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MRO

Management

CONTINUALLY DEVELOPING

Joramco CEO Fraser Currie on the
need to grow and improve capacity,
capabilities and processes



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TICKING TIME BOMB

What are companies doing to address
the maintenance technician shortfall?

INDUSTRY FOCUS

Supply chain and staffing issues are
challenging European MROs

TOTAL TURNAROUND

How independent MRO Caerdydd
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Editor's Letter

It's a busy time for MRO companies around the world at the moment, but great challenges remain – with labour shortages and supply chain issues among the biggest.

That's certainly the case for MROs headquartered in Europe, the subject of the latest edition of our 'Industry Focus' series (page 36) which aims to offer a comprehensive state-of-the-industry analysis for different regions of the world.

"The focus at the moment for MRO leaders is managing their business for the here and now," says Naveo Consultancy's managing director Richard Brown in our report. "Beyond that, [there is a] need to be efficient, a need to think smarter, faster, leaner."

There are many ways of achieving that, as we discover throughout this issue. The always insightful Joramco CEO Fraser Currie explains how his company is continually developing on page 60, having just recorded its best first-half figures on record. He promises "exciting developments" to look forward to.

Oscar Torres was only named president and CEO of Kellstrom Aerospace Group in April, but he is able to bring more than 20 years of experience at the company to this leadership role. Speaking to him for our 'Top Table' interview on page 48, it was clear Torres has plenty of ideas to take the business forward – and a powerful vision to add capabilities,

expand Kellstrom's technical services unit and embrace digitalisation.

Back in Europe, a major turnaround strategy has been successfully implemented at Caerday – formerly Cardiff Aviation – by group CEO Joachim Jones and chairman Bruce Dickinson, the legendary Iron Maiden frontman. Now in its tenth year, the company is set for growth and the pair have a new goal – for Caerday to become one of the industry's major players. You can find out how Caerday got to this strong position on page 64.

This issue also offers our regular array of columns and features. We take an in-depth look at what MROs are doing to address the shortfall of maintenance technicians and engineers; review the current landscape for companies

involved in aircraft painting; and get the thoughts of wheels, brakes and landing gear MRO providers on how they see the future.

Finally, *MRO Management* (as part of Real Response Media) is looking forward to delivering the Predictive Aircraft Maintenance conference in London on 15-16 November. With an exciting speaker programme and fantastic networking

opportunities, we'd love to see you there. For more information and to register, you can visit www.predictiveaircraftmaintenance.com.

In the meantime, I hope you enjoy reading the issue.

Jason Holland

EDITOR

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Photo: Lufthansa Technik

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HANGAR TALK



FACILITIES

Rolls-Royce and Air China to turn new Beijing JV “into world-class aero engine MRO”

➤ Rolls-Royce and Air China are entering into a new 50/50 joint venture (JV) MRO facility in Beijing, China.

The new facility is named Beijing Aero Engine Services – or BAESL – and will provide MRO support on the Rolls-Royce Trent 700, Trent XWB-84 and Trent 1000 aero engines. Air China has all three engine types in its fleet.

Full capacity is expected to be achieved in the mid-2030s, at which point BAESL will be able to support up to 250 shop visits per year. The facility will offer MRO services to Air China as well as other Rolls-Royce airline customers based in Greater China and beyond. The engine manufacturer said it currently powered 60 per cent of China’s widebody fleet, with its engines on more than 550 aircraft in service or on order.

Rolls-Royce’s Trent 700 engines also power 90 per cent of the country’s Airbus A330 fleet and the Greater China fleet represents 20 per cent of all Trent engines flying today.

As part of its strategy in China, Rolls-Royce said the JV would deepen its relationship with Air China, give customers the best level of service, improve the cost-competitiveness of its business, and generate incremental MRO capacity as shop visits grow.

“It aligns in-region growth with in-region capacity providing customer proximity, which supports our sustainability goals by reducing overseas transportation of engines for MRO activity,” the company stated. “The new facility will also support the continued expansion of our capable, competitive and flexible global care network.

“It is part of our strategy to expand our MRO network in a cost-effective way in order to support our growing fleet.”

Air China’s president Ma Chongxian sees a great deal of potential in the new venture: “With safe operation as top priority, Air China has long been committed to developing aircraft maintenance capabilities and ensuring the reliability of the fleet, meanwhile striving to promote the industrialisation of aircraft maintenance.

“In the future, Air China and Rolls-Royce will continue to deepen our profound partnership and start a new journey of cooperation in the field of high thrust engine maintenance.

“We look forward to building the JV into a world-class aero engine MRO company and increasing the volume of China’s civil aero engine MRO industry.”

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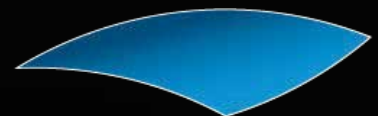
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GE Aviation has opened its \$8 million Asia-Pacific Service Centre at Brisbane Airport, supporting avionics, flight management, electrical power and Dowty propeller systems



AIRCRAFT

“Huge moment” as 2Excel Engineering receives approval to maintain A320 NEOs

2Excel Engineering has received approval from the UK Civil Aviation Authority (CAA) to add CFM LEAP-1A-powered Airbus A320 NEO family aircraft to its maintenance organisation approval certificate at its base in Lasham, Hampshire.

The company already holds approvals to perform heavy maintenance checks on several aircraft types, including Boeing 727s, 737s and 757s, as well as the Airbus A320neo family and Beechcraft King Air and Piper PA-31 aircraft.

