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MRO

Management

PAPERLESS POWER

Joramco chief Fraser Currie on boosting MRO productivity and efficiency with digital transformation

P.24



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REGION OUTLOOK

Observations of MRO activity in Asia-Pacific

P.30

THE SAF EFFECT

Engine MRO in the shift to greener jet fuel

P.42

MAKING AN IMPACT

How 'new' tech can unlock deeper MRO insights

P.50

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WELCOME...

Traditional paper-based workflows have long been integral to MRO operations. But managing activity this way is becoming a hassle and costs a small fortune. By going digital, MRO workflows can be streamlined, admin costs can be slashed and teams will finally stop drowning in documents. Plus, digital systems don't just make things faster; they make them smarter.

Unlike paper records, which are prone to human error, digital solutions offer real-time updates and automatic data capture, ensuring that maintenance decisions are based on solid, up-to-the-minute information.

In an industry bound by strict regulations, keeping accurate and accessible records is non-negotiable. Digital solutions not only secure documents but also make compliance tracking a lot easier. And with cloud-based platforms, teams can collaborate like never before, speeding up decision-making and improving coordination, ultimately leading to faster aircraft turnaround times.

Going paperless is also a win for the environment; less paper means more trees saved, and it is a step towards slashing carbon emissions. Beyond saving the planet, digitalisation unlocks a treasure trove of data analytics, helping MRO providers predict maintenance needs, optimise inventory and keep everything running smoothly. That means fewer delays, less downtime and longer-lasting parts.

Sure, making the leap to paperless comes with its own set of challenges – like the need for hefty tech



Patarapoom/Adobe Stock

investments, finding time for training teams and beefing up cyber-security. And let's not forget the headache of integrating new systems with old ones. But if we're honest, these hurdles are small potatoes compared to the payoff.

Fraser Currie of Joramco shares more on this topic on page 24, highlighting how the MRO provider's move to paperless operations is uncovering productivity gains and revolutionising its maintenance execution.

As the industry dives deeper into this digital shift, it's worth asking – what's holding the sector back? Are the hurdles really that daunting, or is this just the future knocking? And if embraced further, what kind of efficiencies, savings and successes can be unlocked?

Craig Waters

Editor

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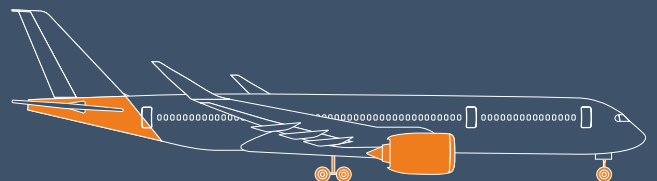


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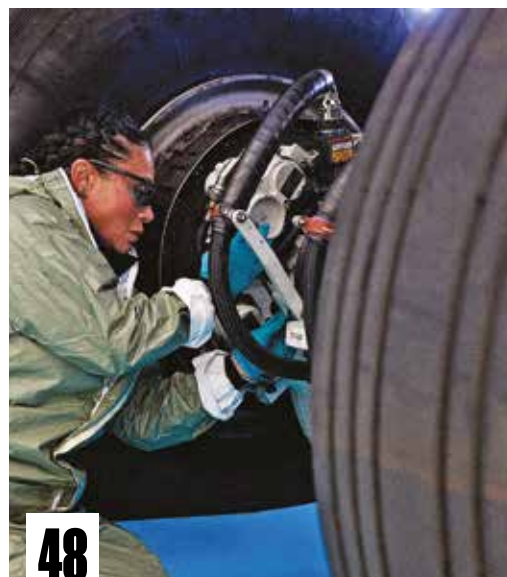
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Hangar Talk.

News from across the industry



TEARDOWN & DISASSEMBLY

EIRTRADE DISASSEMBLES ITS FIRST B777-300ER IN KNOCK

EirTrade Aviation announced it was disassembling its first Boeing B777-300ER in Knock, Ireland West Airport.

Once disassembly has taken place, the harvested material will be repaired to support EirTrade Aviation's B777 customer base.

EirTrade Aviation's Lee Carey said: "There is a shortage of B777-300ER material in the market. We are

experiencing strong demand and the aircraft comes with a freshly overhauled APU and landing gear with over nine years of green time remaining.

"Operators and maintenance facilities of the aircraft who are looking to source used serviceable material (USM) for the 777-300ER to reduce maintenance costs, will be able to access the material fast as we anticipate the teardown taking just 30 days."

The disassembly process will be coordinated in Knock and stock will be located at EirTrade Aviation's facilities in Dublin/Knock – Ireland, and Dallas in the US.

“There is a shortage of B777-300ER material in the market



BASE MAINTENANCE

HAECO and Cargolux agree base maintenance support extension

➤ HAECO has extended its base maintenance support agreement with Cargolux for its Boeing 747-400ERFs.

The extension will run from 2026 to 2028 and will take place at Luxembourg airport where the all-cargo airline's twin-bay widebody hangar is located alongside 14 in-house support shops.

HAECO already offers comprehensive line maintenance support to ensure optimal dispatch reliability for Cargolux's fleet.

HAECO Xiamen's Kevin Guan said: "Building on the success of the initial cooperation that began in 2018, this new agreement not only reflects Cargolux's confidence in our services but also highlights our jointly shared commitment to excellence."

“The extension will run from 2026 to 2028 and will take place at Luxembourg airport



DIGITALISATION

Eurowings achieves digital 'milestone' with Aviator eTLB integration

➤ Eurowings Technik has become the first CAMO organisation in the Lufthansa Group to complete the introduction of the Aviator Electronic Technical Logbook (eTLB) for the entire fleet of Eurowings' flight operations.

Paper-based cockpit processes such as pre-flight checks and logging of technical defects by crew on forms, which was previously entered manually causing delays, are now redundant.

By connecting to AMOS, the maintenance and engineering software used by Eurowings Technik, the eTLB solution enables the communication between crew and maintenance in nearly real-time and provides information on the technical condition of the respective aircraft.



LOT Polish Airlines

BRIEFS

● Lufthansa Technik has secured a new engine maintenance services contract for the CFM56-7Bs of LOT Polish Airlines' Boeing 737NG fleet.

● A new Bombardier facility for light scheduled and unscheduled MRO has opened at Farnborough Airport. It will also provide AOG support with technicians certified to offer OEM support to all Learjet, Challenger and Global aircraft.

● At its Basel facilities, AMAC Aerospace has completed A1, A2, A3 and C3 maintenance checks and seat refurbishment on a privately owned A319.

● ecube has added a new purpose-built hangar facility at its HQ in Wales. Designed to accommodate a B757, the facility adds to ecube's offerings at the base, accommodating transition services across both Airbus and Boeing narrowbody aircraft.

● The Aircraft Fleet Recycling Association (AFRA) and the International Aerospace Environmental Group (IAEG) have agreed to work together to promote environmental responsibility and the circular economy. The partnership will focus on developing and promoting safe and sustainable management of aircraft components and fostering circular economy principles.

IN NUMBERS

27

The Lufthansa Technik
TCS contract covers
27 Air India B777s

10,000

Etihad Engineering trains
more than 10,000 aviation
professionals annually

14

Cargolux's hangar at
Luxembourg airport is located
alongside 14 support shops



LINE MAINTENANCE

LOONG AIR SELECTS HAECO FOR LINE MAINTENANCE IN HONG KONG

HAECO has signed a line maintenance contract with Hangzhou-based air carrier Loong Air.

It is the first line services agreement between HAECO and the airline.

Under the agreement, HAECO will provide a comprehensive range of line maintenance services, including Certificate of Release to Service, transit support (both technical and non-technical), transit cleaning, and ground services equipment for Loong Air's Airbus A319, A320ceo, A320neo and A321neo aircraft at Hong Kong International Airport.

HAECO's Gerald Steinhof said: "This contract highlights our capabilities in providing top-notch line maintenance services and reinforces our position as a trusted MRO partner for airlines worldwide."

"We look forward to a successful collaboration with Loong Air as we support their operations in Hong Kong with our best-in-class services."

“

It is the first line services agreement between HAECO and the airline



petty/Adobe Stock

WHEELS & BRAKES

Czech Airlines and CSAT announce new wheels and brakes partnership

> MRO provider Czech Airlines Technics (CSAT) announced it has formed an exclusive wheels and brakes partnership with Czech Airlines.

CSAT says its components and spares division will offer full-scale wheels and brakes support for Czech Airlines' fleet, ensuring optimal performance and safety.

CSAT's Martin Mintěl said: "With a rich history of collaboration, this partnership marks a continuation of our shared legacy and commitment to excellence."

"CSAT's major stock of wheels, brakes and slides allows us to meet Czech Airlines' needs promptly and efficiently, reinforcing our dedication to delivering top-tier MRO services."

“

This partnership marks a continuation of our shared legacy and commitment to excellence



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“This collaboration underscores Citilink’s unwavering commitment to delivering the highest safety and performance standards”

Dewa Rai, president and chief executive, Citilink



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COMPONENT SUPPORT

Lufthansa Technik wins component support contract for Air India B777s

Lufthansa Technik has signed a multi-year agreement to provide Total Component Support (TCS) for Air India’s entire Boeing 777 fleet.

This is the first contract signed between the two parties since Air India’s takeover by Tata Group, and the agreement covers services for a total of 27 aircraft.

The TCS includes the MRO of aircraft components and provides Air India access to Lufthansa Technik’s global component pool and logistics services.

The partnership will enable Air India to maximise efficiency in its technical operations and ensure the best possible availability of the spare parts it needs.

“**The agreement covers services for a total of 27 aircraft**



Markus Munka/Adobe Stock

COMPONENT SUPPORT

Citilink and Turkish Technic sign A320 deal

> Low-cost airline Citilink has awarded Turkish Technic a component support contract for its fleet of Airbus A320s.

Citilink will benefit from component pooling, repair, overhaul, modification, home base kits and logistics services, plus landing gear overhaul services.

Citilink’s Dewa Rai said: “This collaboration underscores Citilink’s unwavering commitment to delivering the highest safety and performance standards, ensuring a seamless, comfortable and hassle-free air travel experience for our valued passengers.”



zapper/Adobe Stock

ENGINE MRO

SR Technics and Asiana extend PW4000 maintenance agreement

> SR Technics has signed a five-year extension of its PW4000 engine maintenance agreement with Asiana Airlines.

The work on the engines will be carried out at SR Technics’ facilities at Zurich Airport in Switzerland.

SR Technics has been maintaining Asiana Airlines’ fleet of 15 A330 aircraft for the last five years.

Hoon Bae, principal general manager of purchasing at Asiana Airlines, said: “We are pleased to select SR Technics as our PW4168 MRO service provider for another five years.

“We are committed to providing our customers with quality service through this partnership.”

Owen McClave, chief executive of SR Technics, said: “The extension of the PW4000 agreement with Asiana Airlines demonstrates our top quality and reliability, offering our customers impeccable support to their business for many years to come.”

“**We are committed to providing our customers with quality service through this partnership**



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Queen Alia International Airport - Jordan

In the Spotlight.

The latest partnerships, appointments
and innovations advancing the MRO sector



PEOPLE NEWS

C&L Aerospace has appointed Amanda Hartwig as regional sales manager.

Based in Illinois, Hartwig will provide regional aircraft parts support for the northern half of the US and Canada.

Hartwig's focus will be on E170/190, ATR 42/72, Beechcraft 1900 and Saab 340 aircraft, and to provide support for PW 100 and CT7 engines and engine parts.



coreDESIGN/Adobe Stock

BLOCKCHAIN

Air France Industries KLM Engineering & Maintenance (AFI KLM E&M) and Parker Aerospace Group have launched a blockchain platform for back-to-birth tracking of aircraft parts.

Using SkyThread's Blockchain-based platform, AFI KLM E&M can access the complete history of each Parker aircraft part, from new to removals from supported 787 fleets.

The platform is now live for the 787, tracking hundreds of thousands of parts.

FINANCE

Magnetic Leasing secured a term loan from volofin Capital Management to finance mid-life narrowbody aircraft, engines and landing gears.

This marks Magnetic Group's first structured financing facility, aligning with its expansion strategy.

The portfolio's initial assets include two A321-200 aircraft leased to SmartLynx Airlines, and various engines and landing gear leased to companies including MTU and Lufthansa Technik.



SWISS

FUEL QUALITY

Conidia Bioscience has launched Fuelstat One, a new test kit that can rapidly detect microbial contamination in jet fuel.

It can be used throughout the fuel supply chain and detects markers of bacteria that can grow in jet fuel, potentially causing operational downtime and severe safety issues.

PEOPLE NEWS

Eyjolfur Vestmann Ingolfsson is the new head of materials and logistics at Challenge Group, focusing on augmenting the firm's portfolio of sustainable and cost-efficient recycled aircraft parts services.

Ingolfsson will ensure the effective provisioning, procurement, inventory management and distribution of spare parts essential for its aircraft fleet, as well as upholding safety and regulations.



victor/Adobe Stock





Victor Stepanov / Adobe Stock

INDUSTRY PERSONNEL

Boeing's 2024 Pilot and Technician Outlook (PTO) indicates that 674,000 pilots, 716,000 maintenance technicians and 980,000 cabin crew members are needed over the next 20 years to support growing commercial fleets and meet the long-term increase in air travel.

