds. Instead, advanced monitoring will flag potential issues long before they affect safety or schedules. Components will be serviced precisely when necessary, resources optimally allocated based on real demand, and technicians will focus their efforts on urgent, essential tasks with everything needed ready and accessible.

This shift enhances planning capabilities, reduces operational disruptions and delivers a consistently smooth maintenance experience. The result is not only increased uptime but also stronger operational control, improved safety margins and more capacity for maintenance teams to focus on delivering quality outcomes.

**What do you see as the biggest hurdles the industry must overcome to fully realise the potential of predictive maintenance?**



Several critical challenges must be tackled for predictive maintenance to become integral to everyday operations. Foremost among these is data fragmentation. Aircraft platforms, maintenance systems and operational tools frequently operate in isolated silos, obstructing comprehensive visibility. Predictive maintenance demands cohesive, clean data flowing seamlessly across these systems – a capability many existing platforms do not yet support. Outdated infrastructure poses another significant barrier. Legacy MRO systems, originally built for periodic batch processing, struggle with real-time data integration and intelligent workflows. This limits the industry's ability to quickly and effectively act on predictive insights.

Regulatory clarity is also crucial. As predictive maintenance becomes mainstream, standardised frameworks and clear compliance guidance are needed to ensure operators can

confidently implement and rely on predictive recommendations.

Finally, successful adoption hinges on user-centric design. If predictive maintenance solutions are overly complex or disconnected from daily workflows, they risk becoming cumbersome tools rather than integrated solutions. The industry must develop intuitive, practical tools that support maintenance teams without adding complexity.

**Where does AirNxt fit within the broader landscape of predictive and innovative aircraft maintenance activity?**

AirNxt is purpose-built to drive this transformative shift. From its inception, AirNxt has prioritised developing a modern, real-time MRO platform designed explicitly to streamline operations, remove workflow friction and enhance decision-making through predictive maintenance.

Our platform combines intuitive, user-focused interfaces with intelligent features that unify compliance, maintenance operations and data integration. AirNxt's predictive capabilities deliver clear, actionable insights directly into existing workflows, enabling teams to act decisively without disruption.

Rather than layering new features onto outdated architectures, AirNxt's structure mirrors the realities of frontline aviation maintenance – incorporating dynamic task management, live operational updates and seamless data integration. Every predictive insight and recommendation naturally aligns with real-world processes, supporting teams to act with certainty and efficiently.

At AirNxt, innovation is practical. Our solutions are built not just to showcase technology, but to fundamentally improve safety, reduce downtime and simplify complex maintenance tasks.

**What collaborative efforts or partnerships do you believe are essential to accelerate progress in predictive maintenance across the aviation ecosystem?**

Meaningful progress requires active collaboration across the aviation ecosystem. The most impactful advancements occur when regulators, aircraft operators, OEMs and technology providers align around a shared objective: creating smarter, safer and more connected maintenance operations.

Open data exchange is fundamental. Standardised data formats and secure system integrations must facilitate seamless, real-time data flows between platforms. This interconnected data environment forms the backbone for accurate and reliable predictive maintenance tools.

Regulatory alignment is equally essential. Clear, practical regulatory frameworks will support operators in successfully adopting predictive maintenance practices while maintaining compliance and safety standards.

Additionally, robust feedback loops between product developers and frontline maintenance users ensure predictive features are firmly grounded in operational reality. Close partnerships with operators, maintenance providers and training organisations enable the development of intuitive, reliable and truly beneficial tools.

At AirNxt, we are deeply committed to collaborative innovation. By actively engaging across the aviation community, we ensure our solutions effectively address real-world challenges, drive operational excellence and continuously elevate the standards of aviation maintenance software. ●

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# A FAST-TRACK TO THE FUTURE

The APAC region's travel and cargo fundamentals are so strong that only mismanagement of growth opportunities could derail them. **Kevin Rozario** reports

MRO in the Asia-Pacific (APAC) market is currently thriving – to the point that it cannot keep up with client demand. This is where attention is now finely focused, especially with a view to safety following the June 2025 Air India Flight AI171 crash, where there had been speculation over maintenance actions.

Operational and/or structural challenges are very real and impacting the region's MROs' ability to meet growing demand, especially in the light of fleet expansions and deferred maintenance cycles.

Looking at the broader picture – based on a McKinsey report published at the end of 2024 – MRO has fared relatively well across aviation sub-sectors. Tracking 2019 to 2023, McKinsey noted that return on invested capital (ROIC) hit five percentage points for MRO, which was better than airlines, ground handlers, and even airports. Only freight forwarders and manufacturers had better ROIC gains.

Manufacturing supply chain delays, coupled with strong demand for new aircraft and/or engines, has led to airlines extending the service lives of their aircraft. The study noted that the percentage of commercial jets over 25 years old in fleets had increased from 8.1% to 9.6% over the four-year period. As a result, more maintenance has been needed and MRO has rebounded to "modest economic profitability".

In Hong Kong, HAECO, a leading independent aircraft engineering and maintenance group, has seen the impact first-hand. Lars Moeslein, senior vice president group commercial (APAC), tells *MRO Management*: "Currently, demand for our services exceeds capacity, primarily due to supply chain disruptions and workforce shortages. Our customers face a rapidly growing market, the maintenance of ageing fleets and uncertainties in the delivery timelines of new aircraft types."

In response, HAECO, an expert in airframe, component and engine MRO solutions with more than 400 airline clients, has been offering flexibility through its global network, which Moeslein says "ensures agility and responsiveness to customer needs". The company has advanced facilities in Hong Kong, the Chinese mainland and the US.

## How to manage demand better

In APAC, the supply-and-demand issue is particularly pertinent, which is why the region's MRO business, while on a strong trajectory, needs to better manage the situation.

Boeing's commercial outlook to 2044, released during the 2025 Paris Air Show in June, indicates that Southeast Asia and South Asia will see the fastest traffic growth of 7.0%, ahead of the global average of 4.2%. Moreover, including Oceania and Northeast Asia (but excluding China), fleets in Asia-Pacific will total 9,925 by 2044, almost level with North America's 10,475. China's fleet alone will hit 9,755 aircraft by then. The greatest demand will be for single-aisle jets which are set to double from the 2024 figure to more than 35,000.

Two trends make APAC a market to watch: the decline of average airfares relative to income levels, which the report says "has been most pronounced over the last decade in the Asia-Pacific region" and rising cargo due to demand for e-commerce. "Markets in South Asia, China and Southeast Asia are poised for the fastest growth over the next 20 years," the report states. Just over one-third of all freighter demand will come from Asia-Pacific carriers, more than doubling the existing fleet by 2044.

# "ASIA-PACIFIC'S MRO FUTURE IS BRIGHT, IF MANAGED WELL"

Airbus has been outperforming Boeing for orders, but this year the latter company caught up a bit. According to aviation market intelligence and advisory company IBA, Airbus and Boeing delivered 303 and 270 commercial aircraft respectively in H1, thanks to a jump in 737 MAX Series single-aisle production and delivery. Nevertheless, Airbus still dominates the single-aisle market with its A320neo family. Total H1 2025 deliveries, while up 13% year-on-year, were still 20% below H1 2018 levels.

In APAC, Airbus acknowledged that turnaround times (TATs) have slowed. Speaking to *MRO Management*, Raymond Lim, Airbus's head of customer services APAC, comments: "The industry's rebound has been robust, with rising demand for aircraft services and maintenance as airlines ramp up operations. This has led to MROs working at or near maximum capacity."

▲ Lars Moeslein, senior vice president group commercial (APAC), HAECO

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## Backlogs an impetus for new solutions

Lim adds: "Deferred maintenance cycles during the pandemic coupled with a rising average fleet age have created a backlog in some areas. This confluence of factors has unfortunately led to longer TATs for our customers and necessitated an increase in engineering solutions to prevent aircraft-on-ground (AOG) situations."

To overcome these factors, including widespread workforce shortages that are affecting the entire aviation ecosystem, Airbus is making strategic investments. "We're empowering our customers with digital tools like predictive maintenance analytics (Skywise), to enhance efficiency and optimise their operations," Lim explains. "Concurrently, we're collaborating closely with our suppliers and partners to stabilise material and component flows."

Singapore Airlines engineering division SIAEC says the FY2025/26 first quarter (ending June) has "continued to see higher demand for MRO services". Flight volumes across the company's line maintenance network grew year-on-year, as 3.5% more flights were handled in Singapore during the quarter. During the period, base maintenance remained "healthy" and the number of heavy checks performed increased from 18 to 23, though light checks fell from 171 to 147.

**"WITHIN APAC, CHINA ALONE WILL HAVE A VERY BIG INFLUENCE IN THE COMING DECADE"**

Despite higher material and manpower costs, SIAEC's Q1 revenue soared by 33% year-on-year to S$358.4 million (US $278.6 million) and net profits also jumped to S$42.9 million, up by almost 30%.

To keep ahead in an increasingly competitive region, SIAEC has expanded abroad. It has invested in startup operations for base maintenance in Malaysia, with the first of two hangars in Subang set to come on-stream by the end of 2025 while a line maintenance joint venture in Cambodia is expected to launch in the second half of this year. The moves, SIAEC says, "will better position us to meet growing demand and tap new opportunities".