Matt Caswell, 2Excel Engineering’s CEO, said: “This is a huge moment for the staff involved in making this happen.

I would like to thank them all for their hard work and dedication. By adding Airbus A320 NEO CFM LEAP-1A aircraft to our Part 145 certificate, we will have expanded our capabilities, and this lets us build stronger relationships with both new and existing customers as they modernise their fleets.

“Gaining this approval is also a further proof point of our drive to grow and expand our business and is part of our strategic roadmap to broaden the scope of what we can offer our customers, as well as securing long-term prospects for our company, its employees and the local economy.”



ENGINES

MTU Maintenance marks milestone 4,000th CF6 shop visit

MTU Maintenance has celebrated the delivery of its 4,000th CF6 engine – a CF6-80C2 from Air Transport International, a wholly owned subsidiary of Air Transport Services Group. The shop visit was performed by MTU Maintenance’s North American branch in Vancouver.

MTU Maintenance has been supporting the CF6 for four decades, starting with the CF6-50 in 1982. The CF6-80C2 was introduced to its portfolio in 1989 and counts for more than half of shop visits performed thus far. While MTU stopped serving the CF6-50 in 2020, the company remains committed to the CF6-80C2 as MTU also provides MRO services for the military variant of the engine, the F138.

“We are glad to celebrate this milestone. Air Transport International’s growing fleet allows us to further ramp-up our CF6-80C2 volume in the years to come,” said MTU Aero Engines’ chief program officer Michael Schreyögg. “We are engine experts, dedicated to achieving maximum performance and optimal engine life for our customer’s engines. We thank all our customers for their trust in us in over the past 40 years. Without them, we would not have been able to reach such a milestone.”

MAINTENANCE

Aspire MRO to become “pre-eminent” widebody MRO company in North America

Aspire MRO has been launched, offering widebody MRO and passenger-to-freighter (P2F) conversion services. The company is based at the former American Airlines maintenance facility in Fort Worth Alliance Airport in Fort Worth, Texas. It has been founded by experienced MRO executives and is backed by investment funds managed by affiliates of Fortress Investment Group. Aspire will operate six bays for heavy widebody maintenance and 777 P2F conversions at a dedicated 840,000sq ft facility at Alliance Airport. The company said it had already secured a long-term contract to perform P2F conversions and MRO-related work for Mammoth Freighters.

Aspire is targeting both domestic and international customers, and noted that it

had “ample additional capacity to support operators around the globe seeking to meet the ever-increasing demand for next-generation P2F conversions”.

Phil Bathurst, Aspire’s president and CEO, said: “I fully expect Aspire to become the pre-eminent MRO providing conversion and maintenance services to widebody aircraft in North America.”





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DIGITAL

Boeing launches cloud-based digital solution with ANA

➤ All Nippon Airways (ANA) will be the launch customer for Boeing's 'Insight Accelerator' (IA), a new cloud-based digital solution employing artificial intelligence to improve operational efficiency and avoid high impact service disruptions.

IA uses out-of-the-box algorithms to sort and detect anomalies and create alerts to enable airlines to take proactive maintenance and repair action and prevent unscheduled delays.

"There are many products on the market for flight data analytics but Insight Accelerator is the most effective tool for our aircraft operation,"

commented All Nippon Airways manager of planning & administration, engineering Manubu Tono. "It's very innovative, and meets our primary goal of leveraging features in flight data that indicate a system failure before it happens."

Boeing Global Services' vice president of digital aviation solutions Duane Wehking commented: "IA's built-in artificial intelligence, guided exploration and powerful visualisations allow airlines to investigate flight and maintenance data, identify trends and discover insights – all without specialised coding or programming skills. This solution will provide value to airlines from day one."

SUPPORT

AJW Group opens regional support hub in Turkey

➤ AJW Group has opened a new regional support hub and office located in Istanbul – called AJW Turkey. The opening comes in response to growing demand for a full-service local office, operating in the local time zone, according to AJW Group. The company termed Turkey and the surrounding Eurasia region as one of its "priority markets".

AJW Turkey will aim to deliver the full suite of AJW's support solutions to companies in Turkey and the wider region. It will primarily support AJW Group's regional customers, initially as a local extension of AJW's customer support, offering

access to an inventory of Airbus and Boeing spare parts valued at US\$500 million. Services include engines and major assets, contractual support negotiations, MRO services, and nose-to-tail support solutions.



AJW Turkey is expected to expand with inventory located in Istanbul to support operational demands across the region and beyond. It will be led by Umit Caymaz (pictured) as managing director. Caymaz brings over 15 years of aviation experience with previous roles at Onur Airlines and MNG Airlines, in addition to roles at aviation support companies.

BRIEFS



● Wizz Air has received approval from EASA to use Lufthansa Technik's electronic technical logbook (pictured) in daily operations. The electronic technical logbook is part of Lufthansa Technik's AVIATAR platform for digital products and services.

● Spirit AeroSystems has signed a Memorandum of Understanding with Malaysia Airlines to develop MRO services for 737 Next Generation aircraft. The companies will start to jointly work on establishing repair services for nacelle and flight control surfaces to support the airline's fleet and the aircraft of other operators before the end of 2022.

● China Airlines has extended its engine support agreement with AFI KLM E&M to cover the GE90 engines powering four more 777 Freighters.

● Revima Asia Pacific has been awarded a two-year contract to provide landing gear MRO services on Luxair's 737NGs. Work will be carried out at Revima's new 11,000sq m facility south of Bangkok, Thailand.