Boeing's Chris Broom said: "Driven by aviation traffic trending above pre-pandemic levels, personnel attrition and commercial fleet growth, the demand for aviation personnel continues to rise."

TRAINING

Etihad Engineering has welcomed the first batch of aircraft maintenance trainees from the Vision Concept Aviation Training Institute (VCATI) who have graduated after completing their Aircraft Maintenance On the Job Experience (OJE) Programme.

The graduates will now start full-time positions with the company.



DIGITALISATION

IFS acquired EmpowerMX, an AI-powered aviation maintenance software provider specialising in airframe MRO.

Dinakara Nagalla from EmpowerMX said: "With IFS' global presence, EmpowerMX can help our MRO clients deliver faster turnaround, drive bottom line growth and leverage the AI capabilities we are infusing into our products."



200

There will be more than 200 exhibitors at MRO Asia-Pacific 2024 (from Event Preview feature, p.36)



12

Landing gear is required to be overhauled every 10-12 years (from Boeing Q&A feature, p.48)



24,000

A total of 240,000 gallons of SAF will be delivered to Embraer in 2024 (from SAF & Engine MRO feature, p.42)



60

The number of Aerostar employees has risen from 28 to 60 since the Covid pandemic (from Industry Voices feature, p.38)





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VP Sales & Marketing

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FARNBOROUGH INTERNATIONAL AIRSHOW 2024 ROUND-UP

The UK's Farnborough International Airshow returned in July, where industry leaders unveiled new projects and secured significant deals. Here's a round-up of some of the key highlights

ENGINE MRO

Sanad and Air Mauritius sign Trent 700 MRO agreement

Sanad signed a three-year partnership with Air Mauritius to deliver MRO services for Rolls-Royce Trent 700s.

Sanad's Mansoor Janahi said: "This collaboration epitomises our commitment to not only expanding our global presence but also supporting the global aviation supply chain ecosystem from our home base in Abu Dhabi."

ENGINE MRO

TUI and GE sign new engine MRO agreements

GE Aerospace announced an extension to its current services agreement with TUI Airline, as well as a new TrueChoice Service agreement that covers the MRO of the airline's GENx engine-powered Boeing 787 commercial fleet.

GE Aerospace's Russell Stokes said about the continued partnership: "This is a testament to the journey that started in 2005 between GE Aerospace and TUI Airline, as the GENx launch

customer. It's a privilege to continue delivering exceptional services and customer support."

The services extension comes in preparation of the transition to the new TrueChoice engine maintenance offerings for TUI's GENx fleet.

FACILITIES

Collins relocates to \$250m facility in Singapore

Collins Aerospace announced the relocation of its Singapore manufacturing facility to a new, state-of-the-art site in Seletar Aerospace Park, Singapore.

Collins Aerospace says the move represents a significant investment of \$250 million and will bolster its capabilities and commitment to innovation and excellence in the aerospace industry.

Scheduled to begin construction in the fourth quarter of 2025, the new facility is expected to be completed by 2027 with production anticipated to commence in 2028.

ENGINE SELECTION

Sky Airline chooses GTF engine to power Airbus fleet

Sky Airline entered into a Memorandum of Understanding (MoU) with Pratt & Whitney to select the GTF engine to power 10 firm Airbus A321XLR aircraft, with options for 29 A320nes and A321neos.

The selection makes the Chilean-based low-cost airline a first-time Pratt & Whitney customer.

Pratt & Whitney's Rick Deurloo said: "These engines and aircraft will enable

Sky to continue its route expansion while delivering industry-leading fuel efficiency and low CO2 emissions."

Sky Airline's Juan Pablo Latorre said: "As we continue to grow, Sky remains focused on making travel accessible, affordable and sustainable. The A320neo family aircraft powered by GTF engines will provide both environmental and economic advantages."

ENGINE MRO

Thai Airways extends GE90 engines MRO agreement

Thai Airways signed a six-year agreement to extend its TrueChoice Service with GE Aerospace that covers the MRO of the airline's GE90 engine powered Boeing 777 commercial fleet.

Thai Airways' Chai Eamsiri said: "GE Aerospace continues to prove itself as the right maintenance provider for our GE90 engines. This agreement extension ensures comprehensive coverage for our engines well into the future."

Thai Airways and GE Aerospace recently announced a GENx order for the airline's 787 Dreamliner fleet expansion. The airline says it also plans to operate the A321neo with CFM LEAP engines.





russell102/Adobe Stock

2

ENGINES & AFTERMARKET

Air Niugini and Pratt & Whitney conclude agreements

National carrier of Papua New Guinea Air Niugini and Pratt & Whitney finalised engine and aftermarket agreements for the GTF engines that will power the airline's fleet of 11 A220s.

Pratt & Whitney will provide a full suite of support services with a 12-year EngineWise comprehensive agreement.

The order also means that Air Niugini becomes a first-time GTF customer.

Air Niugini's Gary Seddon said: "This is an exciting time for Air Niugini as we modernise our fleet."

"By upgrading next-generation aircraft with the most efficient engines, this will revolutionise travel for our passengers, ensuring significant reduction in fuel consumption and emissions while expanding our route offerings and enhancing passenger experience."

SUSTAINABILITY

Avolon and Airbus join forces on hydrogen-powered aircraft developments

Avolon is to partner with Airbus to support the development of hydrogen-powered commercial aircraft through Airbus's ZEROe Project.

"This is an exciting time for Air Niugini as we modernise our fleet"

Airbus and Avolon will investigate how future hydrogen-powered aircraft could be financed and commercialised, and how they might be supported by the leasing business model.

Airbus revealed its ZEROe hydrogen-powered aircraft ambition in 2020, focused on pioneering the technology required for hydrogen flight and developing the ecosystem to support it.

Avolon says that it shares Airbus's commitment to achieving the aviation sector's decarbonisation goals, and has a track record of being a thought leader on future technologies through its investment in eVTOL developer Vertical Aerospace, and research into sustainable aviation fuel (SAF) production.

Avolon says it is also committed to having a fleet that comprises 75% new-technology lower emissions aircraft by the end of 2025.

Avolon's Paul Geaney said: "Joining the ZEROe Project is another step in Avolon's sustainability journey."

"It will take a wide ecosystem of contributors to meet the challenges of



lanDewarPhotography/Adobe Stock

3

hydrogen-powered commercial flight, and Airbus is playing a crucial role in bringing partners together.

"While we continue to focus on supporting our customers in modernising their fleets with lower emissions aircraft, it is also vital we look beyond that at what can further drive our industry's decarbonisation."

Airbus's Glenn Llewellyn said: "There is real value in bringing together industry leaders to help solve the challenges facing aviation. We know we can't solve decarbonisation alone and welcome Avolon's expertise and worldwide leadership in the aircraft leasing business."

"Working together to consider how the transition can be commercialised and financed for airline customers is crucial to success."

AIRCRAFT CERTIFICATION

Embraer's E-Freighter secures type certification

Embraer's passenger to full cargo conversion, the 190F E-Freighter, has been certified by the National Civil Aviation Agency of Brazil (ANAC).

The aircraft is also due to receive EASA and FAA certification later this year and for the cargo loading system shortly after.

1. The signing between Sanad and Air Mauritius
2. TUI Airline Boeing 787
3. Thai Airways Boeing 777



2



Boeing
3

Making its public debut at the Farnborough International Airshow, the aircraft was developed to fill a gap in the air cargo market and to replace older less efficient models.

Embraer's Carlos Naufel said: "This important step shows that Embraer has the engineering and MRO skills necessary to present an outstanding product and services for our customers."

"We are ready to support the operators interested in expanding their activities in the cargo market with the best-in-class service."

ENGINE ORDERS

Avolon orders P&W and CFM engines to power A320neos

Avolon placed orders for 310 new engines to power 155 A320neos in its order book.

The order was for 160 GTF engines from Pratt & Whitney and 150 LEAP-1A engines from CFM International. The order is valued at over \$5 billion at current list prices.

"The addition of GE90-110B engines will enhance the efficiency of our cargo fleet"

The agreement also includes options to purchase a further 160 Pratt & Whitney engines and 150 CFM International engines.

Avolon's Andy Cronin said: "Engine innovation has been one of the key tools to lower emissions and support the industry's decarbonisation journey. We are delighted to be working with both Pratt & Whitney and CFM International, and excited about leveraging their engines to support the transition of our fleet to more fuel-efficient technology."

Both engine types help to lower carbon emissions by delivering at least 15% reduced fuel consumption compared to previous generation engine technology, and also reduced noise levels.

ENGINES & SERVICES

Turkish Airlines and GE sign 777F GE90-110B engines and services deal

GE Aerospace and Turkish Airlines signed a combined engines sales and TrueChoice flight hour agreement for eight GE90-110B engines to power four Turkish Cargo Boeing 777 Freighters.

Turkish Airlines' Levent Konukcu said: "The addition of GE90-110B engines will enhance the efficiency of our cargo fleet, reinforcing our position as one of the top three air cargo carriers globally."

"As Turkish Cargo continues to grow and strengthen its Istanbul home base as a leading logistics hub, these advanced engines will be very beneficial in achieving our goals."

TRAINING & DEVELOPMENT

Sanad and Rolls-Royce collaborate to foster next-gen aviation leaders

Sanad unveiled a new collaboration with Rolls-Royce focused on nurturing the next generation of leaders in the aviation sector.

Starting in September 2025, Rolls-Royce and Sanad will jointly select outstanding talents from Sanad who demonstrate robust leadership potential to join the Rolls-Royce team in the UK for six months.

This annual initiative aims to equip future leaders with industry-leading skills in aerospace MRO operations, thereby bolstering both Sanad's and the UAE's efforts to cultivate top-tier talent in the aviation industry.

TRAINING & DEVELOPMENT

Vallair and College de Paris International to develop technical training programmes

Vallair and the College de Paris International signed a Memorandum



1

of Understanding (MoU) to collaborate across a broad spectrum of aeronautical skills training, certification and development programmes.

The training programmes will be delivered by Aircraft Academy, a Vallair Group company.

Vallair Group's Grégoire Lebigot said: "The world needs aircraft technicians and we as an aeronautical company believe it is our responsibility to divert resources and energy to ensure that the pool of well-trained and enthusiastic people is fresh and mobile."

CABIN MODIFICATIONS

Lufthansa Technik to modify Dreamliner cabins under new Boeing license

Boeing and Lufthansa Technik announced an agreement to designate Lufthansa Technik as the first Boeing-licensed Service Centre (BLSC) for cabin modifications on 787 Dreamliners.

As a BLSC, Lufthansa Technik is licenced to perform interior



4

modifications on the 787 as an external MRO service provider.

The announcement means that operators, lessors and other companies with 787 cabin modification needs will now have the choice to work with Lufthansa Technik.

As a BLSC for 787 cabin modifications, Lufthansa Technik can design a new cabin interior, provide the associated engineering and perform the integration in accordance with the customer's wishes.

Along with the licence granted by Boeing, Lufthansa Technik will also cover certification of the modification projects. The cabin modifications on the long-haul widebody will be performed at one of the MRO provider's global network facilities.

The two parties state they will continue to make the necessary preparations to enable Lufthansa Technik to start its first 787 cabin modification project in 2025.

COCKPIT TECHNOLOGIES

United chooses suite of Honeywell cockpit technologies for 737 MAX

United Airlines selected Honeywell to provide a wide range of avionics for the airline's new 737 MAX aircraft that will enter service over the next decade.

The order includes a suite of technologies such as the industry's only 3D weather radar, new 25-hour flight data recorders and advanced traffic avoidance systems. ●

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CAPACITY BOOST AND DIGITAL TRANSFORMATION

Having increased its aircraft capacity offering, Joramco's **Fraser Currie** says leveraging digital tools will be a game-changer in its execution of MRO activity



“BY LEVERAGING AI TOOLS, ERRORS ASSOCIATED WITH THE PAPER ENVIRONMENT WILL BE ELIMINATED”

FRASER CURRIE

chief executive, Joramco

Located in a strategic region with access to a global customer base, Joramco has built a strong track record as a leading independent commercial aircraft MRO facility over six decades by serving a wide range of customers in the Middle East, Europe, South Asia, Africa and the CIS countries.

Since Joramco became part of Dubai Aerospace Enterprise (DAE) in 2016, we have embarked on a transformative journey characterised by extensive expansion and development. This journey has strengthened our competitiveness and fortified our position in the global market.

Our strategic location in Amman, Jordan, less than five hours flight time from many European and Asian superhubs, brings the entire global widebody fleet (approximately 6,000 aircraft) within our reach. Coupled with our approval to service 15 aircraft types and over 25 regulatory approvals, Joramco's story becomes even more compelling.

ORGANIC GROWTH

For those of you that follow Joramco, you will be aware of our well-defined initiatives to continue our track record of organic growth.

A cornerstone of this growth is our greatest asset – our people – and central to this is the expansion our world-class training academy which will ensure that



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we continue to match and exceed our internal demand for future engineers.

As part of this growth, we have invested in a new state-of-the-art training academy adjacent to our main facility at Queen Alia International Airport in Amman, Jordan. The new academy will allow us to more than double the number of students year on year.

The academy has accredited licences from the European Aviation Safety Agency (EASA) and our local authority the Jordanian Civil Aviation Regulatory Commission (CARC) and is an approved examination centre for EASA Part 66.