The company is also working on strengthening its presence in the two growth markets of India

**33%**

***Despite higher material and manpower costs, SIAEC's Q1 revenue soared by 33% year-on-year to S$358.4 million (US$278.6 million) and net profits also jumped to S$42.9 million, up by almost 30%***

▲ HAECO Xiamen's new maintenance facility will cover a total area of 537,300 sqm

▲ Raymond Lim, head of customer services APAC, Airbus

▲ HAECO has implemented drone inspections to significantly reduce TATs

and China. In May 2024, SIAEC was appointed as Air India's strategic partner for the development of base maintenance facilities in Bangalore, and in China it still has a non-binding framework in place with Xiamen IPORT Group to explore an investment in one of its subsidiaries that provides line maintenance.

## Closer customer coordination

As in other regions facing capacity constraints, major MROs are actively building long-term partnerships with airline customers to jointly develop solutions that utilise capacity better. Airbus's Lim says: "Our global services network is operating at high capacity across many locations, particularly in Asia-Pacific where demand and utilisation is strong. We're currently seeing airframe MRO slots fully booked and a significant backlog with engine MRO providers.

"On the component front, we're managing challenges related to sub-tier supplier constraints, especially for critical, single-sourced parts. These factors are collectively leading to extended TATs and, in some unfortunate cases, AOG situations, despite leveraging all available engineering solutions. This underscores the critical importance of early planning and close coordination with our customers."

Technology is helping. HAECO has implemented drone inspections to significantly reduce TATs while autonomous guided vehicles streamline material management and warehouse operations and robotic arms handle repetitive tasks. "These innovations boost operational efficiency and workplace safety, allowing our skilled workforce to focus on complex maintenance activities," says Moeslein.

The company's Customer Gateway solution offers real-time visibility in aircraft maintenance progress, while HAECO Intelligence collects operational data to improve task planning and workforce allocation to maximise manpower deployment. "Although some initiatives are still in early development, we are confident these advancements will substantially enhance safety and operational performance," Moeslein adds.

Airbus also notes the importance of tracking data. "The foundation for success in digital transformation also lies in accessing high-quality historical data such as performance measures," says Lim. "This is precisely the mission which Airbus Skywise set out to achieve when it was launched in 2017. Today, it connects data from over 11,000 aircraft in operation."

Such efficiencies are needed in APAC as it becomes a volume-driven MRO market with strategic hubs and OEM-backed facilities. Moeslein comments: "We expect an increase in MRO volume. Countries like India, along with our diverse customer base, are increasingly seeking local MRO solutions integrated into their operations."

He points to two key factors positioning APAC as a volume MRO market: the region's labour availability and competitive cost structures which are attracting both airline operators and MRO providers; and environmental priorities that are influencing airlines' procurement strategies, making the global transport of engines and aircraft parts less compatible with those concerns.

Airbus's Lim agrees. "Asia-Pacific is indeed experiencing volume growth and is emerging as

**"MAJOR MROS ARE ACTIVELY BUILDING LONG-TERM PARTNERSHIPS WITH AIRLINE CUSTOMERS TO JOINTLY DEVELOP SOLUTIONS THAT UTILISE CAPACITY BETTER"**


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▲ SIAEC, the engineering division of Singapore Airlines, says it has continued to see high demand for MRO services in the FY2025/26 first quarter (ending June)

# "IN APAC, THE SUPPLY-AND-DEMAND ISSUE IS PARTICULARLY PERTINENT, WHICH IS WHY THE REGION'S MRO BUSINESS, WHILE ON A STRONG TRAJECTORY, NEEDS TO BETTER MANAGE THE SITUATION"

a global MRO powerhouse, supported by a young, expanding fleet and strategic investments in local capability," he says. "However, the region is not just about volume – we're seeing increasingly sophisticated capabilities, with our support for local MRO providers and the growing presence of OEM-backed centres like Airbus's own facilities in Singapore, Malaysia and China."

## A future like no other?

Asia-Pacific's MRO future is bright, if managed well. Like Boeing, Airbus is predicting a very strong growth phase, with the commercial aircraft services market in the region (including China and India) set to more than double in value from $52 billion today, to $129 billion by 2043.

Lim says: "Of the nearly one million in new skilled professionals needed for the APAC region (nearly 45% of global manpower) over the next 20 years, nearly a third (298,000) are new technicians. This robust demand in maintenance of services and labour, as well as the rising role of sustainability, are all strategic opportunities for collaboration."

Those opportunities are being taken across the region by players like SIAEC (as aforementioned), ST Engineering and Asia Pacific Aircraft Component Services (APACS), either through partnerships and joint ventures in new locations or new MRO contracts. HAECO believes that collaborating with OEMs "will be crucial for securing maintenance approvals and licences".

Moeslein says: "As a key market for narrowbody fleets, there is significant potential for expansion in engine, component and base maintenance services. In terms of regional infrastructure investment, HAECO is constructing a new maintenance hangar at Xiamen Xiang'an International Airport, one of our most significant investments to date." The facility, set to open in 2026, will be the largest single-span hangar in the world and is among the first to achieve LEED Platinum certification. The move signals HAECO's drive for a leading role on the Chinese Mainland.

Within APAC, China alone will have a very big influence in the coming decade. While the aircraft services market is currently dominated by Europe ($37 billion) and North America ($35 billion), in two decades China's steep growth will propel it to $61 billion, according to Airbus projections. Coupled with the rest of Asia-Pacific, the region's total services market will reach $129 billion in 2043, leapfrogging North America and Europe's $105 billion, and shifting the global MRO centre of gravity firmly to the east. ●

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Q&A

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# When data delivers for everyone

Ahead of the first-ever APAC edition of the Predictive Aircraft Maintenance (PAM) Conference in Singapore in September, *MRO Management* asked **Kris Volrath** from event sponsor Veryon for his thoughts on the landscape of predictive maintenance

> **Over the next 3-5 years, predictive maintenance will move significantly closer to automated maintenance scheduling**

**KRIS VOLRATH**
senior vice president of product, Veryon

**As predictive maintenance continues to gain traction, what do you see as the biggest industry-wide challenge in turning aircraft data into meaningful, real-time insights that drive action?**

The biggest challenge lies in breaking down data silos and achieving true interoperability between different aircraft systems, maintenance platforms and legacy databases.

Firstly, many operators struggle with data quality issues, where information is fragmented across multiple sources or contains inconsistencies that undermine analytical accuracy.

Secondly, predictive models require sufficient data at the make and model level to provide realistic and accurate recommendations, which many operators often lack access to or have limited depth.

However, this is often a double-edged sword in that the sheer volume of data generated by modern aircraft can be overwhelming without proper filtering and contextualisation systems.

Thirdly, there remains a significant data science skills gap in the industry, requiring maintenance and reliability teams to be retrained to interpret and act on predictive insights effectively. This last part – a 'human in the loop' – is critical to establishing trust in AI-driven recommendations, as maintenance decisions directly impact safety.

1

**How does Veryon's integrated approach to diagnostics – combining reliability, defect analysis and guided troubleshooting – help maintenance teams move from reactive to predictive maintenance strategies?**

Veryon's integrated aviation platform addresses these challenges where maintenance, reliability and troubleshooting data and analytics are fragmented, creating a unified view that enables proactive decision-making.

By combining historical reliability patterns with real-time defect analysis, maintenance teams can identify emerging trends before they become critical failures, turning unplanned maintenance into planned maintenance.


2

Veryon Guided Troubleshooting provides step-by-step diagnostic procedures based on similar historical cases while adhering to OEM recommendations, reducing repair times and human error, and addressing the lack of technicians in the market by leveraging real-world experience from others. This shift from calendar-based maintenance to condition-based intervention optimises safety, reliability and operational efficiency, and everyone wins.

**1.** The industry still needs to break down data silos and achieve true interoperability between different aircraft systems
**2**. Veryon's solutions help airlines operating mixed fleets turn the vast volumes of maintenance report data into actionable insights

**AI and automation are reshaping workflows across the MRO sector – what results have you seen from operators using Veryon Diagnostics, and where are the biggest efficiency gains being realised?**

Operators using Veryon Diagnostics have reported significant reductions in unplanned maintenance events, with some seeing 20-30% fewer aircraft-on-ground (AOG) situations through early fault detection, a reduction in delays and cancellations of 10-12%, and improved productivity of 17%.

The biggest efficiency gains are being realised in diagnostic time reduction, where technicians can resolve issues faster using AI-guided troubleshooting workflows, while still adhering to the OEM technical publications – marrying the best of real-world experience with OEM guidelines.

Inventory optimisation has emerged as another major benefit, with operators reducing spare parts carrying costs, addressing rogue parts and recommending parts to replace before failure. This frees up experienced technicians to focus on complex problem-solving and strategic maintenance planning.

**Looking ahead, how do you see predictive maintenance evolving over the next 3-5 years, and what role do you envision Veryon playing in that transformation?**

Over the next 3-5 years, predictive maintenance will move significantly closer to automated maintenance scheduling, where AI systems will automatically coordinate parts ordering, technician scheduling and hangar space allocation based on predictive insights.