● SR Technics has been awarded a multi-year CFM56-7B engine support contract by Garuda Indonesia. The engines power Garuda's Boeing 737NG fleet. MRO work will be carried out at SR Technics' facility in Zurich.

● GA Telesis Engine Services has been awarded a long-term engine maintenance contract by Lion Air. The agreement covers the CFM56-7B engines that power the 737NGs across Lion Air Group airlines, including Batik Malaysia and Thai Lion Air. It also includes LLP management and lease engine and logistics support.

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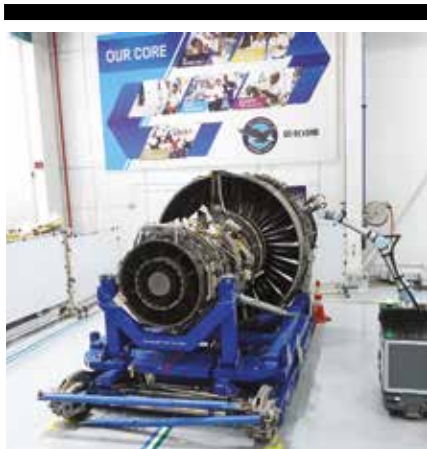
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TECHNOLOGY

Pratt & Whitney seeks “Industry 4.0 transformation” with Singapore technology accelerator

● Pratt & Whitney is to establish a technology accelerator in Singapore in collaboration with the Singapore Economic Development Board (EDB). Technologies developed there will be applied across Pratt & Whitney’s global MRO footprint.

The facility will serve as a centre of excellence for technology advancement, and help to accelerate the development and deployment of technology insertion projects across Pratt & Whitney’s four Singapore-based MRO facilities over the next five years.

The projects will focus on automation, advanced inspection, connected factory and digital twin, and are expected to be worth at least S\$31 million (US\$22 million). Pratt & Whitney said its aim was to help to enhance connectivity and intelligence across its MRO operations. The Singapore technology accelerator will be located at the Seletar Aerospace Park, and is expected to be ready for occupation in the fourth quarter of this year. It will add 16 new positions, which the company plans to fill with local, full-time employees.

Pratt & Whitney’s VP, aftermarket global operations Kevin Kirkpatrick said: “Our Asia Pacific MRO facilities have done a great deal in the way of technology insertion, including developing the first-in-MRO application of 3D printing for aero engine component details, pioneering robotics and launching an industrial simulation software pilot that has resulted in optimised floor space and increased productivity. Our employees continue to test the limits of what is possible.”



SUPPORT

CAE expands aircraft technical support services in Asia Pacific

➤ CAE is expanding its aircraft technical support services offering in the Asia Pacific region.

In the first phase of this expansion, CAE will create an aircraft record central service, based in its existing Kuala Lumpur office, specialising in aircraft transition activities for the region.

“We’re excited about growing our aircraft technical support services in the APAC region to support an ever-expanding roster of clients in this

important market,” said CAE’s group president, civil aviation Nick Leontidis. “Being close to our customers is a winning recipe for their success and ours. With a dedicated team in the same time zone, we will be able to work more closely with our clients in the region and complete their projects more efficiently.”

CAE’s aircraft technical support services will complement the company’s existing CAMO and design office already based in Singapore.

ENGINES

Pratt & Whitney’s Shanghai Engine Center ready to offer more rapid response

➤ Pratt & Whitney is offering more immediate in-region line maintenance services for Asia Pacific-based GTF and V2500 engine operators as a result of its Shanghai Engine Center receiving new certification.

Technicians at the centre were given training by the Pratt & Whitney Line Maintenance Services team in Dallas. They have now received approval from the Civil Aviation Administration of China for the Pratt & Whitney GTF engine, following certification received to provide extensive V2500 line maintenance services in the summer of 2021.

Shanghai Engine Center is a JV between Pratt & Whitney and China Eastern.

Xinglai Gao is one of the mechanics working at Shanghai Engine Center (since 2009) to have received the line maintenance training.

“Product safety and customer happiness are two critical aspects that drive technician performance,” he commented. “Having technicians who are ready to dispatch and deploy, dependably, from both ends of the world only helps increase our proximity to customers. Faster care means less downtime, more flight time and strengthened customer relationships.”



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Trend watch

NEW FACILITIES, TOOLS AND PROJECTS ARE DRIVING INNOVATION IN THE MRO INDUSTRY



01

Testing times

● ST Engineering's commercial aerospace business is adding test cell support to its MRO solutions for the LEAP-1B engine. The LEAP-1B test cell capability is expected to be ready by end-2023, and the expansion follows the setting up of quick-turn services for the engine in February. ST Engineering will work with testing and technology development solutions provider Calspan Aero System Engineering to set up LEAP-1B test cell capability at its engine MRO facility in Singapore.



05

Commitment to training

● Lufthansa Technik's recruitment of trainee apprentices has returned to 2020 levels with 186 young people set to begin their apprenticeship at the provider's German locations. "We need reinforcements for the decade ahead; mechanics and engineers for the production divisions; we need young staff members for logistics and also the commercial sector," said Barbara Koerner, head of training & dual studies at Lufthansa Technik. A total of 23 dual students were also taken on, namely school graduates who combine their degree courses with practical applications.