The academy operates a four-year programme consisting of two academic years followed by two years of practical experience at Joramco's facility.

In terms of new hangar and shop capacity, this is where the significant growth comes from; five additional widebody and narrowbody lines added give us a 22-line capacity.

Joramco's new giant 'Hangar 7', which started construction in January 2024,



2

will be A380 capable whilst in parallel accommodating four narrowbody aircraft. This expansion of capacity is driven by the increasing demand from airlines and operators globally.

GAME-CHANGING EFFICIENCIES

We have embarked on the latest stage of our 'Transformation Journey' which focuses on digitalisation and to achieve our ultimate goal of transitioning to a 'paperless environment'.

Joramco's extensive growth strategy, including the construction of the new Hangar 7, has increased our capacity to 22 lines of widebody and narrowbody aircraft, therefore reinforcing the need



3

“ LEVERAGING DIGITAL TOOLS WILL HELP US DELIVER GREATER DECISION SUPPORT ”

for optimisation of processes to ensure that changes are sustainable. The shift to paperless activity is a major step towards achieving those goals.

Going paperless will result in migration from the traditional paper, ink and stamp methodology of maintenance documentation to an environment of eTask cards and digital sign-off secured by biometrics including facial recognition when affixing digital stamps during maintenance execution.

With the migration to this paperless environment and the inherent changes in workflow, the paperless project will unearth and deliver productivity and efficiency gains in what is set to be a game-changer in the execution of maintenance.

By leveraging the advantages of digitalisation, we are set to benefit from further safety and regulatory compliance with improvements in the quality of paperwork and re-enforcement

of progressive sign-off which makes for easily searchable and auditable work packs.

By leveraging artificial intelligence (AI) tools, errors associated with the paper environment will be eliminated whilst AI and machine learning (ML) will support the mechanics and certifiers in ensuring much greater accuracy of mandatory fields.

With all the productivity gains, there will be an increased presence on the aircraft as everyone works off their tablet to access all maintenance documentation.

This increased physical presence on the aircraft, which results in more supervision and easy access to manuals, will continue to enhance safety.

We believe that leveraging digital tools will help us deliver greater decision support and provide a wide range of associated benefits for our customers. ●

1. Joramco is known as a leading independent commercial aircraft MRO business
2. Ryanair is a long-standing Joramco customer
3. Joramco serves customers in the Middle East, Europe, South Asia, Africa and the CIS countries

Making your mark

Jason Dickstein explains that branding your repair station with a trademark is a smart move

HOW DO YOU PROTECT YOUR BRAND?

Imagine that a competing repair station opens up across the street from you, with the same ratings and capabilities. Its street address is similar to yours. How would your customers distinguish the two repair stations, and know to whom they wanted to send their parts for overhaul?

Businesses distinguish themselves using their trademarks, and this is particularly important in the aviation realm where companies work so hard to build safety reputations and the related brands.

In the US, you can have a common law trademark or you can have a registered trademark.

TRADEMARK BASICS

In most cases, a trademark is word or image that one uses to indicate the source of goods or services. If I name my business 'Jason's Safety Specialists', then I might want to use my company's name as an indicator of who has performed the maintenance that my company performs. This is a way to distinguish my company's services from those offered by my competitors.

Your business name is probably a trademark that you use, but you may use other trademarks as well. If you use an image that customers associate with your goods or services (or that you want them to associate with your goods or services) then this can be a trademark.

Take Boeing's trademark for example, which is a graphic signature that consists of the Boeing symbol together with the Boeing logotype (the company name in Stratotype letters). Most people in the industry (particularly those buying aircraft) will recognise the Boeing logo as an indication that goods



“
THE POINT OF A TRADEMARK IS TO ENSURE THAT YOUR IDENTITY IS NOT CONFUSED WITH THE IDENTITY OF SOMEONE ELSE
”

JASON DICKSTEIN

president, Washington Aviation Group

and services associated with this mark have come from Boeing.

Many people will also recognise that the Boeing symbol is very similar to the McDonnell Douglas logo that Boeing would have acquired in the merger between the two companies.

You can also trademark phrases that are associated with your goods or services. For example, Airbus has trademarked the phrase 'We make it fly'.

In order to be a trademark that you can protect, the trademark typically cannot be merely descriptive. 'The Maintenance Facility' might be merely descriptive of a repair station (in a way that a more fanciful name like 'Chromalloy' is not), and thus it might not be something that could be registered as a trademark.

There are exceptions to this rule, though. If the name acquires secondary meaning (e.g. if people associate it specifically with your business) then it might be subject to registration even though it appears



to be merely descriptive (in this case, you would have to present evidence to show that the mark was not merely descriptive because it had acquired secondary meaning).

Typically, there are two ways to 'protect' your trademarks: through common law rights or through registration.

COMMON LAW TRADEMARK

A common law trademark typically arises as a consequence of the use of the mark.

Typically, your common law trademark is protected under state rights (because there is no federal common law trademark). The modern trend is for state laws to assign certain requirements to common law trademarks, so if you want to rely on the common law to protect your trademark, then you should investigate your state's requirements and make sure that the common law will continue to apply to your trademark.

TRADEMARKS ARE AN IMPORTANT PART OF YOUR BRAND IDENTITY AND YOUR STRATEGY FOR PROTECTING YOUR BRAND IDENTITY

TRADEMARK REGISTRATION

You can register your trademark at the state level or at the federal level.

Generally, states tend to have offices that will register your trademark. This can be useful if you only intend to use your trademark in that state. Most aviation businesses tend to market in more than one state and seek customers from more than one state. For this reason, if you are going to register your aviation-business-related trademark, then it may make sense to register it with the US government (a 'federal registration').

In order to accomplish a federal registration, it makes sense to perform a trademark search to assess whether

it is already in use (this is not a legal requirement, but it is a practical requirement so that you don't waste your time filing for a registration that might not be issued). The US trademark search engine (tmsearch.uspto.gov) can help anyone to examine existing registered (and filed) trademarks that might conflict with your proposed registration.

What if you find your business name has already been taken by someone else? Don't despair! That does not necessarily mean that you cannot register it, too. You need to examine how the other company is using the trademark to assess whether there is any likelihood of confusion.

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“
**BUSINESSES DISTINGUISH THEMSELVES
USING THEIR TRADEMARKS, AND
THIS IS PARTICULARLY IMPORTANT IN
THE AVIATION REALM**
”

One key phrase associated with trademark law is ‘confusion, deceit or mistake’. A purpose of a trademark is to clearly identify the source of goods or services without permitting confusion, deceit or mistake. So, if you see that another business is already using your name, you need to assess the likelihood of confusion, deceit or mistake.

You can have identical trademarks that are not confusing. For example, ‘Dove’ is the trademark of a soap, and it is also the trademark of an ice cream. Reasonable people do not confuse these products. There is no confusion, deceit or mistake so both trademarks are able to co-exist without conflict.

The Trademark Office will do their own research to assess likelihood of confusion. For example, a company that made snow skis used the trademark ‘Trak’. Another company wanted to

register the name ‘Traq’ for racquet ball rackets. The Trademark Office found that the names looked similar and sounded nearly identical when pronounced out loud. This created a possibility of confusion. The Trademark Office also found that there are companies that produce both snow skis and racquet ball rackets under one brand name, so this exacerbated the likelihood of confusion. Ultimately the Trademark Office rejected the second registration because they found that ‘Traq’ would have caused confusion among consumers.

If I wanted to start my own aircraft manufacturing company and call it ‘Beau Wing’, there is a strong likelihood that this would be considered confusingly similar to Boeing.

Note that if there is clear confusion, deceit or mistake between your

trademark and the mark used by someone else, then you may have other remedies if you can show you were the prior user (e.g. you used it first), although your rights may be limited only to those jurisdictions in which you can prove you used the mark. If you are asking questions this deep, then you should be working with an attorney who can help you through the process.

The point of a trademark is to ensure that your identity is not confused with the identity of another organisation in a way that might cause confusion, deceit or mistake with respect to the source of goods and services.

Trademarks are an important part of your brand identity and your strategy for protecting your brand identity. Got more questions? Feel free to get in touch with me – I love to help companies with intellectual property issues. ●

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SUNNY, WITH SUPPLY CHAIN CLOUDS

The Asia-Pacific airline market is approaching a huge growth period, so its MRO sector has to prepare appropriately. **Bernie Baldwin** reports on the outlook for MRO in the region and how the challenges may be overcome

The trend for vast numbers of aircraft to be ordered by Asia-Pacific (APAC) airlines in recent years continues apace in 2024, exemplified by the purchases and agreements announced at the recent Farnborough International Airshow by a diverse range of carriers including Japan Air Lines, Korean Air, Vietjet, Cebu Pacific Air, Drukair and Air Tahiti.

Every order, of course, changes the long-term outlook for the MRO business across the APAC region. But for companies in that sector, there is the near future to think about, especially when there are challenges in acquiring spare parts and components.

Gerald Steinhoff, chief commercial officer at Hong Kong Aircraft Engineering Company (HAECO), offers an overview of how the MRO market across the huge region is faring, and his expectations for the year ahead. “The MRO market in the Asia-Pacific

region is currently performing strongly, with demand for base maintenance exceeding available shop capacity,” he declares.

Steinhoff adds: “Most MRO providers in the region, including HAECO, have secured a significant number of contracts for the next 12 months, indicating robust demand from airlines across APAC. This has led many airlines to shift from a reactive approach to making quicker decisions and longer-term commitments with MRO providers, prioritising faster turnaround times to support their fleet deployment.

“MRO providers in the region, however, are facing challenges, such as cost inflation and skilled labour shortages. To address these issues, HAECO is investing in innovative technological solutions to enhance operational efficiency such as drones, robotics and customer collaboration platforms,” Steinhoff reports.



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He continues: “While some MRO providers have announced capacity expansion plans, it remains uncertain whether these efforts can fully alleviate the current supply pressures in the near term. Overall, the outlook for the Asia-Pacific MRO market remains positive, with strong demand and a focus on technological advancements to ensure the industry’s continued growth and resilience.”

Colin Gregory, senior vice president of sales, Asia and Pacific region at AAR, believes the APAC MRO market has rebounded significantly since the Covid-19 pandemic. “This resurgence is driven by several key factors, led by the region witnessing a substantial increase in air travel demand as travel restrictions ease. This is driving higher aircraft utilisation, which in turn boosts the demand for MRO services,” he explains. “Secondly, the airlines are expanding and modernising their fleets to accommodate growing demand. And newer aircraft require sophisticated MRO services, fuelling the market further.”

Gregory expects the next 12 months to be characterised by the industry’s continued recovery, digital transformation, sustainability initiatives and skilled workforce development. “First, the MRO market is likely to continue

its recovery trajectory as international travel resumes more fully and demand increases,” he predicts. “Meanwhile, a strong focus on digital transformation within the MRO industry will continue. Technologies such as predictive maintenance, augmented reality (AR) for remote inspections and blockchain for supply chain management will gain more traction.

“Finally, there will be a significant push towards creating a skilled workforce to meet the rising demand. Training programmes and partnerships with educational institutions will be crucial,” Gregory adds.

After that overarching view, Gregory picks out some specific trends in sub-regions. “In North Asia, we see Japan’s MRO market focusing on high-tech solutions and partnerships with global MRO providers,” he says. “The country is leveraging its technological prowess to innovate in maintenance processes. Meanwhile, South Korea is investing in expanding MRO capabilities, particularly in digital solutions and sustainability, as it aims to become a regional MRO hub. Still in North Asia, Taiwan is enhancing its MRO infrastructure with a focus on servicing the growing fleet of narrowbody aircraft. Collaboration with international MRO firms is also on the rise.”

Gregory continues: “In Southeast Asia, Singapore – a leading MRO hub – continues to dominate with its comprehensive service offerings and strategic location. The focus there remains on digitalisation and sustainability. Malaysia and Indonesia are each enhancing their MRO infrastructure to meet the growing regional demand, with a particular focus on attracting international MRO business. Further north, Thailand is expanding its MRO capabilities with new facilities and technology upgrades. The

1. HAECO’s Hangar 1 is currently under construction at Xiamen Xiang’an International Airport. Scheduled to begin operations by 2026, the facility is set to become the largest single-span aircraft maintenance hangar in the world

2. Parts suppliers such as AAR will have a significant role to play in tackling the supply chain problems that APAC MRO providers are currently experiencing



“APAC will become by far the largest MRO market by 2034”

Dennis Kohr, senior vice president of corporate sales Asia-Pacific, Lufthansa Technik

2.5%

MRO spend in APAC will grow at an average of roughly 2.5% CAGR (comparable average growth rate) by 2034

government there is supporting this growth through favourable policies. Elsewhere, Vietnam is emerging as a new player in the MRO market, while the Philippines is focusing on developing its workforce and upgrading existing MRO facilities.”

Gregory adds: “In the Indian sub-continent, India’s own MRO market is poised for substantial growth, with government initiatives to reduce tax burdens on MRO services expected to further boost the industry. Pakistan and Bangladesh are gradually developing MRO capabilities, with a focus on supporting local carriers and attracting regional business.