Furthermore, we expect to see closer integration with flight logistics and safety management platforms to create a fully closed-loop process for maintenance to flight operations. With the continued acceleration of next-generation aircraft, engines and IoT sensors, we will have real-time aircraft health monitoring systems, creating continuous feedback loops that refine predictive models.

Veryon will continue to play a central role by developing more sophisticated machine learning algorithms that can predict component failures months in advance rather than days or weeks, improve reliability and better balance safety and operations.

The company is positioning itself to become the industry's primary maintenance, reliability and troubleshooting intelligence platform, connecting manufacturers, operators and suppliers in a unified ecosystem. Digital twins and augmented reality will likely become standard tools, with Veryon's platform serving as the data backbone that powers these advanced visualisation and simulation technologies. ●


# THE NEED FOR SPEED

The need for aerospace to embrace innovative approaches to engineering design, manufacturing and maintenance was a hot topic at this year's Paris Air Show. **Lee Hayhurst** reports

From the standpoint of the traveller, the aerospace industry is essentially about one thing – speed, providing the ability to travel immense distances at unbelievable velocity.

But behind the scenes lies an industry that, for reasons related to safety and caution that it is in no one's interests to challenge, is famously conservative and not renowned for moving quickly.

However, new technologies being applied to design, engineering and maintenance are promising to revolutionise that and will improve the sector's exceptional operational record.

This year's Paris Air Show was a chance to catch up with firms pioneering solutions for a sector being expected to advance more quickly but anchored by legacy processes and supply chain issues.

US-based multinational Ansys develops product design, testing and operations simulation software for multiple sectors, including healthcare, automotive and aerospace and defence.

Its aim is to replace traditional physical processes to speed up time to market of engineering products by allowing greater collaboration just as other sectors, notably automobile, has done.

Steve Bleymaier, chief technology officer for aerospace and defence, says this promises the opportunity to minimise, or even eliminate, physical prototyping by using a virtual environment.

Achieving "first time success" in the development and testing phase saves time and money, improves reliability and maintainability and reduces the future cost of operations.

"Systems that we are developing today are getting more and more complex, but the demand is that they are needed faster and faster," Bleymaier explains.

"Normally that's two diametrically opposed things. More complex means it should take longer. Where we come in is we can help with that process."

Bleymaier says in aerospace it still takes 10 to 15 years to bring next generation product to market and yet expectations are that development cycles should be getting shorter.


Red Bull Racing/Red Bull Content Hub

Red Bull Racing/Red Bull Content Hub

◀ An aircraft and an F1 car share striking similarities in their performance demands and technological sophistication

**"New technologies being applied to design, engineering and maintenance are promising to revolutionise and improve the sector's exceptional operational record"**

He compares this to the automative sector where the same process can take just a few years, adding, "We can't keep doing that. We've got to speed things up."

Dassault Systèmes is also pioneering virtual worlds for aerospace engineering having been founded 40 years ago by Dassault Aviation, the French military aircraft manufacturer.

Two decades after the Boeing 777 became the first commercial aircraft to be fully digitally designed, the concept of digital twins augmenting real world processes remains full of promise.

David Ziegler, senior vice president for aerospace and defence, says that the technology is now being applied to lifecycle management solving wider supply chain challenges.

"The first point about a digital twin is it's about engineering at the start. Engineering is at the core of the virtual twin. What it helps you to do is reduce your development lifecycle.

"Everybody works on a single source of truth, and it enables collaboration at an extended range between engineering, manufacturing and support services to achieve the same design goals.

Ziegler continues: "What's really interesting is the virtual twin of the supply chain. How do you map the risk of your supply chain? How do you make sure you're not single source for what really matters? Today's issues are related to the state of the supply chain after Covid-19 and probably a lack of investment, but it's the way OEMs can better schedule the capacity of the supply chain.

"Right now with the tariff wars increasing problems, it's not only cost and performance, it's also location of the supply chain. Then once you find the right materials, you need to recertify that full process. It takes a long time. A model-based approach gives you the ability to achieve certification more quickly."

Outside of product design and development, both Ansys and Dassault Systèmes see huge potential for digital twinning technologies in predictive maintenance.

Bleymaier explains: "Predictive means your entire supply chain tail is reduced so you don't need to have parts all over the world. And you'll have less impact on the mission – you'll be able to fly where you need to fly when you need to, and have an incredible on-time performance."

The French air force has seen a 10% increase in availability of its Raphael fighter jets working with Dassault Systèmes to input live operational data into its virtual models, says Ziegler.

"Virtual twinning closes the gap between the virtual and the real world. We are going to see virtual twins age. How do you model that change, that ageing of the aircraft?

"The answer lies with access of that virtual twin to the real operations data that is coming off the aircraft. We are using algorithms to predict maintenance failures. This is how we are able to better increase fleet availability."

As if to encapsulate how technology and speed in engineering are related, UK-headquartered leader in measurement technologies Hexagon has struck a partnership with F1 team Red Bull.

Its high-tech tools for engineers are developed under three core pillars, Design, Make and Inspect, as Aziz Tahiri, Hexagon's vice president for aerospace and defence, explains.

"Our customers need to innovate faster and bring products to market in a short cycle time. We are helping design and engineering collaborate for a faster product introduction into the market.

"In Formula 1 there's a need for lots of accuracy, optimisation of design and geometries complying with very strict tenders. All of that applies to aerospace.

"An aircraft and a Formula 1 car are very similar in terms of the performances and technological requirements behind them." ●

# ASIA: POWERING THE FUTURE OF MRO

By harnessing digital capabilities, Asia is poised to dominate the MRO sector, says ADE's **Mahesh Kumar**

The aviation MRO sector is booming across Asia, positioning the region to become the go-to hub for airlines worldwide. The region's attractiveness lies in a rare combination of capacity, technical expertise, skilled talent and competitive cost structures. Yet, there is another factor driving Asia's growing influence – the rapid adoption of digital solutions and innovation in MRO.

In today's fast-paced aviation environment, predictive maintenance has emerged as a defining force in how airlines keep their fleets flying efficiently and safely. By harnessing real-time aircraft health monitoring, AI-driven analytics and integrated digital platforms, we can foresee issues before they occur. This shift from 'fixing after failure' to 'preventing before it happens' not only minimises downtime but also extends the service life of aircraft assets and enhances passenger confidence.

> **"If we continue to embrace digital transformation... Asia will not simply participate in the future of MRO – it will define it"**

**Mahesh Kumar**, chief executive, Asia Digital Engineering (ADE)

Asia's advantage is its agility. Free from some of the long-standing legacy systems found elsewhere, our MRO industry can adopt and adapt new technologies more quickly.

At Asia Digital Engineering (ADE), digital is at the heart of what we do – it is quite literally in our company name. We have a dedicated digital and innovation services department focused on embedding technology into every part of the maintenance journey.

One example of this approach is our Elevade digital ecosystem – designed to bring together fleet management, aircraft health monitoring and workforce optimisation under one roof. Its first module, Elevade Fleet, is already monitoring hundreds of aircraft and thousands of engineering personnel across Asean, providing predictive insights, advanced analytics, and real-time operational visibility. For us, it is not about the technology alone, but about how it enables smarter, faster, and more collaborative maintenance practices.

The vision for Asia is clear: a fully integrated, data-driven MRO model that is predictive, sustainable and globally competitive. Imagine a scenario where a sensor alert automatically triggers a maintenance response – assigning the right engineer, at the right time, with the right part already waiting. This is not a distant goal; it is a reality we are building today.

If we continue to embrace digital transformation, strengthen collaboration between regulators, OEMs, airlines and MRO providers, while investing in upskilling our workforce, Asia will not simply participate in the future of MRO – it will define it.

The opportunity is here, the capability is proven, and the momentum is ours to maintain. The question is not whether Asia can lead, but how soon we choose to take that lead.


1

◀ ADE's digital solutions enable smarter, faster and more collaborative maintenance practices

For more information about ADE, visit: **ade.aero**

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# The Future Starts Now

# MRO ASIA-PACIFIC RETURNS TO SINGAPORE

MRO Asia-Pacific celebrates a major milestone with its 25th edition this year – bringing together aviation professionals for three days of conference sessions, networking, and a packed exhibition

Returning to the Singapore Expo Convention and Exhibition Centre, MRO Asia-Pacific reaffirms its reputation as the region's premier platform for the commercial aviation aftermarket.

In 2024, the event drew 6,000 attendees, including 900 airline representatives from 80 countries, and featured over 250 exhibitors. This year, organiser Aviation Week aims to build on that success by delivering unparalleled networking opportunities, fresh industry insight and hands-on access to the latest maintenance innovations.

## Conference and exhibition

The event opens with a two-day conference (September 16-17), followed by a two-day exhibition (September 17-18) featuring over 300 exhibitors, including global names such as: StandardAero; AFI KLM E&M; Embraer; Lufthansa Technik; Revima; SIA Engineering Company; ST Engineering; Boeing; 8tree; Aero Engine Solutions; Aero Norway; AJW Group; Joramco; MAB Engineering; Parker Aerospace; and many more.