"Vocational training remains one of our most important measures for securing the future"

02

Korean comeback

● Dornier Technology has won line maintenance contracts from three Korean low-cost carriers: Air Busan, Air Seoul and Jeju Air. The Philippine MRO company said it had benefited from the sudden recovery in inbound passenger traffic from Korea, with all three airlines having resumed services to the Philippines. The Philippine market is very strong for Korean carriers because of its popularity as a leisure destination in close proximity to the Korean peninsula. There are also many Koreans living in the Philippines.



03

COMPLEX REQUIREMENTS

● Virgin Atlantic has appointed Bii.aero to oversee the consignment and storage process of its surplus inventory of 747-400, A340-600 and A330-200 assets, now that the airline no longer operates these fleets of aircraft. The material covers all ATA chapters and includes engines, APUs and avionics. Bii will store, manage and market the material to secure revenue from the excess stock, and will sell, exchange and loan the parts, in accordance with customer requirements.

04

Clearer skies ahead

● Lufthansa Technik Philippines has opened a new hangar, adding three maintenance lines to its existing seven at Ninoy Aquino International Airport in Manila. The parking spaces of the 9,000sq m hangar can be configured according to need to provide room for four narrowbody aircraft, or one widebody aircraft and two narrowbody aircraft.





06

Optimising workflows

KLM Royal Dutch Airlines has selected INFORM software to optimise workforce scheduling across its engineering & maintenance, cargo and ground services business units at Amsterdam Schiphol Airport. The AI-powered 'GroundStar (GS) WorkforcePlus' software will be used to standardise planning in the three units, as well as to optimise shift schedules and automate the planning process. The cloud-based AI solution will replace a legacy solution developed in-house by KLM.

07

Parts process

● Vallair has purchased an Airbus A321 for imminent part-out. The 1999 vintage aircraft was previously operated by AtlasGlobal and managed by TrueAero. The airframe will be fully disassembled at Vallair's facility in Montpellier. "Part of the group's strategy is to build and sustain a good-quality spares hub in France," commented director of material management Armando Filho. Parts will be removed from the A321 aircraft, processed and made available for sale in the fourth quarter of 2022.



08

INTERIOR REFRESH

● Emirates will officially commence a multi-billion dollar project to upgrade the entire interior cabins of its 120 Airbus A380 and Boeing 777 aircraft in November. The project will be managed entirely by Emirates Engineering. The company is aiming to completely retrofit four Emirates aircraft from start to finish every month continuously for more than two years. Once the 67 earmarked A380s are refreshed and back in service, 53 777s will undergo a retrofit. The project is expected to be completed in April 2025.

TRENDING STATS

20

MNG Airlines has received its second A330-300P2F from Elbe Flugzeugwerke, representing EFW's 20th Airbus widebody conversion freighter

£6.3bn

Parker-Hannifin has completed its £6.3 billion acquisition of the UK aerospace company Meggitt, creating "a very compelling strategic and cultural combination"

30

Czech airline Smartwings has contracted Lufthansa Technik to provide repair and overhaul services of components for its fleet of 30 Boeing 737NG aircraft

10

Turkish Technic and Honeywell have signed a 10-year global repair license agreement covering the air data inertial reference units (ADIRUs) of Boeing 737MAX, 737NG and 787 aircraft

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PLACING IQ INTO TOOL BOXES AND CRIBS

Talking tool boxes can alert you when a tool hasn't been properly returned. It's among the developments in tool boxes and cribs as part of efforts to reduce foreign object damage concerns, says Snap-on Industrial's **Scott Steward**



— **“Technology today is making tool control a more effective concept to obtain. Innovations are taking tool control to the next level by working to improve technician performance and productivity”**

“

Scott Steward is the aerospace and aviation asset solutions manager for Snap-on Industrial

Tool control has always had added importance in the aviation industry. While a missing tool in an automotive bay can lead to inefficiencies, plus the cost for tool replacement, a tool that gets left behind on an aircraft or dropped on a ramp can lead to much more devastating consequences. Despite the high stakes, the onus has generally been placed upon individual organisations to ensure accountability for their tools. Of course, some accomplish that better than others.

Some MROs require technicians to bring their own boxes to the hangar, creating an environment where it's nearly impossible to implement any sort of comprehensive uniform tool control guidelines. However, there is hope. Technology today is making tool control a more effective concept to obtain. Innovations are taking tool control to the next level by working to improve technician performance and productivity – saving MROs money – all while greatly reducing foreign object damage (FOD) concerns. These advances are driving the industry to develop safer maintenance practices, and in turn allow MROs to become proactive in meeting safety standards the aviation industry demands.

The case for tool control

Creating a tool control programme means eliminating the hodge-podge

of technician-owned boxes and deploying company-supplied tools for consistency in the hangar. There needs to be a uniform benchmark for tools, as well as a method to accurately track and monitor them. A lack of standardisation and control over the number and type of tools can result in accidental oversight and unnecessary risks – such as what happened several years ago when a Boeing 737 lost an engine in flight.

After the aircraft made an emergency landing, investigators examined the engine and were surprised to learn the culprit was a tool mistakenly left behind. The investigation revealed that while performing maintenance on the engine, an engineer and technician left a tool behind in the engine cavity.



1. An effective tool control programme has many benefits – not least saving time and improving safety
2. With a quick scan, tools and equipment checked out from a tool crib can be tracked, enabling administrators to know which technician has possession of that particular item

“Investigators were surprised to learn the engine was lost in flight because of a tool mistakenly left behind”

The technician tightened bolts after servicing the engine, but failed to notice a small gap that was created when the covering didn't sit properly on the engine. That gap was caused by an expander tool overlooked in the engine. Fortunately, the aircraft landed safely and everyone walked away, but the incident clearly illustrates the danger lost or forgotten tools can pose to the aviation industry.