“Looking at Australasia, the MRO sector in Australia itself is focusing on innovation and sustainability, with investments in new technologies and eco-friendly practices. The country is also emphasising the development of a skilled workforce. New Zealand is enhancing its MRO offerings, particularly for narrowbody aircraft, and is investing in digital solutions to improve efficiency. Finally in this sub-region, Papua New Guinea and Pacific Island nations are focusing primarily on maintaining their existing MRO capabilities to support local aviation needs, with limited expansion expected in the short-term,” Gregory remarks.

Dennis Kohr, senior vice president of corporate sales Asia-Pacific at Lufthansa Technik expects the APAC region to change significantly within the next decade, and becoming the largest market in terms of aircraft and operations. “APAC will

become by far the largest MRO market by 2034,” he states.

“MRO spend in APAC will grow at an average of roughly 2.5% CAGR (comparable average growth rate) in that time. However, that applies for APAC as a whole. There are significant differences between the sub-regions. We see the two key markets – and the largest markets by far – as China and India, and they are very different. India will grow at a speed twice as fast as the rest of APAC, so more than 5% annually supported by the large aircraft orders from Air India and IndiGo.”

Kohr adds: “Northeast Asia is a very mature area. There are strong domestic markets with local MRO solutions – in Korea with Korean Air, and in Japan where Japan Airlines and All Nippon Airlines have large in-house MRO infrastructure with a high focus on quality and skilled labour. That’s also one of the reasons why there is such a strong relationship between Lufthansa Technik and these markets, because the values that we share are the same. To further strengthen our position, we recently opened a new component warehouse in Japan to cater for the market locally.

“Southeast Asia is completely different. It has a lot of low-cost carriers and their fleet expansion is just amazing. Vietjet in Vietnam and Cebu Pacific in the Philippines are wonderful examples of that. In the Philippines we are also well positioned with Lufthansa Technik Philippines being the largest facility outside Germany with almost 3,000 employees.

▲ Orders for aircraft from APAC carriers continued at the 2024 Farnborough International Airshow. Among the agreements was Air Tahiti’s deal for four ATR 72-600s, scheduled for delivery between 2025 and 2028

“Singapore, though, remains the MRO hub here, because of the regulatory environment and the well-established infrastructure,” Kohr adds. “India is obviously a market that is currently facing an unforeseen growth. But although there are some MROs, the vast majority of services are still provided by foreign MROs.

“Australia and New Zealand are mature markets with very well-known players, but it’s also remote and basically calls for a local setup.

“I think the next 12 months will continue to be challenging and the focus will be on mastering the supply chain issues that the entire industry faces. Managing that smartly will be key, and it is not only a task for the MRO, but also a task for the airlines. Upfront planning has never been as important as today. Capacity is so short that it’s not sufficient just to call two weeks up front asking, ‘Do you have a slot for my C-check?’ You will be late. Thankfully, airlines are tendering way earlier to secure capacity in the very tight market, because I don’t believe the supply chain will be completely solved and ironed out as it was prior to the pandemic,” Kohr stresses.

Although local set-ups are valuable, many APAC MRO providers attract business from commercial aircraft operators in other parts of

the world, who send their (usually widebody) aircraft to the region for servicing. HAECO’s Steinhoff believes there are several reasons for this. “Firstly, the APAC MRO market is more cost-competitive compared with other regions, while still maintaining excellent service and quality standards,” he posits.

“Additionally, the substantial increase in air passenger and cargo routes across the Asia-Pacific in recent years has provided operators with a strong incentive to utilise MRO facilities in hubs like Hong Kong,” Steinhoff explains. “Furthermore, comprehensive MRO service providers in the region, such as HAECO, offer one-stop solutions with well-equipped hangars in strategic locations to cater to diverse maintenance needs. This combination of cost-competitiveness, strategic geographic location and comprehensive service capabilities is what makes Asia-Pacific MRO providers highly attractive.”

AAR’s Gregory believes cost efficiency, both in labour and operational costs, is the primary reason why APAC is attractive to commercial aircraft operators from further afield. “The whole region – but particularly countries like India, Vietnam and the Philippines – offers significantly lower labour costs compared with North



▲ Dennis Kohr, senior vice president of corporate sales Asia-Pacific, Lufthansa Technik

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“South Korea is investing in expanding MRO capabilities, particularly in digital solutions and sustainability, as it aims to become a regional MRO hub”

Colin Gregory, senior vice president of sales, Asia and Pacific region, AAR

America and Europe, which is a major draw for airlines looking to reduce MRO expenses. Lower operational costs, including contributions from utilities and facilities, further enhance the cost efficiency of the region's MRO services,” he explains.

“The second major factor involves advanced technological capabilities. In the area of digital solutions, MRO providers in countries like Singapore, South Korea and Japan are at the forefront of adopting technologies such as predictive maintenance, augmented reality and blockchain,” Gregory continues. “The next factor is the region's skilled personnel. Many MRO providers have specialised training programmes that ensure high standards of service quality and safety.”

The comprehensive service offerings from APAC MRO providers also bring in customers. “They offer a wide range of services, from basic line maintenance to complex overhauls and modifications. This one-stop-shop capability is highly attractive to global operators,” says Gregory. “In particular, the region is known for its specialisation in various aspects of MRO, such as engine maintenance, avionics and component repairs, which cater to the specific needs of different aircraft types.”

Gregory continues: “Additionally, many APAC countries offer favourable regulatory environments and incentives to attract foreign airlines. These include tax benefits, streamlined regulatory processes, and investment in infrastructure.”

Returning to the ‘comprehensive offerings’ aforementioned, APAC MRO providers continue

to improve support programmes and capabilities, with new technologies to help lower costs and/or reduce turnaround times (TATs), as well as enhancing sustainability levels. HAECO's Steinhoff confirms that to be the case, stating: “Our recent sustainability initiatives include the installation of solar photovoltaic panels, water treatment systems to recycle waste water and electrification of ground support equipment.

“To enhance customer collaboration and data sharing, we are launching a customer gateway platform this year, providing real-time visibility on maintenance progress,” he continues. “The company was also an early adopter of drone technology for aircraft inspections, significantly reducing TATs while improving precision.”

With regard to trends and technologies, Lufthansa Technik's Kohr also picks up on sustainability. “It's very in vogue these days, with questions about the MRO contribution to a more sustainable aviation industry,” he says. “I used to answer that MRO itself is already a much more sustainable solution than buying new. However, it also applies to the repair of parts. So instead of installing a new piece part that is part of a larger component, we repair these to avoid scrapping and replacing them. That is already a contribution to a more sustainable environment itself.”

After the stress caused by the pandemic, it seems the MRO industry in Asia-Pacific is in good shape for a sustainable future. The one cloud on the horizon is big and dark and comes from supply chain concerns. If that can be overcome, flourishing times are likely to follow. ●

1. APAC MROs are attractive to airlines outside the region as exemplified by HAECO's new extended agreement with Cargolux for Boeing 747-400ERF base maintenance from 2026 to 2028

2. Inside an AAR warehouse

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MRO ASIA-PACIFIC RETURNS TO SINGAPORE

MRO Asia-Pacific is the largest event of its kind in Asia

Taking place on September 24-26 at the Singapore Expo Convention and Exhibition Centre, Aviation Week's MRO Asia-Pacific brings together airlines, operators, MROs, suppliers, OEMs, regulators, lessors and industry experts to explore the trends and challenges in the Asia-Pacific region's aviation maintenance industry.

The conference and exhibition – which is set to attract over 5,000 professionals – provides a perfect platform for all those looking to expand their networking and do business in the sector.

With more than 200 exhibitors, event organisers claim attendees will have the chance to discover new technology and test products and services that will improve maintenance operations.

CONFERENCE AND SPEAKERS

The conference is a chance to hear from industry experts and join a C-level audience in debating the future of the industry.

The in-depth sessions are a mix of presentations and panel discussions on the industry's hottest topics, including supply chain optimisation, workforce development, engine MRO strategies and digital transformation. They aim to drill down into critical issues facing the industry and enable stakeholders and thought-leaders to come together to discuss concerns, find solutions and identify opportunities.

Just some of the confirmed speakers of the conference include: Ryan Cauntay, head of engineering at Philippine Air Asia; Brian Douglas, head of maintenance at Nauru Airlines; Mahesh Kumar, chief executive of Asia Digital



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“Attendees will have the chance to discover new technologies and test products and services”

Engineering (ADE); Benjamin Scheidel, chief executive of Hong Kong at HAECO; and Shevantha Weerasekera, vice president of engineering and maintenance at Cebu Pacific Air, among many others.

OTHER EVENT FEATURES

Available to event attendees is the Go Live! Theater where sessions take place right in the centre of all the action – on the exhibition show floor. These sessions include product demos and short talks on relevant issues and quickly deliver take-aways that pique continued discussion and conversation.

While walking the show floor, event attendees will also discover a range of regional pavilions that group specific exhibitors together, and taking place ahead of the start of the event in the evening of September 23 will be the 5th MRO Asia-Pacific Awards which pay tribute to pioneers across eight categories, each symbolising a distinct pillar of excellence. ●



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



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1. MRO Asia-Pacific is set to attract over 5,000 attendees
2. The event offers a diverse range of seminars and panel discussions

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TOGETHER WE THRIVE

Aerostar's **Greg Guzman** advises that utilising employee strengths can help 145 repair stations tackle today's challenges

I have seen many challenges in my 25 years in the 145-world: the chaos that ensued after 9/11, the financial crisis in 2008/2009 and most recently the challenges during and in the wake of the Covid-19 pandemic.

My instinct, despite these challenges, has always been to lean into the strengths of my team. I am a firm believer in surrounding yourself with the best people so that you can rely on them in the face of such adversity.

Trust and take care of your people and empower your people to earn the trust of and take care of your customers.

CHALLENGES IN TODAY'S OFFICE ENVIRONMENT

In the post-pandemic era, like many industry peers, we've faced issues in recruiting and maintaining a solid, talented employee base.

To be a hands-on company that prides itself on best-in-class customer support, we know we also need to be an employee-first company. One of the tools we implemented in this approach is a 9/80 work schedule; a two-week fixed work schedule that compresses 80 work hours into nine days rather than 10, to increase employee engagement and offer better work-life balance.

Employees now enjoy every other Friday off work, but we still have five-days-a-week coverage and productivity has increased throughout the organisation.

We have grown from 28 employees during the pandemic to 60 employees currently. Our retention rate has steadily improved as well.



“
**I BELIEVE OUR
COMMITMENT TO
TRANSPARENCY HAS
STRENGTHENED
RELATIONSHIPS WITH
OUR CUSTOMERS
AND PARTNERS**
”

GREG GUZMAN

president, Aerostar, Inc.

SUPPLY CHAIN ISSUES

The days of just-in-time inventory are over. Whether procuring parts or buying multi-million dollar test stands, deliveries rarely meet promises, leading to inflated inventories to fulfill customer contracts. With no end in sight for these issues, we must work together, leveraging our collective vision and talents to restore normalcy.

► Aerostar employees enjoying some time together away from work

MAINTAINING CUSTOMER TRUST

Transparency is always the best policy. From the onset of Covid-19, I told the team to be transparent with our customers whether it was good news or bad. Whether it was a turn time delay, or astronomical price increase that we had to pass on to our customers, everyone was genuinely appreciative of the transparency as we worked together to get those aircraft back in the air.

I believe our commitment to transparency has strengthened relationships with our customers and partners and, in turn, grown our business.

POSITIVE MANTRA

Regardless of the circumstances, it is imperative to maintain a positive outlook, and that starts from the corner office. Circumstances change, but how we choose to meet those circumstances is always within our control.

Coming to work with a great attitude is invaluable; it costs nothing, is infectious and spreads quickly throughout the plant. Take care of those around you and good things will happen.

An employee-first approach along with a company-wide commitment to learning and transparency have been central to our survival and success in the face of uncertainty. ◉



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EXPECT ACCELERATION

In the run up to the 2024 Predictive Aircraft Maintenance Conference in Dublin in November, *MRO Management* asked **David Marty** from event sponsor Airbus his thoughts on the landscape of predictive maintenance

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

Predictive maintenance solutions can revolutionise MRO activities by preventing unexpected downtimes, minimising costs, extending equipment lifespan, improving operational efficiency and offering environmental benefits.

By avoiding unplanned maintenance, predictive maintenance reduces the risk of lacking necessary skills, resources and spare parts for repairs. It also minimises unnecessary maintenance and repair costs by preventing severe failures and enabling timely part replacements and repairs, making it more cost-effective than reactive maintenance.

Monitoring equipment performance rather than relying solely on scheduled intervals can extend the lifespan of line-replaceable units (LRUs) in compliance with MSG-3 (Maintenance Steering Group) regulations.

Moreover, predictive maintenance allows MROs to better forecast maintenance actions and allocate resources, enhancing overall operational efficiency and productivity.

Predicting and preventing equipment failures also improves workplace safety.

Additionally, efficient maintenance reduces energy consumption and waste and, by predicting equipment failure and handling replacements in



“
**PREDICTIVE
MAINTENANCE
REPRESENTS THE
NEXT STEP IN THE
TRANSFORMATION OF
MRO ACTIVITIES**
”

DAVID MARTY

head of digital solutions central
sales and marketing, Airbus

advance, it avoids costly and urgent part transportation, alleviating strain on the supply chain.