1


2

Attendees will have the chance to explore new technologies, test products and services, and engage with MRO professionals from across the airline supply chain, including operators, lessors, OEMs, parts suppliers and digital solution providers.

## Content highlights

Sessions across both the conference and free-to-attend show floor theatres will tackle the most pressing topics facing the sector today. Conference themes include:

- Strategies for regional supply chain resilience
- The role of localised support in strengthening operational continuity
- Adoption and trust-building around USM sourcing in Asia-Pacific
- The impact of AI in engine and airframe maintenance: tools, barriers and business cases
- Workforce development: recruitment, retention and leadership amid skills shortages
- Future workforce structures shaped by automation and AI
- Aircraft interior investment trends and how airlines are adapting cabin configurations.

## Speaker line-up

The high-profile line-up of speakers includes: Holger Beck, president and CEO, Lufthansa Technik Philippines; Raymond Lim, vice president of customer services Asia Pacific, Airbus; Gerald Steinhoff, chief commercial officer, HAECO; Kevin Li, managing director, MTU Maintenance Singapore; Wilson Liu, vice president of procurement, Hainan Airlines; Aziz Yunus, head of component and warehouse services, Asia Digital


3

Engineering; Rakesh Dixit, group director – fleet technical management, Cebu Pacific Air; David Harper, fleet support director, customer & product support operations, GE Aerospace; David So, senior vice president corporate planning and continuous improvement, SIA Engineering Company; Fidiarta Andika, vice president of engine services, GMF AeroAsia; Vanessa Thacker, vice president of MRO strategy, Rolls-Royce; Ene Krinpus, managing director, Magnetic Talents, Magnetic Group; Eleana Choy, senior vice president human resources, SIA Engineering Company; Shevantha Weerasekera, vice president of engineering and maintenance, Cebu Pacific Air; and Rahul Shah, senior vice president strategic growth & business development Asia Pacific, Middle East and Africa, AAR Corporation.

## Go Live! Theatre sessions

The MRO Asia-Pacific Go Live! Theatre adds another layer of insight through practical case studies, panels and product showcases. This year's sessions will explore key topics such as strategies to extend parts lifecycles, developments in the regional air cargo market, the evolution of turboprop engine maintenance, and more.

Speakers featured in the Go Live! Theatre sessions include Nimisha Jha, AVP technical transactions Asia Pacific & Middle East, Avolon; Sunny Xi, principal, Oliver Wyman; and Michael Brown, senior vice president engine trading, NTE Aviation LLC.

## Unmissable networking

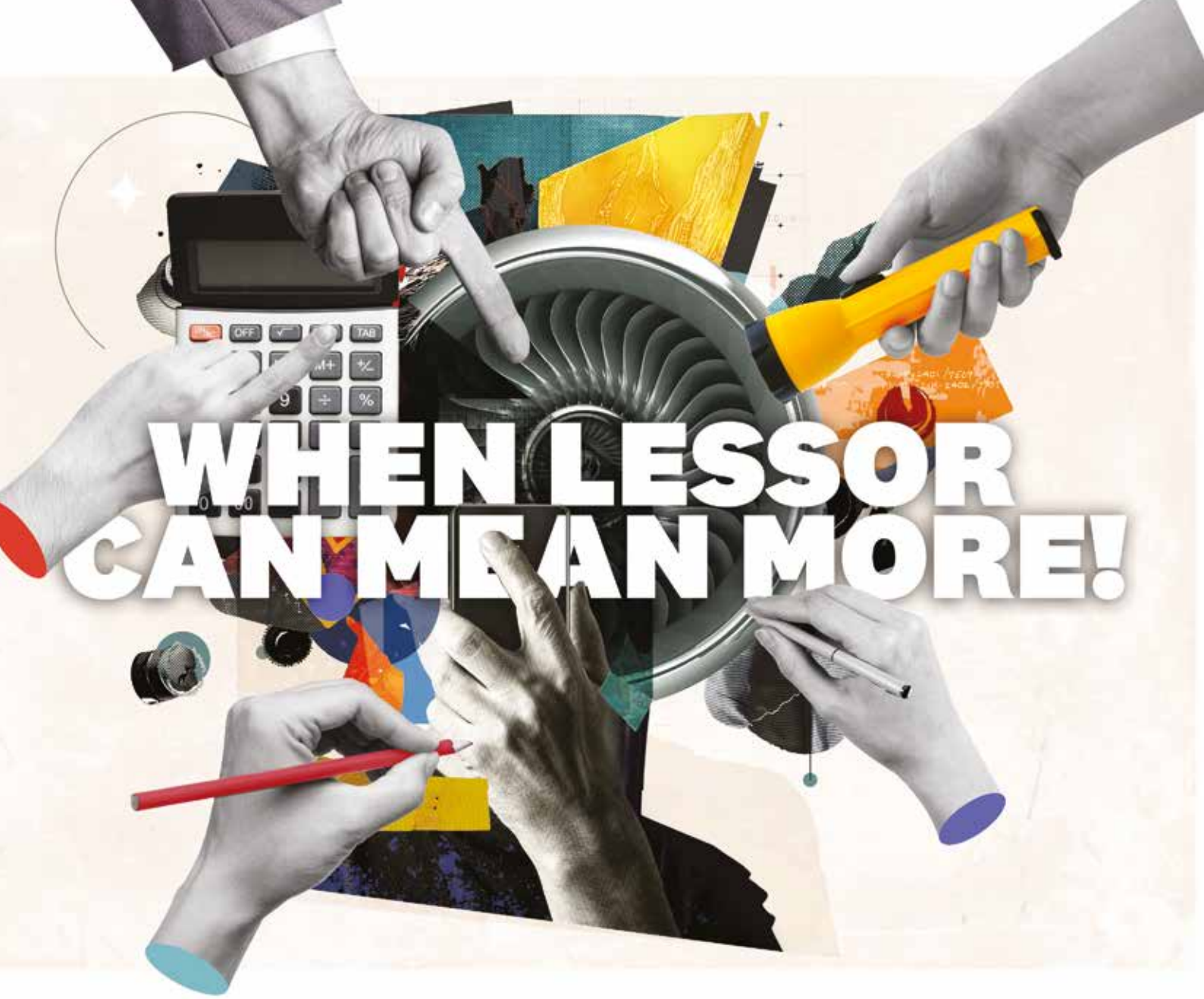
With dedicated lounges, meeting tools, and hundreds of buyers and suppliers in attendance, MRO Asia-Pacific provides abundant opportunities to forge new connections.

Whether you're looking to engage in pre-arranged meetings or ad-hoc conversations, the event's app makes it easy to plan ahead and build relationships that drive business.

As the Asia-Pacific region continues to grow in strategic importance for global MRO, MRO Asia-Pacific remains the must-attend event for professionals looking to understand, influence and lead the next phase of aviation maintenance. ●

**1.** Over 300 exhibitors will take part
**2.** The venue in Singapore
**3.** Delegates will hear from a line-up of high-profile speakers

For more information and to register to attend, visit **mroasia.aviationweek.com**



# WHEN LESSOR CAN MEAN MORE!

Performing maintenance on leased aircraft requires a careful approach as there are more parties involved than for an owned aircraft. **Bernie Baldwin** reports on the challenges involved

The maintenance of an aircraft through its operating life might easily be considered to be a straightforward process. The aircraft is taken off the line, then enters the hangar for all the necessary procedures and processes (which are often less than straightforward), all the work is signed off by qualified personnel and the aircraft returns to service.

This is the case when the aircraft are owned by the operating airline, but is not quite so clear-cut when aircraft are leased by the operator. And according to IATA, it's now more than 20 years since a majority of aircraft were owned rather than leased, and that the percentage of leased aircraft now sits around the 60% level and has done for some years.

In these circumstances, of course, the lessor is the actual owner of the aircraft or is managing the lease on behalf of a third-party owner. These entities therefore have the final say over how the asset (the aircraft) is maintained.

With multiple parties involved, therefore, the lease contracts must include all the details of which party has responsibility for each part of the maintenance process. This also means the apportioning of costs. Thus, each party must be aware of their role and understand what is expected of them as the asset goes through its time with the operator.

# "ONE PARTICULAR AREA OF DISPUTE IS THAT LESSORS DO NOT OFTEN APPROVE THE USE OF PMA PARTS"

This allocation of responsibilities mainly applies to dry leases, as wet (ACMI) leases include maintenance services, so the lessor does the handling of maintenance. With a dry lease, only the aircraft is provided by the lessor, hence the need to specify the responsibility of each party across the term of the lease.

Generally, with a dry lease, the aircraft operator is the party responsible for ensuring the aircraft's airworthiness, working with an MRO provider approved by all parties in the terms of the lease. Naturally, the operator will be required to follow all the regular maintenance procedures and regulations, and will mostly bear the cost of all that, just as they would if the asset was owned.

One particular area of dispute is that lessors do not often approve the use of PMA parts. Usually, parts from the OEM are the preferred option when component replacement is required. Lessors believe this practice helps to retain a higher residual value of the asset, leading to better lease rates when an aircraft is moved on from one lessee to another.