Automation in the boxes

Digital imaging technology is one way to bring standardisation and accountability to tool boxes. This technology provides the ability to monitor and track tools as they are removed and returned from boxes throughout the day – all in real time. It works by scanning each tool in the drawer to determine its status. If tool status is questionable, an interactive monitor affixed to the box can display the disputed tool transaction, or it can be identified in the audit image at the administrator's PC. User log and data time/date information is available for every transaction.

Digital imaging technology offers several advantages to the aviation industry. For starters, it reduces FOD concerns. If a technician checks out 15 tools and later returns 14 tools, the system announces not only that a tool is missing, but which one, and the location it was being used, alerting the technician

to go back and find that tool. Additionally, the digital imaging software allows the box's designated administrator to add or delete users, assign various levels of user access and lock permissions, and track individual tool usage.

The system can be synchronised to individual or multiple boxes and can pull data and images from each selected tool box. It also allows people and supervisors who are connected to the box throughout the network to know the status of all controlled tools and equipment.

It operates like an unmanned tool crib at the point of work, improving technician productivity.

Linking tool boxes to tool cribs

The level of accountability is now extending to the tool crib as well. This is valuable because in the past, organisations didn't have an efficient way to move tools and equipment within their inventory, or accurately keep track of them. While tool boxes were being monitored with a system like digital imaging, there wasn't an effective complimentary programme for the tool crib. More importantly, there wasn't an efficient network linking the tool crib to tool boxes and lockers. Innovations are making this happen today, and the benefits are plentiful.



With a quick scan, tools and equipment checked out from a tool crib can be tracked, enabling administrators to know which technician has possession of that particular item.

Other capabilities include setting up calibration schedules for tools such as torque wrenches to ensure compliance dates aren't missed, and administrators can be alerted when consumable items such as drill bits, fasteners, PPE and other products are running low and need reordering. This enables airlines and MROs to connect the tool cribs with the boxes and lockers – linking all critical components of tool control under one central platform.

Deploying a well-designed tool control system will work toward consolidating tools in your facility. It's also going to reduce FOD concerns and improve accountability, while promoting an atmosphere for crib attendants and technicians to be more productive. Tool control is fast becoming an area that works for you – and that's all thanks to automation and connectivity. **M**

DOING MORE WITH LESS

Modern defect inspection technologies provide the power to decrease turnaround times, says 4D Technology's product engineering manager and InSpec product manager **Kramer Lindell**



— **“The high precision of the 4D InSpec reduces the uncertainty typical of visual inspection and 2D measurements. Removing any doubt increases yield”**

“

Kramer Lindell is product engineering manager and InSpec product manager at 4D Technology

MROs have been plagued with labour shortages and high turnover rates since the onset of the Covid pandemic. The start of the decade has brought on a wave of retirements and, with that, a loss of trusted and experienced technicians. With a smaller workforce and increased turnover, what can MROs do with their defect inspection techniques to accomplish more with less?

Most MROs are heavily reliant on outdated defect inspection technology that is highly variable and time consuming. Optical comparators and stylus profilometers are commonly seen performing these measurements. Some inspection techniques do not rely on technology at all, but on visual and fingernail inspections that yield no quantifiable results.

MROs can save time and money by using state-of-the-art inspection technology. Giving an inspector the ability to immediately know whether a defect is within the specification makes them vastly more productive and easier to train, while reducing uncertainty and increasing yield. The 4D InSpec is an instrument that facilitates this for MROs around the world.

What can the 4D InSpec measure?

The 4D InSpec is used by MROs to measure all dimensions of wear, pitting, corrosion, scratches and dents. The parts inspected include blades, gears, hubs, blisks, tubing, rivets and welds. Anything that has a defect can be measured, whether it is titanium, carbon fibre, rubber or ultra-finished metal. Because it acquires 3D data, small geometries can be measured as well. Any edge break parameters

can be easily quantified, such as chamfers, rounded edges or radii.

How accurate is the 4D InSpec?

The instrument's noise floor is one ten-thousandth of an inch. Every 4D InSpec is calibrated on an ISO-certified height standard, and can be verified at any time by taking a single measurement of the series of depths on the standard. Typical defects

are measured with a standard deviation around .00001 inches.

Is it possible to improve turnaround time when MROs are shorthanded and have an increasing backlog?

Providing maintenance technicians with the best tools available increases their throughput and decreases the turnaround time of each individual part.

40%

MRO companies using the 4D InSpec instrument have reported increases in yield to be around 20-40 per cent, reports 4D Technology



“Measurements that typically take several minutes are instantaneous with 4D InSpec”

The 4D InSpec is a handheld surface gauge that gives technicians vibration-immune, 3D data right on the shop floor. Measurements that typically take several minutes are instantaneous with the 4D InSpec. The technician can take a snapshot of the defect with this instrument and immediately know whether it is within the specification.

The instrument is also small – about the size of a flashlight – and therefore easy to manipulate. Because it uses an optical technique, mirrors can be used to obtain measurements in hard-to-reach areas. In some cases, this has saved MROs over a month of teardown on different engine components. The speed of the instrument allows the same technician to inspect more defects per hour and more parts per day.

As new technicians are hired, how can MROs ensure they are performing accurate inspections, despite a lack of experience?

The software used with this system has been painstakingly designed to be easy to use and intuitive. Technicians typically become proficient in gathering data in a single day of training.