Predictive maintenance represents the next step in the transformation of MRO activities, leveraging data from IoT, aircraft sensors and big data analytics platforms, with an expected acceleration in adoption in the coming years.

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

Predictive maintenance is an emerging trend in the MRO market, driven by strong industry interest. It involves using aircraft sensor data, which sometimes requires costly retrofits for older aircraft, and historical records analysed with artificial intelligence (AI) and machine learning (ML), supported by regulatory guidelines.

The digital maturity of Airbus is crucial for deploying and creating value from predictive maintenance solutions, such as Skywise Fleet Performance+.

As the industry progresses, the integration of advanced analytics and the increasing digital maturity of companies will shape the future of predictive maintenance, making it an essential component of MRO activities.

In what ways is Airbus already utilising predictive maintenance solutions, and how is this helping improve activity?

Airbus' predictive maintenance journey started more than a decade ago by leveraging aircraft sensor data and later the Skywise platform.

Skywise is a comprehensive aviation data platform that integrates data from various sources, including aircraft sensors, maintenance records



Airbus

“ SHIFTING FROM TRADITIONAL MAINTENANCE PRACTICES TO PREDICTIVE MAINTENANCE REQUIRES CULTURAL CHANGE AND EDUCATION TO OVERCOME RESISTANCE ”

and operational data to help airlines predict potential failures, optimise maintenance schedules and reduce unscheduled downtime.

Airbus Customer Services supports operators with predictive maintenance recommendations, enhancing fleet management and optimisation.

Advanced nose-to-tail analytics, developed through the Digital Alliance, are available in the Skywise digital solution called S. Fleet Performance+, which helps airline operators avoid technical cancellations and delays, ultimately saving hundreds of flights. This proactive approach significantly improves the overall efficiency and reliability of airline operations.

What are the primary hurdles the industry must overcome to advance predictive aircraft maintenance?

The industry must overcome several hurdles to advance predictive aircraft maintenance.

First, there is a need to utilise big data, especially time series data, instead of traditional data sources like Quick

Access Recorders (QAR), Digital Access Recorders (DAR), and Aircraft Maintenance Centralized System (AMCS) reports, to maximise the value of predictive maintenance.

Implementing and maintaining the necessary IT infrastructure, including sensors, IoT devices and advanced analytics platforms requires significant investment.

Additionally, there is often resistance within organisations to adopt new technologies, making the digital maturity of a company a critical factor.

Shifting from traditional maintenance practices to predictive maintenance requires cultural change and education to overcome resistance.

Lastly, demonstrating short-term return on investment (ROI) can be challenging, although the long-term value of predictive maintenance becomes evident once it is deployed.

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

◀ Skywise provides all users with one single access point to their enriched data by bringing aviation data from multiple sources across the industry into one secure cloud-based platform

Over the next decade, predictive maintenance in the MRO industry is expected to see widespread adoption due to decreasing technology costs and increasing awareness of its benefits. Numerous OEMs will develop advanced analytics to enhance value across the board.

Predictive maintenance will become a core component of the MRO industry, leading to more proactive, efficient and cost-effective maintenance strategies, ultimately helping airline operators run their fleets more safely and reliably. ●

PREDICTIVE AIRCRAFT MAINTENANCE 2024



On November 13-14,
MRO Management and its

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

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

Thank you to our Silver Sponsor, Airbus, for supporting PAM 2024.

For more information and how to register to attend, visit predictiveaircraftmaintenance.com



Ian Dewar Photography/Adobe Stock

BENEFIT TO AVIATION, BUT BURDEN TO MRO?

Sustainable aviation fuel is coming, but when, and what impact will it have on engine maintenance? *Kevin Rozario* reports

There seems little doubt that there will be a transition to 100% sustainable aviation fuel (SAF) in the future, and it will have implications for aircraft engine makers. Today, engine OEMs have, for the most part, certified their power units to work with SAF blends without modifications.

In November 2023, Virgin Atlantic made a historic flight across the Atlantic from London Heathrow to New York JFK by becoming the first commercial airline to use 100% SAF. The jet was a Boeing 787 using Rolls-Royce Trent 1000 engines.

The so-called 'Flight100' proved that SAF has the capability of being a drop-in replacement for conventional fossil jet fuels in turbines – replacing current Jet A and Jet A-1 as per ASTM specifications.

For the time being, SAF is possibly the only real mid-term solution for decarbonising long-haul aviation and therefore engine makers are very focused on it.

Other technologies, for example electric and hydrogen, are still in early development, whereas drop-in SAF can be used now.

The LHR-JFK widebody flight was made possible through a consortium led by Virgin Atlantic and included Boeing, Rolls-Royce, Imperial College London, the University of Sheffield, ICF and the Rocky Mountain Institute, all in partnership with the UK's Department for Transport (DfT).

While Flight100 shows that 100% SAF can work, the fuel still represents less than 0.1% of global jet fuel volumes today.

Engine expert Jamie Davey at aviation consultancy IBA Aero says: "Cost is going to be the real barrier to entry."



2



3

Pratt & Whitney

“Higher-quality SAFs are chemically similar to conventional jet fuel, meaning no significantly worse impact on engine wear and tear is expected”

SAF VARIATIONS

Obtaining SAF in large volumes will also be a major challenge, while certifications are yet to be ironed out given the variations available.

According to one keen observer of the SAF business: “There are several different generations of SAF. The most widely produced at the moment is HEFA feedstock (hydroprocessed esters and fatty acids) which has the lowest benefit.

“As an industry, we’re looking more towards power-to-liquid (PtL) which is more expensive, harder to produce and much further behind on the manufacturing pathway. However, it’s more effective at reducing emissions.”

Airbus believes that PtL offers the required energy density for high-power demand engines for long-haul travel.

For reference, the SAF used on Flight100 was a dual blend of 88% HEFA supplied by AirBP, and 12% SAK (synthetic aromatic kerosene) supplied by Virent, a subsidiary of Marathon Petroleum Corporation. The HEFA is made from waste fats while the SAK is made from plant sugars. According to Virgin, SAK is needed in 100% SAF blends to give the fuel the required aromatics for engine function.

Production of next-gen SAFs is not likely to ramp up until the late 2030s, assuming the investment needed across all available feedstocks and technologies is there. In the meantime, there is a bit of scramble for current supply.

Earlier this year, Embraer tied up a deal with Avfuel to increase its uptake of Neste MY SAF

at Melbourne Airport in Florida to one load per week. The agreement means one 8,000-gallon truckload of the Neste product will be delivered every quarter to Sheltair MLB, the FBO providing storage and handling services for Embraer at the airport.

The agreement began in April and will result in a total of 240,000 gallons of SAF delivered to Embraer in 2024, a significant increase on previous years, resulting in a 570 metric tonne reduction in carbon emission for the year.

Michael Amalfitano, president and chief executive of Embraer Executive Jets, described the collaboration with Avfuel and Sheltair as a “pivotal milestone” in its journey toward net-zero emission flights.

Today, fuel standards allow for up to a 50% SAF blend in commercial jet engines. Flight100 will give regulators, certifiers and engine OEM’s plenty of data for fine-tuning products, and possibly scaling up production.

‘NO BARRIERS TO 100% SAF’

In November 2023, Simon Burr, group director of engineering with Rolls-Royce’s technology and safety unit said that the company had recently completed compatibility testing of 100% SAF on all its in-production civil aero engine types. “This is further proof that there are no engine technology barriers to the use of 100% SAF,” he noted.

As of July, Sean Bradshaw, Pratt & Whitney’s senior technical fellow for sustainable propulsion,

0.1%

While Flight100 shows that 100% SAF can work, the fuel still represents less than 0.1% of global jet fuel volumes today

1. Since its initial flights in 2012, almost every platform of the Boeing ecoDemonstrator programme has flown on SAF

2. Bruce Ansell, technical manager engines, APOC Aviation

3. Pratt & Whitney is advancing the use of SAF while also developing technologies to support alternative, zero carbon fuels like hydrogen



Virgin Atlantic

1

“For the time being, SAF is possibly the only real mid-term solution for decarbonising long-haul aviation”

50%

All Pratt & Whitney engines are certified to operate with SAF on a drop-in basis, blended up to 50%

says: “All Pratt & Whitney engines are certified to operate with SAF on a drop-in basis, blended up to 50%. Used as a drop-in fuel, SAF does not entail any changes to engine or aircraft performance or maintenance requirements.”

There is also evidence from big OEMs like Airbus and Boeing that SAF may lead to cleaner engine combustion. This can potentially reduce the formation of deposits and improving engine efficiency in the long run.

However, there is some caution about what it will mean for engine MRO. Bradshaw explains: “While higher concentrations of synthetic (non-fossil derived) blending components can lead to a reduction in sulphur and other impurities in the fuel, it is too early to conclude whether this will have any impact on engine maintenance. Furthermore, the operational specification for 100% SAF has still to be defined.”

At APOC Aviation, a leasing, trading, aircraft part-out and component support specialist, Bruce Ansell, technical manager in the engine division, comments: “Very little has been reported on any negative effects to the power plant.

“There remains a possibility that SAF, particularly the ethanol-based variants, may have some impact on various components within the fuel system unless changes are made. This has already been seen in small gasoline engines which were changed from E5 to E10 fuel, whereby several older models found seals and gaskets

were degrading much faster following the switch to E10.”

Like other engine OEMs, Pratt & Whitney is a longstanding supporter of initiatives to evaluate and define SAF specifications. It is a member of the Commercial Aviation Alternative Fuels Initiative (CAAIFI) and the International Aerospace Environmental Group (IAEG). “We have a programme of engine testing to ensure preparedness for future 100% SAF specifications and we are also studying the effects of SAF and low-sulphur fuel on aircraft non-CO₂ emissions through the FAA-ASCENT programme,” explains Bradshaw.

At the end of July, Pratt & Whitney tightened its partnership with Portugal’s big MRO OGMA, an Embraer company by announcing the induction of the first Pratt & Whitney GTF engine at the plant. The Portugal shop becomes the 18th active facility in the GTF MRO network. The closer ties between a big aircraft OEM and engine maker may also lead to stronger collaboration on SAF impacts, an area in which both players are highly focused.

Neither company commented on this type of partnership, but Carlos Naufel, president and chief executive of Embraer Services and Support, did say that the “deepened relationship” meant it was on track to expand its services portfolio as part of Embraer’s accelerated growth strategy.

1. Virgin Atlantic’s ‘Flight100’ from LHR to JFK was the first commercial aircraft to use 100% SAF in November 2023

2. Sean Bradshaw, senior technical fellow for sustainable propulsion, Pratt & Whitney



2

MINIMAL SHORT-TERM MARKET IMPACT

In the coming few years, the impact of SAF on aircraft engine maintenance is expected to be minimal, especially as higher-quality SAFs are chemically similar to conventional jet fuel, meaning no significantly worse impact on engine wear and tear is expected.

With further joint testing followed by certification to come, the real MRO impact will become clearer, and

production volumes should also rise. This will lead to lower costs and wider adoption, led by engine OEMs like GE Aviation, Rolls-Royce and Pratt & Whitney. However, fully-fledged adoption at 100% levels may not come for another decade – or more.

APOC Aviation's Ansell says: "High percentage SAF use will be common in seven to 10 years' time, though much work must still be done on various SAFs and analysis of their longer-term impacts." He expects to see low-percentage SAF commercially viable from 2027 – without subsidies.

"At this point I don't foresee any downside to the MRO industry; any issues arising from SAF will generally require resolution by an MRO," he continues. "We are not going to see any meaningful impact on time between services, and I will be interested to see if surfaces within engines are going to be impacted by the different SAF variants."

IBA Aero's Davey expects some natural teething issues as 100% SAFs are implemented. "It is the same with

any new tech that comes out," he says. "But with enough research and enough testing, its use should be fine. Moreover engine longevity should be better, especially the hot sections."

For now, SAF usage remains small, as previously mentioned. A new report on scaling SAF from management consultancy McKinsey & Company puts 2024 production capacity at "not exceeding 1.5 million metric tonnes (Mts)" or barely 0.5% of total jet fuel needs (based on International Air Transport Association (IATA) estimates).

However, the consultancy expects demand to rise due to regulation and voluntary airline commitments. It says: "The estimated global demand from mandated SAF is around 4.5 million Mts in 2030. Airlines have voluntarily pledged to use even more: announcements of the largest airlines would accumulate to more than 20 million Mts in 2030."

At that level, demand will outstrip supply, so there is still some way to go on the production front before MROs really need to sit up and take notice. ●



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THE DIFFERENCE A YEAR MAKES

Rotable Repairs' **Bryan Croft** reflects on a year of opportunities that has come with the firm being integrated into the VSE Aviation family

Rotable Repairs is an aircraft wheel and brake specialist. Formerly part of the world's leading independent distributor of aerospace MRO services and distribution, Desser Aerospace, over the past 12 months we have undergone significant internal changes and investments.

Acquiring Desser and, inherently, Rotable Repairs in July 2023, provided VSE Aviation with a platform for geographic expansion into high-growth international markets.

The move reinforced Rotable Repairs' commitment to excellence and innovation in aviation, ensuring business longevity, achieving record results and savings for our customers and strengthening our market position.