TrueNoord is a specialist in regional aircraft leasing and its head of technical, Jack Bos, is closely involved in the negotiations regarding the maintenance of assets which are on dry lease. He outlines the level of oversight the company generally takes on the MRO work done – from simple checks to C-checks or refurbishments, to choice of provider for engine and airframe work – by the lessee on an asset.

"TrueNoord lease contracts contain the provision that all maintenance work should be performed by an Approved Maintenance Provider. In principle such a maintenance provider should be an EASA/FAA approved facility. However, for airframe work up to a certain work scope we will approve locally approved facilities," Bos explains. "Furthermore, the work scope of each engine shop visit needs to be approved in advance by the lessor.

"During the lease, TrueNoord performs periodic annual audits of our aircraft. These consist of an extended walk-around inspection of each aircraft and a detailed inspection of the aircraft records generated since the previous annual review. If possible, such an annual review will be scheduled during an airframe hangar check," he reports. "Other than that, we do not send inspectors to monitor MRO events performed during the lease, except for the redelivery check. The lessee is entitled to 'quiet enjoyment' of the aircraft during the lease period."

Bos also emphasises the level to which those conducting oversight are trained and certified. "People conducting an annual physical review, or monitoring the redelivery check (mostly consultants), should have extensive experience as an engineer, ideally on the aircraft type to be monitored," he says. "Reviews of the aircraft's technical records are mostly performed remotely using digital copies of those records. These are performed by separate records specialists."

As a lease moves towards its end, the parties involved need to ensure that the asset is being returned in a satisfactory condition, which can lead to much greater involvement with the lessee as there are likely to be specific areas which

▼TrueNoord recently delivered a factory-new ATR42-600 (MSN 1801) to Afrijet Business Service – operating as FlyGabon. The aircraft will be on a long-term operating lease


▲ Porter Airlines of Canada has six Embraer 195-E2s on lease from TrueNoord

generally require close attention from those performing oversight.

"TrueNoord's lease contracts contain very detailed redelivery conditions that need to be complied with by the lessee," Bos confirms. "The redelivery inspection will consist of a detailed inspection of the aircraft and the monitoring of the redelivery check, the redelivery demonstration flight and the borescope inspection of both engines and, if applicable, the APU. Furthermore, all technical records generated during the lease will be reviewed in great detail, ensuring all required status listings and statements are provided by the lessee."

After the return of an asset from its first lease, there is occasionally a period before the aircraft is re-delivered for a subsequent lease. During this time, the aircraft may undergo some MRO work to meet the new lessee's requirements. Bos explains the return and redelivery procedure.

"In an ideal situation, a transition between two leases is 'back-to-back'. This means that the lessor is not required to perform any MRO work between two leases because the delivery condition of the next lease is mirrored from the redelivery condition from the previous lease, and the whole process takes place within a matter of days," he notes.

"In practice, however, this seldom happens. In the case of extended periods between return and delivery, for example, if a new lessee has not yet been contracted at the time of return (in some cases a repossession), we must place the aircraft in storage at an MRO facility under the control of a CAMO (Continuing Airworthiness Management Organisation)," Bos confirms. "The work package to be performed prior to delivery to a new lessee could consist of an airframe calendar check, modifications – such as a LOPA (layout of passenger accommodations) change – component maintenance and in some cases even engine shop visits.

"All MRO work performed 'in between leases' is closely monitored on-site by TrueNoord representatives," he emphasises.

This practice relates to one of the first things TrueNoord does regarding maintenance when drawing up a lease agreement. "Before TrueNoord contracts work to an MRO it can take some time to negotiate a GTA (General Terms Agreement) with the involvement of our legal department to define commercial terms, such as the applicable labour rates and handling charges for materials. We prefer to work with a shortlist of selected and experienced MROs," Bos asserts.

While planning maintenance may be less straightforward on leased aircraft, clear definitions at such a stage will undoubtedly make the process smoother. ●

**"LEASE CONTRACTS MUST INCLUDE ALL THE RESPONSIBILITY FOR EACH PART OF THE MAINTENANCE PROCESS"**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# KEEP MOVING

When lease terminations, airline collapses or geopolitical shocks disrupt maintenance plans, Spire Flight Solutions mobilises aircraft fast and compliantly

◀ Spire Flight Solutions gets aircraft where they need to be during unscheduled transitions

In aircraft maintenance, scheduled events are predictable: airlines plan for them, MROs allocate slots and aircraft cycle through with minimal disruption. But unexpected events – from bankruptcies to sudden lease ends – demand more than a maintenance plan. For Spire Flight Solutions (Spire), a World Fuel company, the urgent, complex logistics of unscheduled transitions are just as critical as the maintenance itself.

## The slot puzzle

MROs operate with limited capacity. "Timing is vital," explains Daren Seex, vice president of sales – commercial aviation at World Fuel. "If we need to get an aircraft moved at a specific time to create space within the MRO, that coordination has to be precise."

This coordination is essential. When MRO slots are scarce, delays can ripple across operations. Spire ensures aircraft arrive and depart on time, maximising slot efficiency and minimising downtime.

## Unscheduled movements

While airlines handle their own scheduled maintenance, unscheduled movements – such as lease transitions, repossessions or urgent reconfigurations – are where Spire and World Fuel step in. "Lessors don't have their own crews or infrastructure," says Seex. "We fill that gap."

One example was Monarch Airlines' collapse in 2017, when Spire moved 28 of 32 aircraft to MROs across Europe and the US in just two weeks. "We had people on-site in the UK coordinating every detail," recalls Michael Sotir, director of commercial services business development at Spire.

Another was the Russian invasion of Ukraine, which triggered urgent aircraft repositioning. These aren't hypotheticals – they're real-world crises that demand fast, compliant action.

> "When MRO slots are scarce, delays can ripple across operations"

## A full-service approach

What makes this team effective isn't just experience – it's infrastructure. "We have our own in-house flight planning and fuel departments," says Graham Caffrey, sales manager at Spire. "That's not common in this space." The team also holds regulatory approvals, such as those from Bermuda, that aren't universally available.

World Fuel's trip planning teams span global offices connected by Falcon, a proprietary system that enables seamless coordination. Sotir notes: "While others may approach trip planning differently, our model is built on a truly global infrastructure – with dedicated teams in offices around the world working in sync."

## Compliance and continuity

In an industry where liability and compliance are critical, World Fuel's corporate standards set it apart. "As a publicly traded company, we're held to the same standards as our lessor clients," says Seex.

When things go wrong – from last-minute lease terminations to geopolitical events – lessors need a provider who can act fast and get it right.

## The quiet role of logistics

Most *MRO Management* readers won't see the behind-the-scenes work that gets aircraft to their facilities – but it's there. When things go awry, Spire and World Fuel step in, wearing headsets instead of capes, carrying permits and coordinating crews worldwide. They're who lessors and airlines call when the unexpected turns urgent. ●

For more information about Spire, visit **spireflight.com**


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Lufthansa Technik
Engine Services

# Eva Schnierle

In the first instalment of our Meet The Mechanics interview series – created to shine a light on the hands-on professionals who keep aircraft in top condition – we feature **Eva Schnierle**, engine mechanic at Lufthansa Technik, who shares how starting out in a glider club workshop sparked her passion for precision in aircraft maintenance, and the day-to-day realities of the job

**How did you get into aviation maintenance and what inspired your career path?**

After completing my school education, I pursued a bachelor's degree in mechanical engineering. During the Covid-19 pandemic, I realised that pure academic study was often too abstract and theoretical for me. Aviation had always fascinated me and my entry into the field was significantly influenced by my involvement in a glider club. I volunteered there and we had our own workshop where we performed maintenance on the gliders. This hands-on experience sparked my interest in aviation maintenance.

The technology behind aviation is incredibly fascinating. I enjoy getting hands-on because it makes me understand the underlying principles much better. Plus, I can see the results of my work and quickly address any problems that arise. That realisation led me to switch to becoming a mechanic. Recently, I completed my vocational training as an aircraft mechanic with a specialisation in engine technology at Lufthansa Technik. I find engines especially exciting because they are so complex and are a fundamental reason why airplanes can fly.

**Can you walk us through a typical day or shift in your role?**

We operate on a two-shift system. I am currently assigned to the early shift. Every third week, I also work the late shift. Our early shifts start at 6:00am and end at 2:15pm.

Our work is all about teamwork. In the morning, we are assigned to one of our work areas. Then, we meet with the four to five people who will be working on the engine. We review what happened the night before and go through the task at hand.

This said, we handle a lot of documentation that precisely records the engine's status. Depending on this status, we perform either assembly or disassembly tasks, which are divided among the team members. Some tasks are impossible to do alone, like installing large modules on the engine, which requires three to four people. As a newly trained mechanic, I always perform tasks alongside a mentor.

**What's one particularly memorable challenge you've faced on the job – and how did you resolve it?**

Documentation is a significant part of our work. When I install a tube, the actual screwing accounts for only about 30-40% of the job. Much of the work involves dealing with manuals, job cards and internal processes. For example, these specify if and how I am allowed to install that specific tube with specific screws and seals on the engine. It can be challenging, but you push through it.