There is no need for any complex tricks or tribal knowledge that may be lost as workers change roles. The 3D data is as easy to acquire as taking a picture.

The data is automatically analysed by 4D's software to report if the defect is allowable. Because of the simplicity of measurement, different technicians will get the same value for the same defects. The high repeatability and reproducibility of the 4D InSpec allows it to be gage capable, which is not true for other common shop floor techniques.

The desire for automated inspection has increased substantially over the past two years. Can inspection with the 4D InSpec instrument be automated as well?

Automation is an obvious solution when faced with a labour shortage. A technician with a robot can accomplish even more than a technician with an instrument. The 4D InSpec's vibration immunity makes it amenable to either handheld or robot-mounted inspection. A robot can move to and measure each area of interest on a part at a rate of a few seconds per location.

Parts that took hours to inspect take minutes handheld and take seconds with a robot. Automation is ideal for parts with known locations of wear that commonly need inspection. Measurement results can be collected and displayed in a database, automatically flagging measurements that were out of the specification. Parts can be totally inspected and cleared at a rate that has never before been possible.

Why should MROs invest in metrology?

The high precision of the 4D InSpec reduces the uncertainty typical of visual inspection and 2D measurements. Any uncertainty leads to expensive parts being needlessly scrapped by the need to err on the side of caution. This instrument, on the other hand, allows technicians to confidently measure up to the specification line.

Removing any doubt increases yield. MROs using the 4D InSpec have reported these increases in yield to be around 20-40 per cent. Every MRO without sufficient metrology is losing money that could otherwise be kept. Cutting costs by reducing unnecessary scrap allows most MROs to see their investment in the instrument returned in a single month. **☛**

↑

Kevin Hughes, director of maintenance at BP Aero Engine Services, measures a nick on an engine on BP Aero's shop floor



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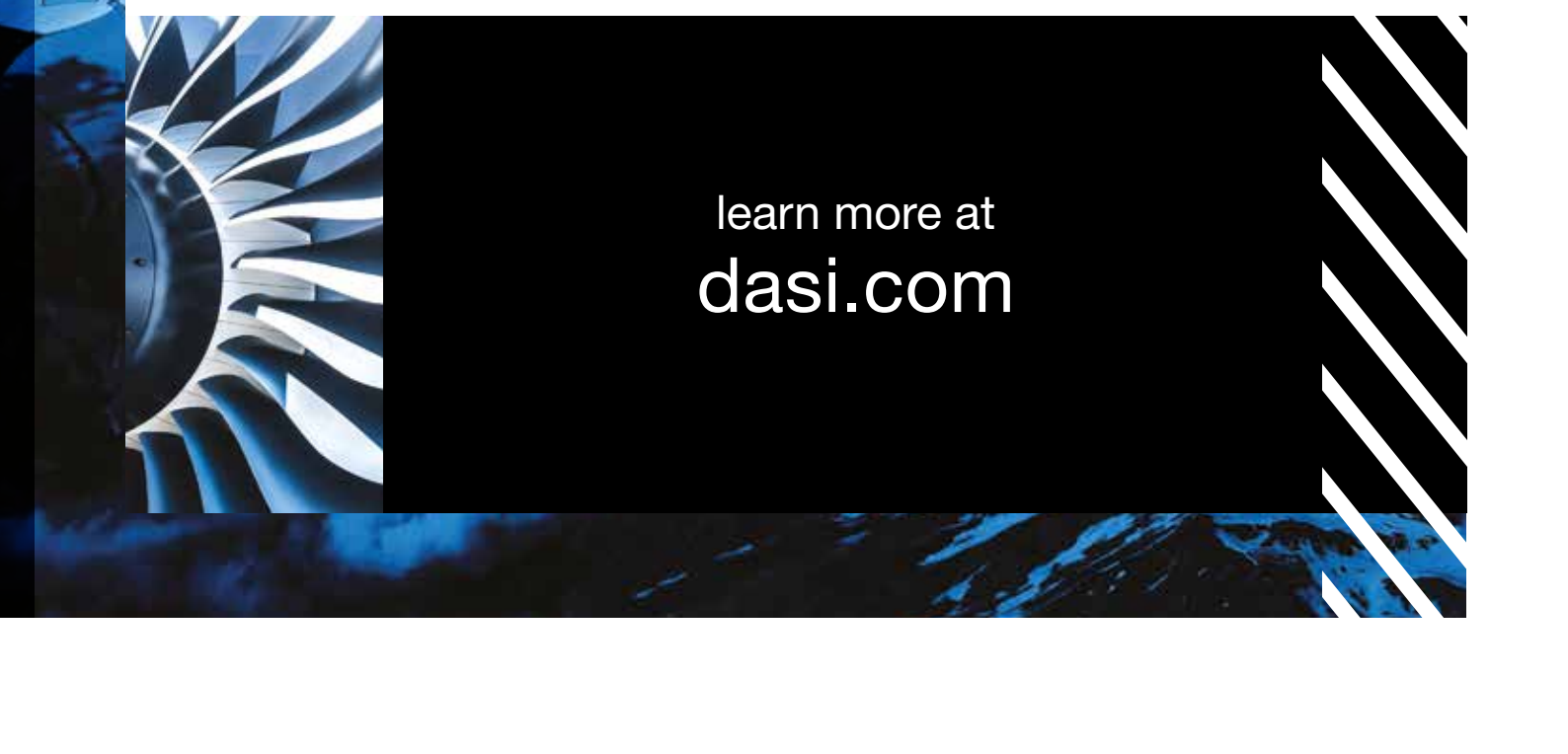
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Don't waste time looking for inventory services across multiple vendors – turn to DASI, the single source for all of your inventory needs.