HUGE PURCHASING POWER

We leverage VSE's resources, including finance, IT, HR, legal and considerable purchasing power to drive growth. The acquisition provides significant investment and collaboration opportunities with other VSE companies, enhancing our European presence and benefiting both our organisations and our combined customer base.

DEVELOPMENT AND GROWTH STRATEGY

VSE has been extremely supportive of Rotable Repairs' strategy for development and growth. Ultimately the business will be fully integrated and aligned with the other divisions in the group. With VSE's support and the focus of



“
**VSE HAS BEEN
EXTREMELY
SUPPORTIVE OF
ROTABLE REPAIRS’
STRATEGY FOR
DEVELOPMENT
AND GROWTH**
”

BRYAN CROFT

managing director,
Rotable Repairs

internal quantum control specialists, we have reviewed and updated our processes, including all IT hardware and equipment, bringing us in line with VSE standards.

As well as being dedicated to the customer experience, VSE is also focused on the welfare and satisfaction of its staff, with new contracts having been issued and policies and staff benefits reviewed and reinstated. Sales, marketing and business development activities have also been reviewed, and we now have access to a greater

sales/business development team, helping us to reach out to potential new customers and creating more business opportunities.

MARKET LEADER AMBITIONS

Rotable Repairs has invested in B787 wheel and brake infrastructure and assets. Our view is to become a market leader and to support an increasing world fleet. We have also set up a dedicated B787 brake room, which houses two B787 brake testers.

As a Safran-authorized MRO, we support the UK's flag carrier, many of the UK's largest operators and many modern narrowbody and widebody variants, some of which house new aircraft technologies not generally supported. We have also invested in stock and core assets with which to trade and grow this important revenue stream.

We've upgraded plant operations and IT equipment to meet VSE standards, greatly improving operations. We've refined our processes with the support of VSE's expertise and resources and we're leveraging the larger group's purchasing power and shared resources to serve our customers better. ●

▼ Rotable Repairs is an aircraft wheel and brake specialist



For more information about Rotable Repairs, visit: rotablerepairs.com

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SMOOTH & SAFE TOUCHDOWNS

Boeing's **William Ampofo** tells us about how the OEM's Landing Gear Exchange Program lowers capital costs and helps reduce aircraft downtime with a proven economical repair and overhaul solution

Could you provide an overview of the Boeing Landing Gear Exchange Program and its objectives?

Landing gear is a critical component of any aircraft, ensuring a smooth and safe touchdown during every flight.

Boeing's Landing Gear Exchange Program combines innovation with a commitment to customer success, offering a proven solution that enhances efficiency and improves customers' bottom lines.

Landing gear is required to be overhauled approximately every 10-12 years, depending on aircraft use and model. The Landing Gear Exchange Program provides a streamlined solution when landing gear becomes unserviceable or in-need of a scheduled overhaul due to the number of hours or cycles.

By participating in the exchange programme, customers can benefit from capital efficiency, quick turnaround times, quality assurance and a customer-centric approach.



“
WE WORK WITH CUSTOMERS ON A LANDING GEAR EXCHANGE SCHEDULE THAT MEETS THE NEEDS OF THEIR FLEET
”

WILLIAM AMPOFO

senior vice president of parts and distribution and supply chain at Boeing Global Services, and the chair of the Boeing Supply Chain Operations Council

Our Landing Gear Exchange Program reduces maintenance expenses, minimises downtime and provides high-quality landing gear components to customers so they can focus on delivering a safe, comfortable experience for their passengers.

How does the exchange process work, from the perspective of an airline participating in the programme?

We work with customers on a landing gear exchange schedule that meets the needs of their fleet, and reduces their operational risk, cost and complexity by managing all logistics of the repair and overhaul process.

Our exchange pool of certified landing gear is unmatched, and we leverage our global network of MRO facilities to ensure availability when and where customers need it.

Customers receive repaired and overhauled or new gear as a forward exchange, allowing them to immediately install the Boeing-certified landing gear instead of waiting to receive replacement gear.

Once the customer returns their unserviceable landing gear to the MRO facility, our extended team of best-in-class experts overhauls and certifies the exchanged landing gear before placing it into Boeing's exchange pool.

Do airlines have to meet certain criteria to qualify for participation in the programme, and what aircraft models are supported?

We created our customer-centric programme to maximise customer performance and address requests for cost-effective maintenance solutions for their Boeing commercial airplanes.

Customers who operate aircraft compatible with the models available in the programme can sign a partnership agreement with us to participate.

The programme supports both main landing gear and nose landing gear for customers flying the 737, 747, 777 and 787 Dreamliner.



Boeing

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Boeing

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“
**LANDING GEAR IS REQUIRED TO BE OVERHAULED
 APPROXIMATELY EVERY 10-12 YEARS, DEPENDING
 ON AIRCRAFT USE AND MODEL**
 ”

How does the pricing structure of the programme compare to purchasing new landing gear outright?

Participating in our Landing Gear Exchange Program offers financial and operational advantages by minimising upfront costs and providing a predictable, cost-effective alternative to the variable costs for purchasing and maintaining new inventory.

Airlines also benefit from minimised out-of-service time and the associated revenue loss, because of the quicker turnaround times receiving and exchanging their landing gear.

How does Boeing ensure the quality and reliability of the landing gear exchanged through the programme?

We are committed to keeping our customers flying safely, efficiently and sustainably. Through our Landing Gear Exchange Program, repairs and overhauls are performed by Boeing-

certified MRO providers, meeting all regulatory requirements, and backed by a three-year warranty.

This ensures the landing gear components meet the highest industry standards, giving customers confidence in the quality and compliance of the parts they receive.

Our dedication to providing the highest quality and most reliable assets sets us apart from the competition.

How does the programme contribute to sustainability and environmental efforts within the aviation industry?

Boeing helps customers reduce their carbon footprint by extending the life of landing gear components and reducing additional part purchases required to perform in-house overhaul and repairs.

Customers are also able to maximise the utilisation of their landing gear by leveraging Boeing's programme which helps manage the overhaul schedule, avoiding premature replacements.

Refurbishing and reusing landing gear also extends the lifecycle of existing components, minimises waste and reduces the manufacturing impact and need for new parts.

What kind of support does Boeing provide to airlines throughout the duration of their participation in the programme?

We provide comprehensive support tailored to our customers' specific needs and leverage our OEM expertise to offer specialised assistance exclusively for Boeing aircraft.

We also support the project management of the MRO process and coordination with suppliers, eliminating the need for our customers to individually contract and schedule each step, streamlining maintenance and exchange procedures. ●

1. Over time, landing gear can wear down due to the immense forces and stresses endured during landings and takeoffs
2. Landing gear is a critical component of any aircraft



1

MAKING AN IMPACT

Mario Pierobon finds out how new technologies are impacting productivity and safety in the MRO sector through digitalisation, AI, robotics and 3D printing

1. Pratt & Whitney's 'cobot' is able to capture more consistent images with its extendable arm

“ONE APPLICATION WE ARE NOW USING IS AN INSPECTION ‘COBOT’ FOR AN ENGINE PRE-INDUCTION PROCESS”

Gilbert Sim, director of aftermarket global operations technology and CORE, Pratt & Whitney

‘New’ tech is already impacting the MRO sector, and there are multiple real-world examples showcasing these breakthroughs.

According to Lee Hui Fung, senior vice president and head of innovation and continuous improvement at ST Engineering’s Commercial Aerospace business, one of the more significant impacts of new technology can be seen in productivity improvement given how labour-intensive MRO work can be.

“Some of the applications can be seen in the digitalisation of maintenance processes for more efficient data flow and collection, and the implementation of robotic solutions to minimise repetitive and/or dangerous labour,” she says.

‘NEW’ TECH IMPACT

Companies in the MRO sector heavily rely on information derived from various data sources such as OEMs, their customers and their internal sources, affirms Saravanan Rajarajan, director of aviation solution consulting at Ramco Systems. He says: “This data is often available in different formats, such as aircraft maintenance manuals (AMM), which are generally in XML, SGML and PDF formats, as well as customer work packages and task cards, which are generally in the PDF format.”

He adds: “Generative AI (Gen AI) is well poised to deliver efficiencies and accuracy by enabling a conversation with this data. One of the key factors to consider is the fencing of these data around which the conversation is happening, so that the data source is highly controlled, thereby ensuring authenticated responses. Gen AI can assist a mechanic with questions by leveraging the OEM documents and previous repair history, as well as operational and reliability data of the equipment they are working on.”

Pratt & Whitney is leading a dedicated effort across its worldwide manufacturing footprint to modernise and transform its operations, including digitalisation and investments in Industry 4.0 technologies, affirms Gilbert Sim, director of aftermarket global operations technology and CORE at Pratt & Whitney.

“Our approach to Industry 4.0 transformation is powered by two key thrusts,” he says. “One is the industrialisation of MRO processes with robotics, connected factory and shop digital twin innovations to speed up turn times without compromising operational quality and safety.

“The second focal point is on material restoration through cutting-edge technology such as additive repairs, and process automation from digital inspection, adaptive processing and coating and masking of parts.”

AI AND 3D PRINTING

ST Engineering has integrated advanced AI into its Engine Health Monitoring solution in order to yield deeper insights that better help with informed data-driven decisions, says Lee.

“These include predictive maintenance capabilities to optimise maintenance schedules and identify critical engine issues without the need for off-wing inspection, freeing up shop floor labour and reducing disruption to operators’ business plans.”

Lee continues: “In the same vein, with additive manufacturing, we are able to quickly produce spare parts on demand to resolve aircraft-on-ground (AOG) situations, enabling airlines to minimise the operational downtime of their aircraft while avoiding the need to maintain costly inventory.”

The MRO process typically generates a wealth of data pertaining to the defects, parts consumed, labour hours, time elapsed, etc. that – accumulated over time – can be converted into a competitive advantage by leveraging artificial intelligence/machine learning (AI/ML) tools, says Rajarajan. “The machine learning capabilities of Ramco’s Aviation Suite leverage data and advanced algorithms to derive insights. For example, when mechanics report the defect, the system leverages the historical records pertaining to the type

of aircraft and ATA code to suggest a list of similar defects that were resolved in the past,” he says.

Pratt & Whitney is leveraging AI for MRO processes. Taking inspiration from the semiconductor industry, it is using AI-based computer vision to manipulate a system of robotic arms to manipulate high-pressure turbine vanes, dispense highly toxic filler materials and fill cooling holes with them, all previously done by hand, explains Sim. “Apart from reducing the time required for each component by 13%, we have minimised the level of human contact and time spent interacting with the toxic filler material, hence improving productivity while increasing safety for our employees,” he says.

3D printing is another area that is a gamechanger for MRO, and Pratt & Whitney is applying 3D printing beyond the additive manufacturing of parts. “We use 3D print reusable masks to protect parts during the grit spraying and thermal spray coatings processes,” explains Sim. “Currently, the masking is done manually using tapes. With the 3D printing, we are able to apply masks on more geometrically complex components that could not previously be done by hand.”

DIGITAL TWINNING, ROBOTICS AND BLOCKCHAIN

In the domain of aviation MRO, innovations are also being experienced with regard to digital twinning, robotics, predictive maintenance and blockchain.

By creating a digital model of the facility, Pratt & Whitney learned a new set of skills including data cleaning,

data entry, modelling the processes and interpreting the results of the simulation, observes Sim. “Planning sessions like these were previously done with a physical mock-up, which takes two weeks or longer to create as compared to a digital twin,” he says. “A physical mock-up also only allows for one variant to be tested, while digital twins can generate endless possibilities and iterations of the space, with each new simulation taking just four days to create.”

Robotics is another area in automation the aircraft MRO sector is leveraging, explains Sim. “For instance, one application we are now using is an inspection ‘cobot’ for an engine pre-induction process. Previously, photos of the engine were taken manually, and the quality of the photos will vary from technician to technician, especially for trickier angles.”

Sim adds: “The cobot is able to capture more consistent images with its extendable arm and automatically include it in the pre-induction report documents. The use of robotic arms is another automation example to support

technicians in automatically removing and installing sleeves for the front case from engines undergoing MRO. Now only one technician is required to operate the machine, halving the manhours and process time while eliminating fatigue.”

For blockchain innovation to yield tangible benefits, it needs the network effect for information sharing, highlights Rajarajan. “Currently, the challenges are with siloed blockchain networks, which limit the potential, or when the chain includes all the supply chain players, including the MRO tier 2 & 3 suppliers, etc. Arriving at the standards for the industry to adopt is a challenge,” he says. “We are working on a proof-of-concept to demonstrate the use of blockchain to digitally track and record the movements and maintenance history of parts across airlines, lessors, logistics suppliers, maintenance providers and original equipment manufacturers such as engine producers.”

According to Lee, for these innovative technologies to become mainstream, they would need to navigate obstacles to implementation such as complexity, investment costs and long lead times. “Nonetheless, we have been implementing many of these technologies into our solutions and processes, while we continue to look out for more potential use cases and develop solutions that meet our and our customers’ needs. For example, as conditions in workshop environments are more controlled (indoor, air-conditioned), we have found that they are more conducive for robotics solutions,” she concludes. ●



▲ Digital twins enable technicians to build a broad understanding of assets

“GEN AI CAN ASSIST A MECHANIC WITH QUESTIONS BY LEVERAGING THE OEM DOCUMENTS”

Saravanan Rajarajan, director of aviation solution consulting, Ramco Systems



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PROTECTION FROM THE ELEMENTS

Mark Bechtel describes how Shield's Envelop® Protective Covers safeguard jet engines against various threats that can compromise their airworthiness and performance

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“
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WEATHER CONDITIONS**
”

MARK BECHTEL

aviation field services rep,
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intake and exhaust covers are used while engines are on wing, and when engines are on a maintenance stand, covers are used that encase the entire engine during transport, maintenance and overhaul or in storage waiting to go back on an aircraft.