Technical English is something you don't necessarily learn in school. It's definitely different from everyday conversational English. We have our own courses for that during vocational

**"OUR TEAMS, USUALLY MADE UP OF FOUR TO FIVE PEOPLE, ARE ROTATED REGULARLY TO KEEP THINGS FRESH AND MAINTAIN HIGH STANDARDS"**

▶ Eva Schnierle says about working with aircraft engines: "It's exciting to understand how they work and see the results of my efforts when fixing them."

training. You master it through repetition, constantly diving in and learning through practice.

There are also many service bulletins for engines. It's crucial to focus and work precisely to ensure the customer receives the exact service they requested. Even a small change like a screw or a part number can make a difference. Everything must be done with utmost concentration. If I feel uncertain, I ask my experienced colleagues and don't let stress get to me.

**How do you and your team approach safety and reliability in your work?**

Safety is our top priority. We know how important it is to work accurately. While routines are helpful, it's also vital to avoid 'bad' habits. Our teams, usually made up of four to five people, are rotated regularly to keep things fresh and maintain high standards, similar to how pilots and co-pilots switch roles.

We follow the manuals closely and double-check everything. Two highly qualified people independently verify each step when working on critical modules. The experience of long-term employees is invaluable. If you are unsure about something, you should always ask for a second opinion. It's crucial to question everything critically to achieve the best results. Clear communication and mutual respect are essential in our daily collaboration.

Each step we need to take is carefully documented in our job cards. Every action is recorded with a personnel number, so it's easy to trace who did what and with which tools. Shift handovers are both verbal and written in the job card, ensuring smooth transitions and consistency in our work.

**What changes or innovations do you see shaping the future of aircraft maintenance?**

During my vocational training, I have already tested training with artificial intelligence (AI). This could become more common, especially for engine type courses we receive here. AI could assist with location training, showing where different parts are on the engine and help visualise complex systems in a more intuitive way. Plus, it's already being tested in production and supports visual inspections today, for example in engine borescope inspection.

I am open to this new technology as long as it supports the work of mechanics. However, I don't think the mechanic job will disappear because of AI. Each engine is different and the tasks that need to be done can vary greatly. Therefore, I think the expertise and hands-on skills of mechanics will always be necessary.

**What do you enjoy most about the job – and what keeps you motivated day to day?**

I love working with aircraft engines because they are very complex and interesting. It's exciting to understand how they work and see the results of my efforts when fixing them.

Learning new things every day keeps me motivated. Aviation maintenance is always changing, so I need to stay updated with the latest technologies and methods.

Working with my team is also very inspiring. My colleagues and mentors are experienced and passionate about aviation. We support each other and solve problems together, which makes the job very enjoyable.

The special nature of aircraft maintenance and the chance to work with advanced technology make my job feel important and exciting. This combination keeps me motivated and happy to come to work every day, knowing that I contribute to something meaningful and technically challenging. ●

**"MY COLLEAGUES AND MENTORS ARE EXPERIENCED AND PASSIONATE ABOUT AVIATION. WE SUPPORT EACH OTHER AND SOLVE PROBLEMS TOGETHER, WHICH MAKES THE JOB VERY ENJOYABLE"**

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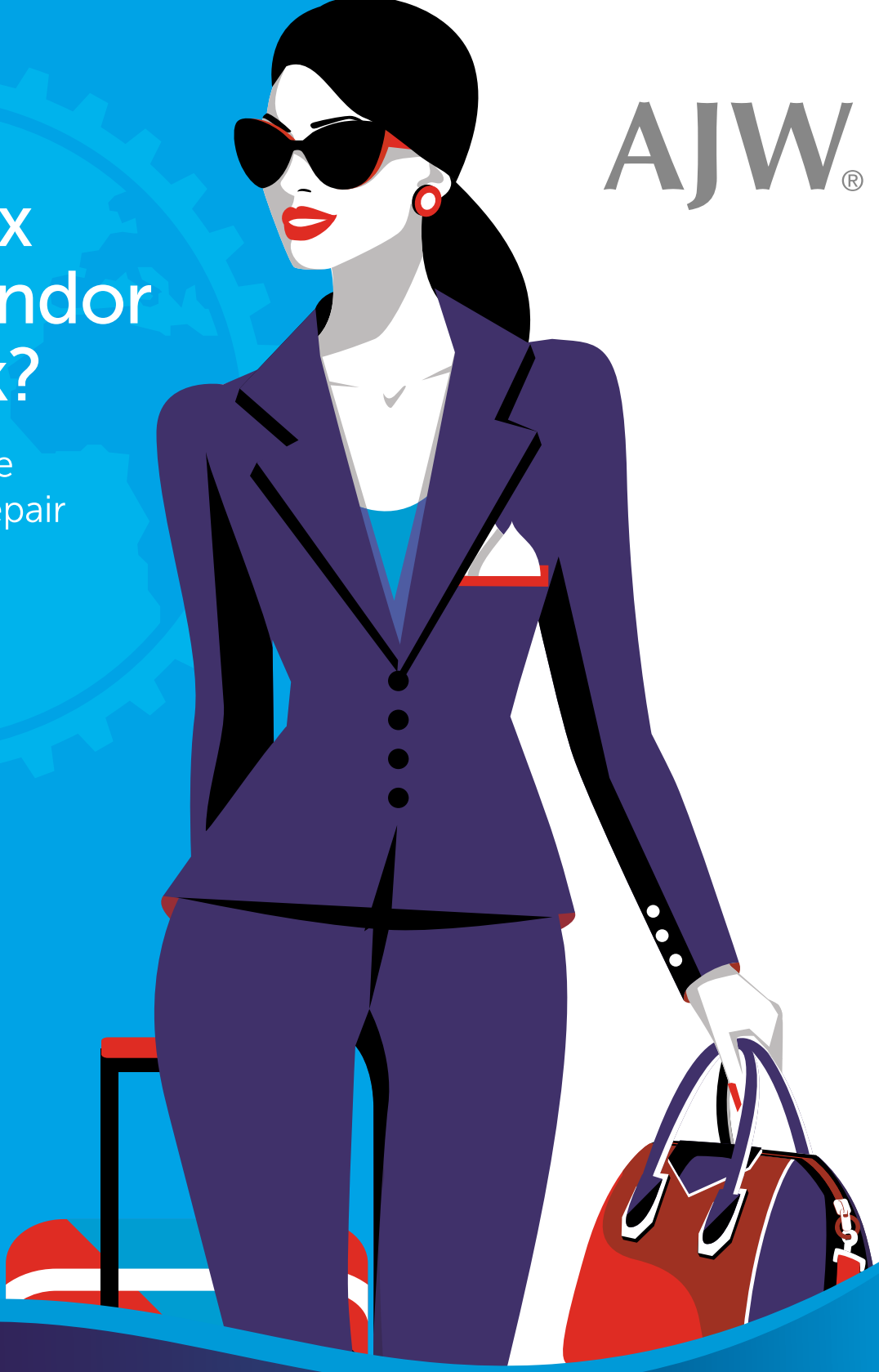

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ABNCAST

# Tarmac Aerosave surfs the waves of demand

**Lee Hayhurst** caught up with the French MRO, recycler and storage expert for an edition of ABNcast

Tarmac Aerosave claims to be 'Your Transition Expert' for its aircraft and engine recycling and tear down, storage and MRO work – a title equally fitting for its agility in adapting to shifting market demands, especially since Covid-19.

Speaking to ABNcast, Lisa Pomes, vice president of sales, likened it to surfing waves of demand.

Currently, with new hardware difficult to come by, that demand is for MRO to keep aircraft in the air, whereas during the pandemic it was storage, followed by reactivations as flying resumed.

As the pandemic hit, Tarmac Aerosave received more than 600 aircraft – a challenge as well as an opportunity, according to Pomes.

"We had to support the industry," she said. "We supported the airlines by accommodating the aircraft that were grounded because they couldn't fly and then by reactivating those aircraft.

▼ Lee Hayhurst with Tarmac Aerosave's Lisa Pomes

> "We have the flexibility and this is our strength"

"When Covid-19 was over, everyone said they wanted to fly again, so we hired a lot of people and invested a lot in order to reactivate those aircraft.

"It was a big impact, but that wave is over. For us, the big wave was after Covid because of the reactivation of aircraft. Now we are back to normal because all the aircraft are flying."

The creation of Tarmac Aerosave was announced at the 2007 Paris Air Show by founding partners Airbus, Safran Aircraft Engines, waste management firm SUEZ and Equip'Aéro. It was then an extension of the PAMELA (Process for Advanced Management of End-of-Life Aircraft) project that showed 85% of an aircraft's weight could be recycled or reused.

Today, Tarmac Aerosave claims it can now achieve 92% recycling and is working with Airbus on composite material challenges.

Capitalising on the value of second-hand parts, it has dismantled its first A320neos – just six years old and formerly operated by defunct Indian LCC Go First – and has also torn down 10 A380s.

Pomes said the company sees itself as a leader in a field that will grow in importance as global fleets age.

"We are ready and, with Airbus behind us, confident about going through this five- or ten-year wave. It's not a top subject in the industry, but it's something we need to talk about.