The background of the advertisement is a collage of blue-toned images. At the top, the word "DASI" is written in a large, white, sans-serif font. To its right is a logo consisting of several white, curved, parallel lines that resemble a stylized wing or a fan. Below the logo, a large commercial airplane is shown in flight, angled upwards towards the right. The entire scene is overlaid with various geometric shapes and patterns in shades of blue, including diagonal stripes in the top left and bottom right corners.

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The bottom section of the advertisement features a close-up image of a jet engine's fan blades on the left side. To the right of the engine is a large, solid black rectangular area. The text "learn more at" is positioned above "dasi.com" within this black area. The bottom right corner of the entire image features diagonal white stripes on a black background.

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COVER STARS

Can technology transform what an engine protective cover could be? The answer is an emphatic ‘yes’, says Shield Technologies’ aviation field services representative **Mark Bechtel**



“Shield offers patented and proven cover technology and technical expertise to the commercial aviation industry in the form of protective commercial engine bags used during maintenance, overhaul and transport”



Mark Bechtel is aviation field services representative at Shield Technologies

In the past there were two primary types of engine protective covers used by military and civilian aviation: canvas and vinyl.

While canvas covers are very breathable, they did not keep moisture from contacting the equipment under them and, in reality, did little more than hide what they were covering.

Vinyl covers, on the other hand, can be a good waterproof barrier but are not breathable. So any moisture already on the covered equipment will be trapped, which creates the ‘Greenhouse Effect’ that actually propagates mould, mildew and corrosion.

This is where Shield Technologies Corporation and its advanced line of ‘Protective Cover’ technology comes in. Shield’s advanced protective covers offer a multi-layered cover system that has a 100 per cent solution dyed, water resistant yet breathable, highly UVA/UVB resistant outer layer.

Bonded to the fabric is a breathable, non-porous membrane which allows water vapour to pass through it and exit out from under the material.

Water can’t penetrate the fabric but any moisture that was already on the equipment is allowed to evaporate and pass through the waterproof membrane, providing passive corrosion protection.

Shield Technologies’ non-porous cover membrane doesn’t have the

tiny holes to release moisture that are found in every other waterproof breathable cover in the world. Instead, its cover releases the moisture through breathing caused by pressure differential.

In porous cover membranes, these tiny holes become clogged with dirt, dust, sand, salt crystals and sulfides, making their covers unbreathable. Washing these covers only partially brings back the breathability for a short time.

Because Shield Technologies’ membrane doesn’t have these tiny holes, these contaminants do not affect the breathability of the fabric, and so the cover breathability is more than three times what is required to prevent the ‘Greenhouse Effect’.



1



2

“A waterproof breathable cover has its limits and only provides passive corrosion protection”

As mentioned, a waterproof breathable cover has its limits and only provides passive corrosion protection.

Now for the technology leap that has transformed the cover industry. The most effective way to eliminate corrosion is to combine a waterproof, breathable cover (passive corrosion protection) with a vapour corrosion inhibiting layer (VCI) as an integral component of the cover (active corrosion protection).

Typical VCIs emit ions that bond with metal to prevent the electron transfer with water molecules, which is the corrosion process. While effective in reducing corrosion, these VCIs can leave an ionic residue on the equipment they are trying to protect, which can degrade the performance of sensitive electronics, optics and sensors.

In a simple role reversal, the VCI that Shield uses prevents corrosion by emitting ions that attach to water molecules to prevent them from exchanging electron molecules with the metal surface. Because the VCI ions do not attach to metal, there is never an ionic residue that could affect the performance of the equipment that is being protected. Besides being very effective in stopping

corrosion, the VCI layer that Shield uses lasts more than six years, which will outlast the cover itself.

One of Shield Technologies' most successful attributes is in cover development. Whether it be covers designed for aviation, ground or maritime use, they are all developed by our staff of retired/former military subject matter experts in concert with our team of engineers, and customer input.

100%

Shield's protective covers offer a multi-layered system with a 100 per cent solution dyed, water resistant, breathable UVA/UVB resistant outer layer

Shield engineers use advanced modelling and computer aided design (CAD) programs as well as ongoing professional training in advanced textile and industrial soft-goods design to rapidly create cover designs.

The resulting cover designs are superior in fit, form and function to competitors' covers and are developed with minimal time and fit checks.

Shield Technologies prides itself on producing covers that typically meet and exceed customers' expectations for reliability, ease of use, environmental protection, reduced maintenance, increased operational readiness and a high return on investment.

In the US military there are more than 100,000 Shield Technologies covers in use for most major naval, ground and aircraft weapons systems. These ensure targeting systems, day/night vision sensors, electronics, communications equipment and turbine engines are all protected and fully operational when needed anywhere, in any climate in the world.

Major end item original equipment manufacturers trust Shield to reduce the maintenance burden of their equipment and include these covers as part of their deliverables. This acceptance of the technology demonstrates once again the superior protection offered by Shield.

Shield is excited to offer all of this patented and proven cover technology and technical expertise to the commercial aviation industry in the form of protective commercial engine bags used during maintenance, overhaul and transport. With engine bag designs for Pratt & Whitney, Rolls-Royce and CFM International engines, this sector of commercial aviation has become a priority for Shield.