The covers are easy to install and stay affixed even in the most severe weather conditions, so the environmental and FOD protection is continuous.

Besides the initial low-cost investment for the covers, the return on investment is extremely high because within the first 90-120 days of use they have paid for themselves in lower engine maintenance repair and replacement costs.

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Shield offers proven cover technology and technical expertise to the commercial aviation industry with engine bag designs for Pratt & Whitney, Rolls-Royce and CFM International.

Shield is the undisputed leader in delivering the most effective, longest lasting corrosion inhibiting cover systems available anywhere in the world today.

Envelop® Protective Covers have without a doubt transformed what a cover can and should be. ●



For more information about Shield Technologies Corporation and Envelop® Protective Covers, visit envelopcovers.com



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COMPLIANCE CAN BE TRICKY, BUT TRACEABILITY CAN HELP

Jag Lamba claims that a lack of detailed requirements and standardisation in the aviation industry can cause confusion and that the sector must approach traceability in supply chains to better support compliance

The aviation industry makes for unique challenges for supply chain and risk management professionals working at MRO. The supply chains are complex, timelines are demanding, and evidence must be provided to regulators in service of demonstrating airworthiness. For the latter, accurate documentation and traceability are crucial – companies must show proof that regulations are being followed and that safety and reliability are maintained.

However, the world's leading aviation authorities – the FAA in the US and the EASA in the European Union, for example – don't provide regulations on specific documentation requirements when it comes to that proof. They often function as recommendations along with the guidelines set in other areas and lack any detailed requirements or standardisation.

This creates significant confusion when it comes time to offer proof of compliance; the documentation might all be available, but how can it be collected, analysed and reported to authorities in aggregate when there is no standard? The lack of detailed requirements makes it difficult for companies to prove their compliance without a significant burden on their end.

That's why transparency is so important in aviation supply chains, as it can reduce the time it takes for the right information to be gathered and then combined into clear reporting for the relevant aviation authorities. Transparency and the traceability it enables are rarely mentioned in the FAA's *AC 20-154A Guide for Developing a Receiving Inspection System for Aircraft Parts and Material*, but a close look at the details makes it clear that such transparency is more than helpful; it's largely necessary.

For example, section 7.8 (Article Documentation/Identification) outlines several possible documents that could be considered acceptable for determining airworthiness when receiving articles from vendors, but the list is long and inexhaustive. MROs are often at the mercy of their vendor's preferred method of providing documentation, which will likely differ from other vendors' methods – increasing complexity and putting a greater burden on the MRO when it comes time to provide proof to the FAA. Similarly, section 7.6 (Written Receiving Inspection Procedures) sets expectations for parts and materials to conform to their applicable specifications, and outlines the large number of details that must be reported, including the 'path' of the article through the supply chain, starting at its origin.



“Transparency is so important in aviation supply chains, as it can reduce the time it takes for the right information to be gathered”

Jag Lamba, chief executive and co-founder, Certa

TRANSPARENCY AND TRACEABILITY IN PRACTICE

In complex supply chains like those in the aviation industry, such transparency isn't easily enabled, though it's vitally important. Tools and procedures made specifically for the purpose of tracking information, building visibility and analysing the relevant data in order to create clear documentation can help MROs overcome the lack of detailed requirements and the dearth of standardisation in the industry.

MROs looking to increase transparency and traceability should use the following as a checklist of must-haves, and either build these capabilities in-house or seek to bring on third-party partners and tools that can enable them:

Automation

Automation reduces the time and effort required for compliance documentation. By sending questionnaires, nudging vendors for necessary documents, analysing data and generating reports, automation tools drastically reduce manual errors and expedite compliance checks, ensuring no critical compliance information is missed.

AI capabilities

AI-driven solutions can revolutionise transparency and traceability in the aviation supply chain, tackling the core challenges faced by MROs. This includes generating comprehensive governance policies and procedures aligned with the latest regulatory standards, streamlining due diligence and vendor segmentation by providing insights that can help identify and mitigate risks more effectively, and auto-generating information such as questionnaire answers during onboarding or control assessments using historical and pre-uploaded data.

A central repository for documentation

All of those documents and details can get lost in a complex maze of folders and computers when there's no central system to organise them. That also creates more headaches come reporting time, or in the case of an audit. A single repository that automatically stores info as it is provided by vendors and other members of the supply chain enables transparency at multiple steps of the compliance process.

Risk-based workflows

Workflows should account for the screening of various compliance risks for new third parties or potential new links in a supply chain. This can be cross-checked with the information on such risks made available by data providers. This is not only useful when screening new vendors (and potentially keeping away organisations that could cause an MRO to fail compliance), but also for continuously reassessing current third parties annually or when regulations change.

Transparency built into the process

Every step of the third-party relationship management process should forefront transparency. That means gathering as much data as possible during onboarding, building clauses into contracts that require clear documentation and implementing process orchestration that can gather needed info from cross-functional teams as well as third parties.

ENABLING TRANSPARENCY TO SUPPORT COMPLIANCE

It's not a small undertaking, but building transparency and traceability into the supply chain will help MROs meet compliance requirements more easily. Alongside the functions listed above, it behooves an organisation to develop a culture of transparency throughout its supply chain and risk teams – and preferably the entire organisation. Ensuring that everyone from employees to vendors and beyond know that information and proper documentation are non-negotiable requirements will set the tone and make the gathering (and reporting) process much smoother.

Finally, it's worth mentioning that there is an increased emphasis on sustainability and efficiency in the aviation space, joining safety as guiding principles behind supply chain activity. These all require traceability and transparency up and down aviation supply chains, and an MRO that puts an emphasis on process-based transparency will be headed in the right direction even beyond compliance matters. ●





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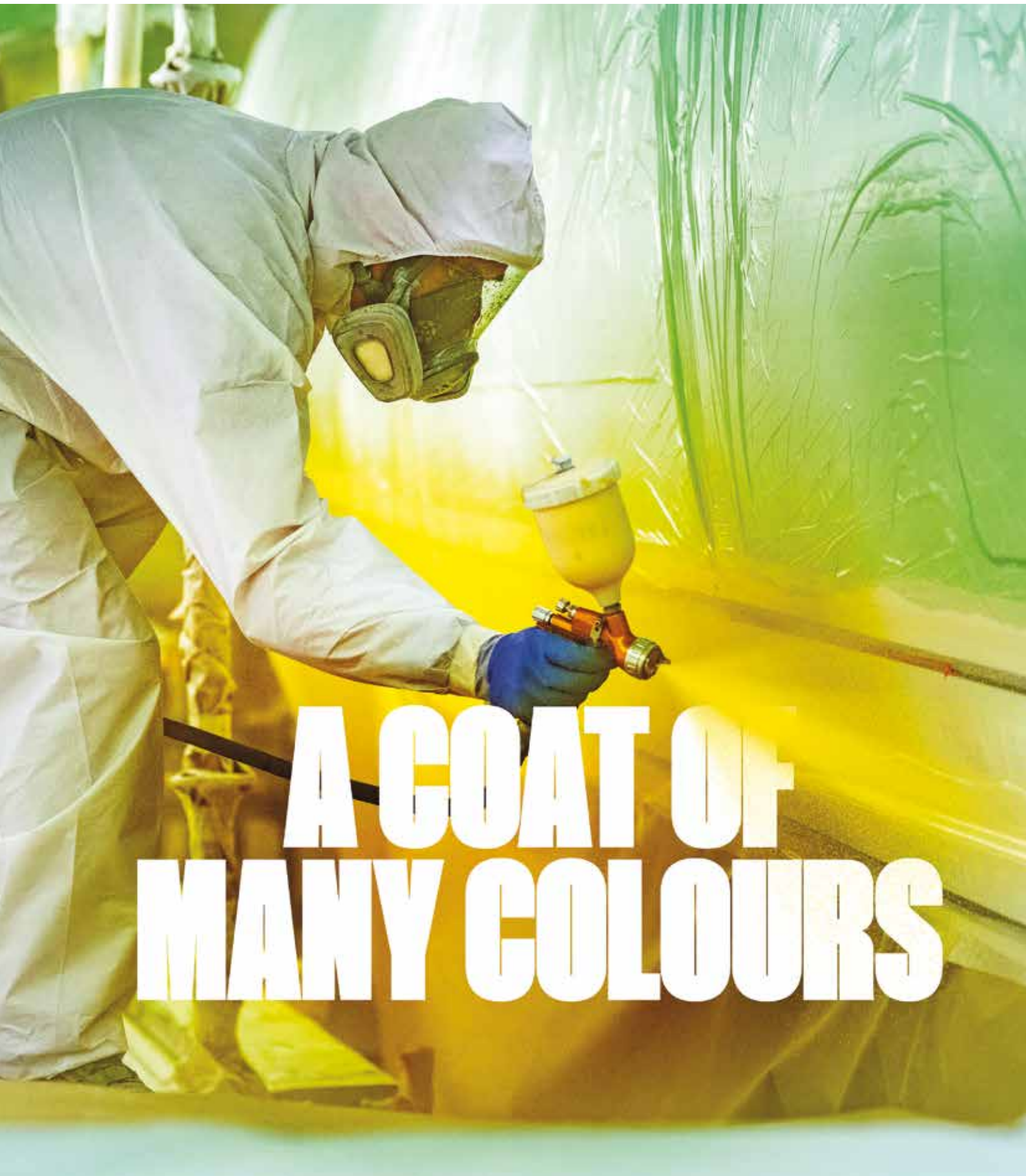
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A COAT OF MANY COLOURS



◀ White is not the only colour for an aircraft

Special liveries bring a splash of colour to the otherwise analogous aircraft exterior. *Alex Preston* dips a paintbrush into this technicolour world

The aircraft exterior is an exciting canvas that offers more than just a space for the traditional accoutrements of corporate livery. An airline's logo branding, partial or full tail branding and country flag are details we've grown accustomed to seeing on aircraft, but occasionally we're lucky enough to glimpse something more visual, something a little more eye-catching.

Special liveries or decorative liveries are often highly original and designed for a specific period, normally to celebrate a milestone or event, or as part of a wider advertising campaign or a brand link-up.

Some airlines choose to apply these decals using a vinyl wrap. Notable examples include Air New Zealand, whose 2002 promotional livery of the first instalment of *Lord of the Rings* weighed over 132 lbs (60 kg), and the *Star Wars* livery series from ANA. Others to join the Rebel Alliance, albeit temporarily, include Alaska Airlines, LATAM, United and Virgin Atlantic, who have all promoted themed areas at Disneyland Park, Disneyland Resort, Anaheim, California using vinyl wraps. Others have chosen to rely on the steady hand of painters.

EYE FOR DETAIL

In November 2023, QantasLink's first brand new Airbus A220 aircraft rolled out of the paint shop at Airbus' facility in Mirabel, Canada.

The aircraft spent two weeks in the paint shop undergoing an Aboriginal paint scheme, making this aircraft the sixth to join the national carrier's longstanding Flying Art Series.

According to René Lang, executive managing director aviation at Mankiewicz, "Special liveries are always lighthouse projects for all parties involved: the airline, the paint crew and the paint manufacturer. So, a close cooperation is needed for this.

"Designers sometimes come to us with samples with specific colour specifications, which we work out with them in close collaboration with our colorimetry department," Lang continues. "Our international design team constantly searches for new colour trends in various industries and design fields. We can support livery designers with a team for creative and professional exchange at eye level."

PPG provides customers with a wide variety of choices for their livery by manufacturing topcoats in solids, gloss ranges and special effects, using mica and metallic colours. Applying the clearcoat after all the base colours helps maintain the vibrancy, brilliance and durability of the livery.

Aerospace Coatings' PPG global military segment director Duane Utter and PPG global product director Robin Pepper outline how the company is able to match most colours and gloss ranges needed for special liveries. "We offer design services through PPG's



1



2

“SEVERAL ASPECTS COME INTO PLAY WHEN IT COMES TO THE FINER DETAILS OF A SPECIAL LIVERY”

Livery Lab, which is a partnership with Aerobrand. Many of these special liveries will be for special events and the aircraft could remain in service for quite some time.”

Under the partnership with Aerobrand, PPG develops colours quickly while Aerobrand provides the design. “This work takes place at our design studios in Burbank in the US, Shildon in the UK and Toulouse in France, with the customer present. By being at the same location, we can rapidly match colours for customer approval,” the pair explain.

“Special liveries also usually come in very individual shades,” says Lang. “The designers have a very clear idea of precisely what the new shade should look like. They often provide a sample of the required colour. Our global colorimetry team can then use these samples to match and recreate the shade with our laboratory.

“When painting special liveries, it is also vital that we can offer local support for the paint job worldwide with our technical team to accompany the paint job on site. As a global paint manufacturer, we have 16 locations worldwide from which our team can quickly be on site at the customer’s premises,” he adds.