"An aircraft is not a small thing, and we are responsible. In Europe there is strong regulation, which means you cannot abandon an aircraft."

For now, though, MRO is the big trend. "We work more with European airlines to do regular maintenance until the time the transition projects with lessors come back," said Pomes.

Tarmac Aerosave isn't aiming to be Europe's next big MRO, instead using its flexibility to take on smaller jobs at shorter notice than rivals can handle.

"Even if we are becoming bigger, we have the flexibility and this is our strength. We have many hangers, and we have three sites so we can move things around. Aviation is a really fast changing industry, and we are just surfing the wave," said Pomes. ●

This interview originally featured on a special Paris Air Show episode of ABNcast, the podcast from *Aviation Business News* (ABN), the parent media brand of *MRO Management*. To subscribe go to ABN's YouTube channel **youtube.com/@aviationbusinessnews**, or scan the above QR code.

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# PAINTING A NEW PICTURE

Two new aircraft paint shop developments – one in Qatar, one in the UK – signal how the aircraft painting sector is evolving with automation, sustainability and strategic integration into MRO networks

Aircraft painting is stepping into the spotlight as a more strategic and high-value part of the MRO landscape, now being recognised for its role in brand identity, surface protection and even operational efficiency. New developments in Qatar and the UK highlight this shift, with projects pointing to a more modern and integrated approach to aircraft coatings, combining advanced technology and sustainability.

In Qatar, the establishment of a widebody aircraft painting facility at Dukhan Air Base marks a significant strategic investment. Announced in June 2025, the joint venture between Qatar Airways, Barzan Holdings and Satys Aerospace will also see the construction of a multipurpose space to support light maintenance activities.

For Engr. Badr Mohammed Al-Meer, Qatar Airways Group chief executive, the facility is about far more than fresh liveries: "Together with Barzan Holdings and Satys Aerospace, we are introducing breakthrough technologies by building local capabilities that will define the future of Qatar's aerospace sector."

The site is designed to serve a broad range of aircraft types – from commercial jets to military platforms – and is billed as the first of its kind in the Middle East.

With the region's airlines continuing to expand their fleets and brand identities, the ability to conduct repainting and livery changes domestically will offer major time and cost savings.

Additionally, the facility's use of robotic automation and digital painting technologies reflects the sector's push towards smart maintenance.

In a joint statement, the partners say the venture supports the Qatar National Vision 2030 by building "high-value industrial capabilities, creating skilled jobs and promoting Qatar as a global leader in aviation technology and services."

Notably, the inclusion of eco-friendly paint systems and energy-efficient infrastructure underscores the growing environmental pressures on MRO providers to improve sustainability across all maintenance operations – including coatings.

Meanwhile, in the UK, Bombardier is advancing the construction of its new 51,000 sq ft paint facility at the London Biggin Hill Service Centre.

Once complete, the two-bay paint hangar will support Bombardier's Global, Challenger and Learjet aircraft. With demand for end-to-end MRO services growing – particularly among business

**"Painting is no longer just a finishing touch – it's an operational imperative"**

aviation customers who expect seamless turnaround and premium finishes – the new facility will enable Bombardier to provide a single-location experience that covers everything from heavy checks to final paint touch-ups.

Sander Podgoric, general manager of the London Biggin Hill Service Centre, says that the new facility "adds a sought-after service element to the already comprehensive offerings for our customers, ensuring they have a complete maintenance experience to help keep their aircraft in the air."

The investment has not gone unnoticed locally. Peter Fortune, Member of Parliament for Bromley and Biggin Hill, who visited the site in July 2025, has praised its economic contribution and how it will create more local jobs and opportunities.

Both the Qatar and Bombardier projects are indicative of a broader industry realignment, where aircraft painting is becoming a strategic capability embedded within wider MRO networks – supporting faster turnarounds, localising specialist services and aligning with decarbonisation strategies.

Paint hangars, once outsourced or geographically dispersed, are now being repositioned as high-value infrastructure assets. The integration of robotic systems, as planned in Qatar, offers clear productivity gains while reducing human exposure to harmful chemicals.

As fleets expand, and with sustainability goals placing fresh demands on every aspect of the aircraft lifecycle, painting is no longer just a finishing touch – it's an operational imperative.

Maintenance professionals must therefore consider how next-generation paint facilities can help future-proof their operations, reduce downtime, and support greener, more efficient MRO practices. ●

**1.** Representatives from Qatar Airways, Barzan Holdings, and Satys Aerospace sign the agreement


1

# MASTERING THE COMPOSITE CHALLENGE

Composites dominate modern aircraft, but their uneven surfaces demand specialist coating solutions. **René Lang** says Mankiewicz has the answer

Nowadays, composite materials are frequently used throughout aircraft. Even metallic aircraft incorporate composite parts in the cabin and on exterior components such as nacelles and stabilisers. In the latest generation of aircraft, composites dominate – from the hat rack to the wing box. They offer remarkable flexibility and stability but present challenges when creating a flawless surface.

Bare composite parts often have uneven textures, so achieving a smooth finish requires careful preparation. Let's spot how coatings can help to make them even.

## The flexibility challenge

Creating the ideal base for a perfect finish requires high-performing primers and fillers. Every coating layer – from primer to clearcoat – must be flexible enough to cope with movement and stress.

Flap stabilisers and nacelles need special primers that combine flexibility and vibration resistance with excellent adhesion. Mankiewicz addresses this challenge with Alexit FlexPrimer, a highly flexible primer that prevents cracking and adhesion loss in areas exposed to constant movement and vibration in flight.

For wing surfaces, Mankiewicz offers Alexit WingFlex – a repairable, process-optimised two-in-one coating that is the only system on the market developed for both the upper and lower wing boxes. It meets the aviation industry's demanding requirements for flexibility and durability.

1

> **“Every coating layer must be flexible enough to cope with movement and stress”**

**René Lang**, executive managing director aviation, Mankiewicz

## Smoothness from the first layer

Composite surfaces typically have more imperfections than other substrates, so correct preparation is essential to ensure a flawless finish. A smooth surface starts with the very first layers.

Mankiewicz has developed a specialised range of surface correctors for structural parts, addressing a wide variety of defects. Options include SprayFiller (spray gun application), KnifingStopper (spatula application) and RapidFill (spatula or spray gun) – each designed to streamline processes and reduce scrap.

2

A new development is the RapidFill cartridge, which mixes the material just in time at the tip. This innovation allows the fast-drying product – with its short pot life – to be used effectively on large surfaces, improving efficiency, precision and minimising waste.

Even interior composites require smooth, even surfaces to achieve seamless decorative and functional finishes. Alexit FST PrimeFill offers a 3-in-1 interior solution, acting as a pore filler, primer and filler in one. This eliminates the intermediate drying stage between filler and primer, saving application time, reducing weight and enhancing operational efficiency.

From exterior components exposed to the toughest conditions to interior surfaces demanding aesthetic perfection, Mankiewicz provides tailored solutions for all composite applications – ensuring flexibility, durability and a flawless finish from the first layer to the last. ●

**1.** Composites are true marvels of flexibility and stability and need fitting coating solutions
**2.** Composite materials require special coating products to ensure a smooth surface design

For more information about Mankiewicz, visit: **mankiewicz.com**

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# CLOSING THE COMPOSITE LOOP

The urgent necessity for composite recycling in the Asia-Pacific region holds the promise of sustainable solutions for end-of-life aircraft, writes **Chamika Willorage**

The Asia-Pacific (APAC) region holds a distinct advantage as home to more than half of the world's population, positioning it for rapid growth in air travel demand. This expansion will be driven primarily by the rise of the middle class, set to triple the number of air travellers. As a result, half of all global passenger journeys are expected to either originate from or be destined for APAC.

China remains the world's second-largest domestic passenger aviation market and will continue to lead the region, while India's fast-growing domestic sector is further boosting regional capacity.

In the global air cargo market, APAC accounted for 34.2% in 2024. Freight volumes are projected to double over the next two decades, growing at an average annual rate of 3.6%.

Meeting this combined passenger and cargo demand will require a substantial fleet expansion. According to the COMAC market forecast, APAC will account for 42% of all new aircraft deliveries worldwide by 2043 – some 18,854 passenger and freighter aircraft. This will support market growth and replace older, less fuel-efficient models, with more than 6,200 aircraft – around 30% of global retirements – expected to leave service over the same period.

## The need for capable recycling facilities

Despite this growth in aircraft operation, there are fewer end-of-life (EOL) aircraft facilities in the APAC region compared to North America and Europe, which presents both opportunities and challenges for sustainable aircraft decommissioning. The most significant challenge in this context is promoting efficient and environmentally responsible services for aircraft at the EOL phase. This includes developing specialised facilities capable of achieving high recovery rates for aircraft materials – a critical step in minimising landfill use and preventing environmental pollution.

Older generation aircraft, such as B747s and A330s, consist of a high percentage of aluminium, which is relatively easy to recycle. According to industry estimates, approximately 80-90% of an aircraft's weight can be reused, recycled or repurposed. Still, some materials, like certain types of plastics and composites, are more challenging to recycle. Several academic studies indicate that by the end of 2050, nearly half a million tonnes of accumulated carbon fibre reinforced polymer (CFRP) waste will be generated from the commercial aeronautical sector globally. Therefore, it is crucial to establish more composite recycling facilities and research centres to tackle this issue.

Modern aircraft such as the A350 and B787 increasingly incorporate lightweight composite materials like CFRP, which account for over 50% of their total weight. While this high utilisation improves durability and reduces fuel burn, it presents major challenges at the EOL stage due to the lack of economically viable recycling technologies. The technical complexity of composites remains a significant barrier to sustainable aircraft decommissioning. Current research indicates that only around 1% of CFRP is recycled – far below what is needed. This combination of high usage and low recycling rates underscores the urgent need for advanced, efficient composite waste recycling solutions.

**42%**

***According to the COMAC market forecast, APAC will account for 42% of all new aircraft deliveries worldwide by 2043***

**"THE APAC REGION HAS THE POTENTIAL TO BECOME A GLOBAL LEADER IN SUSTAINABLE AVIATION PRACTICES"**

◀ Chamika Willorage, senior maintenance control support engineer, Cathay Pacific Airways

## Recycling methods

When it comes to selecting the composite recycling technology, mechanical recycling is the simplest method due to its cost effectiveness, on-site processing capabilities and relatively low environmental impact. However, it is not the best option for recycling aerospace grade CFRP waste. It produces short fibres or powders with limited reuse potential.


▲ Specialised facilities are needed to recover aircraft materials, reducing landfill and preventing pollution

Producing high-end products from recycled composites requires recovering both fibre and resin while preserving their original properties. Thermal recycling methods such as pyrolysis and fluidised bed processes can achieve this by operating at high temperatures to decompose the resin matrix, producing longer, cleaner fibres with improved mechanical properties. However, these combustion-based processes carry environmental risks from emissions and ash.

Several studies mention that chemical recycling methods – using solvent-based or supercritical fluid techniques – also offer the potential to recover fibres with their properties largely intact. Yet, high operating costs and the challenge of managing chemical waste continue to limit their scalability in industrial applications.

More recently, electrically driven recycling methods, including electrochemical techniques and high-voltage fragmentation, have shown promise. By using electric energy to break down resin matrices, they can separate fibres with minimal damage.

All CFRP recycling methods require further development to optimise recovery rates while maintaining fibre strength. The usability of recycled fibres and resins depends on the quality they retain post-recycling, which may differ from virgin composites. Identifying viable applications for recycled materials – and verifying that they meet aviation's strict performance and safety requirements – will be essential for advancing sustainable composite recycling in the sector.

## A forward-thinking approach

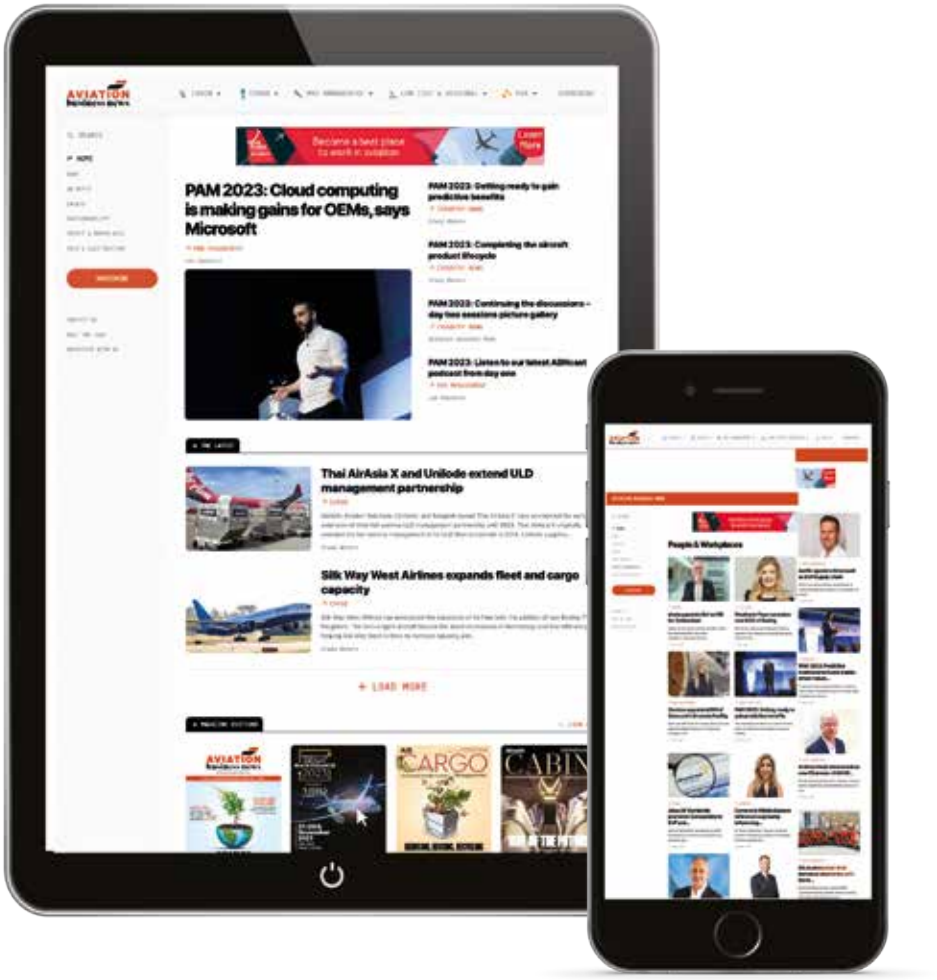
As the number of retiring aircraft rises, the APAC region must prioritise investment in composite recycling facilities and the support of innovative research initiatives. These measures will help prevent landfilling, improve the sustainability of aircraft EOL operations and position the region to meet future environmental and operational demands.

**"THE APAC REGION MUST PRIORITISE INVESTMENT IN COMPOSITE RECYCLING FACILITIES AND THE SUPPORT OF INNOVATIVE RESEARCH INITIATIVES"**

A strengthened focus in this area will also encourage the establishment of new EOL facilities across APAC. Locating composite recycling sites close to aircraft dismantling centres is vital to ensure long-term accessibility for composite waste collection. Key considerations in site selection include logistical constraints, preferential tax regimes, supportive government policies, the availability of skilled labour and the presence of technological infrastructure that fosters innovation.

Achieving this requires an integrated approach involving governments, civil aviation authorities, industry stakeholders and international organisations such as the Aircraft Fleet Recycling Association (AFRA). By working together, these stakeholders can ensure that sustainable decommissioning practices are embedded across the region.

With a forward-thinking approach centred on composite recycling, the APAC region has the potential to become a global leader in sustainable aviation practices. Integrating composite recycling into the region's aviation framework will contribute meaningfully to the worldwide shift toward greener aviation, safeguard natural resources and support longterm industry viability – all while addressing both environmental imperatives and the demands of a growing aviation market. ●

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# From acquisition to acceleration

Sharon Green explains how a recent acquisition and a pioneering blockchain partnership are reshaping the way Unical Aviation manages aircraft recycling

> **Unical and ecube are poised to lead the industry into a new era**

**SHARON GREEN**
chief executive, Unical Aviation

On September 5, 2024, Unical Aviation completed the acquisition of ecube Solutions, a specialist in aircraft storage, disassembly and transition services with operations in the UK, Spain and the US. The move marks a significant expansion of Unical's reach across Europe, the Middle East and Africa, while combining two complementary capabilities into a single powerhouse for aviation reuse. Together, Unical and ecube are poised to lead the industry into a new era – delivering first-of-their-kind projects such as A320neo teardowns and reducing time-to-market for critical aircraft parts across the globe.

In parallel, Unical and ecube have partnered with Block Aero Technologies to register their next 100 aircraft recycling projects under the AFRA CAAC programme, using blockchain-powered Registry as a Service. This cutting-edge approach creates secure digital product passports for every recovered component, offering unprecedented traceability from disassembly through to reuse in active fleets.

▲ Unical and ecube are ready to transform the industry landscape

Historically, one of the most persistent challenges for the used serviceable materials (USM) sector has been the lack of transparent and verifiable records for aircraft parts. Without a universally accessible and tamper-proof digital trail, buyers and regulators often faced delays, extra inspections, or even abandoned transactions due to trust concerns. These inefficiencies not only slow down maintenance schedules but also inflate costs and reduce the resale potential of otherwise valuable components.

Blockchain technology directly addresses these shortcomings. By establishing an immutable, real-time ledger accessible to all stakeholders, it delivers a trusted source of truth for component provenance. The system also streamlines compliance with Civil Aviation Administration of China (CAAC) requirements, improves operational efficiency and gives customers worldwide instant visibility into part provenance via an open registry portal.

By embedding blockchain into its circular economy strategy, Unical is redefining industry expectations around sustainability, transparency and value recovery. The integration of secure digital records with physical asset reuse sets a new benchmark for eco-responsible aviation asset management – strengthening customer confidence, enhancing regulatory alignment and reinforcing Unical's commitment to driving innovation across the aviation lifecycle. ●

▶ Unical, through its subsidiary ecube, is undertaking the first dedicated teardown programme for the A320neo family





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