PERFECT FINISH

Coatings have evolved to allow such inspiration to be realised on aircraft exteriors. Paint can now be used in areas where decals would have been the first choice, allowing for more vivid coloured liveries with finer details and higher gloss and colour retention values.

“Several aspects come into play when it comes to the finer details of a special livery,” explains Lang. “A coating that is easily adjustable via the thinner and whose drying time is ideally adjusted to the surface to be painted, in combination with stencils for the filigree shapes and a talented and experienced paint crew, is the formula for perfect craftsmanship.”

In the case of Qantas’ *Minyma Kutjara Tjukurpa* aircraft, some 100 painters were involved in completing the livery, with the Airbus teams working with 130 stencils to replicate the detailed designs. It features over 20,000 dots and is the most complex livery Airbus has ever completed for an A220.

Many impressive special liveries are brought to life by various colour shades that come together creatively and in complex shapes. Working with a BaseCoat/ClearCoat (BCCC) system is a game changer for reducing turn-around time.

The recent adoption and qualifications of the BCCC systems into the aerospace

industry has had many advantages.

PPG’s Desothane HD/CA 9008 has much better weathering and allows airlines to last longer before needing repainting. In addition, since the base coat has higher hide, it requires less coatings and dries much faster so you can apply the more complex liveries more quickly, according to Utter and Pepper.

Other advances for the exterior market include PPG’s solar heat management coating. This enables designers to use darker colours on the exterior while the aircraft stays up to 25 per cent cooler on the inside, depending on the exterior paint colour.

“PPG also offers a specialty intermediate coating which is used between the primer and the topcoat. When the aircraft goes through the repainting process, only the topcoat and intermediate coat have to be stripped, leaving the primer intact. This allows for a faster turnaround and therefore less downtime,” explain the PPG duo.

To further optimise the painting processes and surface performance, Mankiewicz developed the Alexit BaseCoat/ClearCoat system, whose

1. Qantas’ special ‘indigenous’ livery

2. Mankiewicz coating being applied

◀Brussels Airlines' *Amare* aircraft took 16 days to paint



properties include adjustable drying times, which fit large areas with good overspray uptake and fast drying properties for smaller areas.

"The time required to paint a special livery is a crucial factor," says Lang. "Due to the usually extensive range of colours and the high level of detail on the fuselage and fin, it is essential to keep the drying times as short as possible. The high opacity of the Alexit BaseCoat is very helpful here. If the paint covers with one coat – and our Alexit BaseCoat does with the majority of shades – you can save a second coat of the same colour and, therefore, time."

One complex project Mankiewicz was involved in was WestJet's *Magic Plane*, a 2013 collaboration with Walt Disney Parks & Resorts (Canada) to promote Walt Disney World Resort in Florida. The custom-painted livery of the Boeing 737-800NG aircraft, which featured Mickey Mouse as The Sorcerer's Apprentice casting a spell, included a total of 36 different paint colours and took a team of 26 people 24 days working around the clock to paint.

For Lang, one of the most significant advantages of the Alexit BaseCoat/ClearCoat is that the paint system

enables the so-called wild spraying technique, reversing the classic painting process sequence.

"Instead of starting with the most frequent colour, the lowest is applied first," he explains. "In a standard procedure, you would start to spray the most-used colour first (primarily white), followed step by step to the less frequent colour. An intensive workforce and material are needed to mask the aircraft between the paint application."

Wild spraying also allows for spraying two colours at the same time, provided that they are not too close to each other, to avoid overspray.

KEEPING COVERED

Aircraft livery coatings must withstand tough environments. Whilst needing to be durable, long-lasting and decorative, they also need to have excellent chemical and abrasion resistance, without compromising a rich, high gloss finish with excellent distinctiveness of image (DOI). DOI is an indication of the perfection of a reflection, and lack of haze or "orange peel" in a surface.

Using a BaseCoat/ClearCoat layer structure, the ClearCoat as the final layer is the most protective coating. The

polyurethane system offers strong UV protection and perfect gloss and wet-look properties. "The vibrancy of the livery benefits from the outstanding DOI of the Alexit BaseCoat/ClearCoat system," says Lang, who adds that it lasts for a long time. WestJet's *Magic Plane* will finally retire this year after 10 years in glorious colour.

The latest highlight for Mankiewicz is the recently launched Brussels Airlines' *Amare*, one of its Airbus A320neos dressed as a Belgian Icon. The aircraft is designed to contribute to the Tomorrowland music festival. Joëlle Neeb, senior media relations manager at Brussels Airlines reveals that the paint job itself took 16 days. "But if you look at the full design process, this was a project of 13 months."

Neeb says the new design needed to be aligned with the airline's branding as well as its other recent Belgian Icon *Trident*, with a gradient from light to dark, front to back. "No fluorescent colours could be used nor small details around the doors," she says.

Amara features the world's first livery to include augmented reality, as the bird design comes to life when scanned with a smartphone. "When you scan the Tomorrowland logo on the engines using Instagram and select a specific filter, you will see the magical bird come to life. That is how it is done today, but this will probably change in the future to make it even easier," says Neeb.

Mankiewicz is a long-standing supplier of paint for the airline's Belgian Icons, a collaboration Neeb says has always been "very nice". "The same goes for Airbourne Colours who utilise it with their highly skilled paint crew during a paint job," she adds.

"In the end, it all comes under the big heading of 'Cooperation', avers Lang. "An outstanding special delivery is always the result of close cooperation between the airline, designer, paint crew and paint manufacturer." ●

“WE MUST ACT NOW”

World Aero's **Phil Randell** explains concerns for future generations of manpower in MRO

Attracting a fresh generation of talented workers into aviation maintenance is a concern for many MROs worldwide and an issue that's likely to hamper growth plans, in particular of large organisations.

Recent generations have shied away from hands-on jobs, in favour of following more 'white collar' careers. Ups and downs in the aviation industry and the devastating effect of the pandemic has only exaggerated this.

I was fortunate to have been one of many who received a respected apprenticeship with the UK Ministry of Defence at A&AEE Boscombe Down, England, which set me up well for my career, then as a licenced engineer and eventually to wheel and brake MRO at World Aero.

However, like many other centres, this training school and its annual output of talented technicians has fallen away.

Aviation maintenance must be shown as an attractive, respected, interesting and potentially lucrative option to what have recently become more traditional career choices.

In talks I've given to young people, there has been a lot of talk of AI. Whilst World Aero and I are embracing the ideas that AI can bring to us and our industry, it's plainly obvious that as it stands, there is no way for AI to replace the maintenance engineer.

Sure, it can offer guidance and assist with troubleshooting, but skilled human interaction will always be required.

If we fast forward 10 years, a great number of 'white collar' jobs will have been replaced by AI and the job market



“
**WE HAVE A DUTY
TO ENCOURAGE
NEWCOMERS TO
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MAINTENANCE AS
A CAREER**
”

PHIL RANDELL

owner and chief
executive, World Aero

may well be very different from what we see today. So perhaps being an 'AI proof' aviation technician is worth consideration after all.

One of the other challenges which I feel greatly dampens enthusiasm for working in aircraft maintenance, and evident from my experience in wheel and brake MRO, is the ever-increasing burden of regulation.

Indeed, at every opportunity, when asked what the biggest risk to our business is, I always unwaveringly state 'over-regulation'. Whilst some of us thrive on it, and it is of course of paramount importance to a senior

▼ World Aero provides aircraft wheel, tyre and brake MRO component repairs and AOG services for commercial or corporate jets

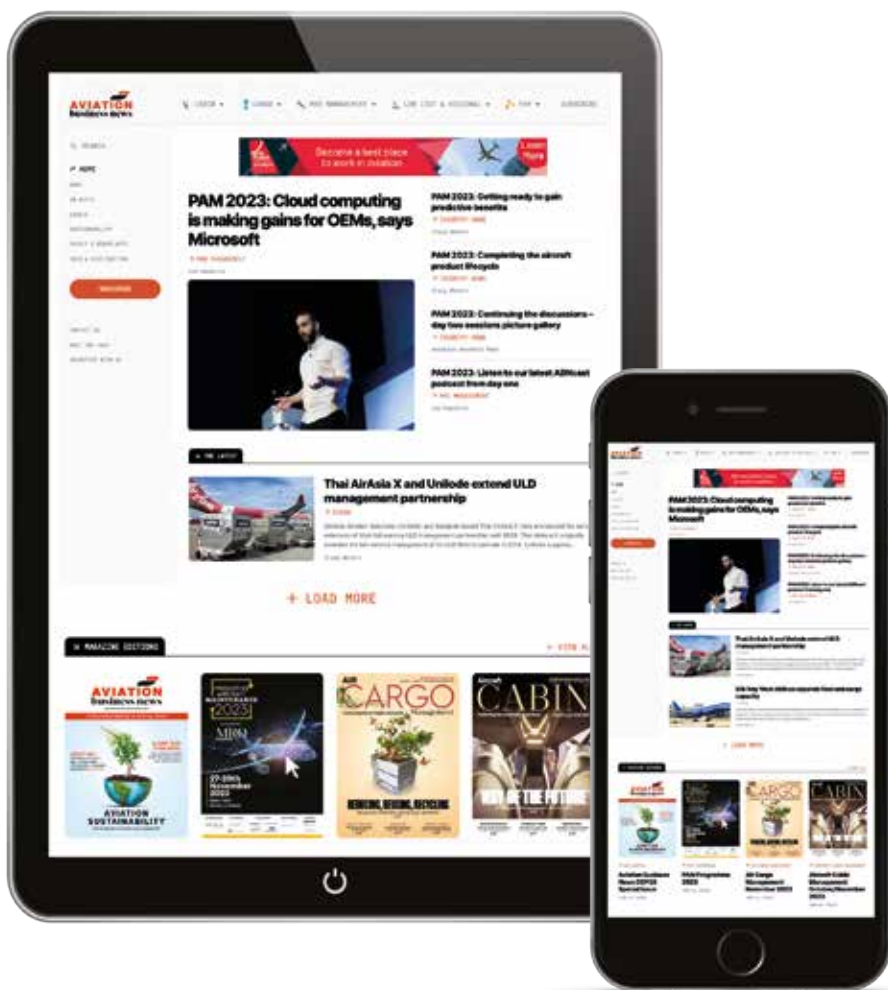
technician's role, in reality the vast majority of the workforce just want to come to work in a well systemised business, do their job with pride and go home again.

While many industries offer just that, aviation and its quagmire of ever-changing requirements is just a turn-off for many, especially workers who are undertaking a supervised low or semi-skilled function.

As industry leaders, we have a duty (not to mention a desperate need) to encourage newcomers to choose aviation maintenance as a career. Lack of visibility, the unavailability of training schemes and over-regulation, this 'perfect storm' has led to a decline in the number of skilled workers available and we must act now. ●



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A quality-centric approach to disassembly

Ascent's **Scott Butler** underscores the repair station's commitment to green practices and a sustainable aviation future



“WE ARE PROUD TO BE ON THE LEADING EDGE OF GREEN INITIATIVES AND FOSTERING A MORE SUSTAINABLE AVIATION LIFECYCLE”

SCOTT BUTLER

chief commercial officer,
Ascent Aviation Services

Association (AFRA) and in June I was elected to a three-year term to the association's board of directors.

Ascent's vision greatly aligns with AFRA's mission that *“champions the collective needs of the aviation sector in advancement of environmentally responsible end-of-service practices and realisation of circular economy goals, by developing and promoting the safe and sustainable management of components and aircraft”*.

At Ascent, we are proud to be on the leading edge of green initiatives and fostering a more sustainable aviation lifecycle. As an MRO and retirement hub, we handle reclamation and disposal of dozens of commercial aircraft annually.

Along with green revolutions in other industries, AFRA's Best Management Practices has increased awareness and improved the sustainability of end-of-life aircraft management.

Ascent has long maintained a quality-centric approach to the disassembly process and uses this MRO mentality

from when the aircraft lands to the final hull disposal. Each component removed goes through a thorough inspection and handling process before being sent to our own Part 145-approved back shops or being shipped to our customers.

We have added landing gear teardown and overhaul to the large capabilities list, further extending the lifecycle of these valuable aviation components.

Our customer base now often requires ESG processes flown down from their own initiatives, even in normal maintenance and handling procedures, pushing the industry to sustainability levels seen in other industries.

Ascent views the end-of-life market growing from the niche component world to a full-value lifecycle which is getting more investment from all levels of manufacturer, government and other investment funds.

The more we bring visibility to this lifecycle will only lead to greater shared responsibility for its sustainability. ●

Ascent Aviation Services (Ascent) is a Class IV 14 CFR Part 145 certified repair station specialising in every aspect of the aircraft maintenance lifecycle of all fleet types.

We maintain narrowbody and widebody, small to large, regional to long-haul aircraft, and one of the largest storage and reclamation operations in the world.

Ascent has expanded its capabilities and has begun building two new hangars at its Pinal Air Park (MZJ) location in Arizona to support the B777-300ER modification programme.

The new programme will greatly extend the life of these widebody passenger airplanes, reducing the excessive waste due to large-scale reconfigurations.

Ascent has been a longtime accredited member of the Aircraft Fleet Recycling



▲ Landing gear teardown and overhaul has been added to Ascent's capabilities list



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