Shield Technologies aims to deliver the most effective, longest lasting corrosion inhibiting cover system available anywhere in the world today – and has without a doubt transformed what a cover can be. ❶

1. Engines need protection from water, corrosion and other harmful impacts

2. Shield Technologies is now focused on commercial aviation engine covers as a priority



Generating more power

In the run-up to the 2022 Predictive Aircraft Maintenance conference in London in November, *MRO Management* has created a column covering all things predictive maintenance. In this issue, we see how Pratt & Whitney is collaborating with Collins Aerospace to enhance its predictive maintenance services

Pratt & Whitney says its predictive maintenance services and engine health monitoring help to save between US\$35,000 and US\$100,000 per aircraft per year in cost avoidance.

The engine maker is now strengthening its collaboration with fellow Raytheon Technologies company Collins Aerospace to power up its predictive maintenance support solutions still further.

The pair have signed a full-flight data delivery agreement to that effect. The thousands of parameters from sensors and systems collected by Collins' 'GlobalConnect' and other data solutions during a flight will expand the engine health management services

offered by Pratt & Whitney as part of its 'EngineWise Insights+' solution.

The end effect is that Pratt & Whitney will now be able to draw insights and pinpoint trends using an even larger data pool. EngineWise Insights+ makes use of full-flight data captured from take-off to landing, allowing Pratt & Whitney to provide customers with preventative maintenance recommendations that aim to optimise performance, mitigate fleet disruptions, reduce customers' operating costs and maximise time in the air.

"By collaborating with a company that has longstanding relationships with many shared airline partners

↑
Pratt & Whitney will draw insights using full-flight data from take-off to landing

and industry-leading connectivity solutions, we are able to streamline data management and more immediately offer our predictive maintenance support," says Pratt & Whitney's vice president of aftermarket global operations Kevin Kirkpatrick.

"This agreement simplifies processes to meet our customers' evolving needs and enhances services to keep their operations running smoothly. We are excited to be working with our sister company Collins Aerospace, which helps to underscore the broad scope of aviation services that Raytheon Technologies offers across its portfolio."

With robust data governance, cyber security and landscape monitoring, Collins says it can provide data "quickly and with the same privacy, security and reliability that has made it a trusted provider of connectivity solutions for nearly a century".

"We continue to see a strong increase in the demand for analytics, predictive maintenance and data management and we are on the leading edge as we collaborate to bring best-in-class solutions to our global stakeholders in the technical operations space," explains Jen Schopfer, Collins Aerospace's president, connected aviation solutions. "As a long-time trusted innovator in aviation data and messaging, privacy and security are at the centre of everything we do as we deliver data-driven insights such as efficiency, reliability and sustainability for the industry." 

PREDICTIVE AIRCRAFT MAINTENANCE 2022

● On 16 November 2022, the Predictive Aircraft Maintenance Conference 2022 will take place at the Pan Pacific London hotel to explore the future of predictive maintenance, bringing together senior level executives from airlines, OEMs, MRO specialists and Big Data experts. For more information, visit predictiveaircraftmaintenance.com



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Julie Dickerson
Chief Executive Officer

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In the details

When different business units of a company work together – whether sales, maintenance technicians or lawyers – needless contract pain can be avoided, says Washington Aviation Group attorney-at-law **Ryan Aggergaard**

The Fall (autumn) trade show season is upon us. These events – combined with the rolling over of many fiscal years (not to mention the impending end of the calendar year) – present opportunities for many businesses to set new expectations for sales in the coming year and implement new strategies to realise those goals.

Last issue, we took a backward look at some of our contractual documents. Specifically, we talked about our terms & conditions and the boilerplate language that appears on our purchase orders. As we discussed, these documents allow for ease and consistency from transaction to transaction.

However, not every transaction, and especially not every large or complex transaction, lends itself neatly to our standard terms.



“Review the terms of a contract carefully, and don’t view every contract negotiation as zero-sum combat”



Ryan Aggergaard is an attorney-at-law at Washington Aviation Group



With global air travel continuing to rebound over the next couple of years and aircraft in need of maintenance as they re-enter and resume service, now is an important time to make sure the contracts that memorialise new transactions are serving your needs and are free from oversights and errors that could cost your company money.

Although it should go without saying, one of the most important things to be mindful of when signing a contract is to ensure the document is proof-read and that basic spelling and grammar rules are followed. You also want to review *very carefully* to ensure that the contract memorialises the actual agreed-to terms. You do not want to spend time negotiating a deal and sign a contract only to later learn that an essential term never made it onto the paper. A couple of examples help to illustrate the importance of such mundane vigilance.

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With contracts, the different business units of a company should be on the same page

Several years ago in the US state of Maine, a state law (but illustrative of the point, for our purposes) omitted an Oxford comma in a labour law that exempted certain activities from overtime pay requirements. That provision exempted:

The canning, processing, preserving, freezing, marketing, storing, *packing for shipment or distribution of*: agricultural produce; meat and fish product; and perishable foods.

Note how the law read ‘packing for shipment or distribution’ and not ‘packing for shipment, or distribution’. That slight omission allowed truck drivers to argue that distribution was not exempted from overtime pay because the law exempted *packing for distribution*,

not distribution alone, and hey, of course we distribute, but we don't pack. And the court agreed! The result was that the employer ended up settling the case with the plaintiff drivers to the tune of US\$5 million in overtime pay. That's an expensive comma!

Another famous example involved a condominium offering plan in New York, which gave buyers a right to back out of their contracts if the first closing did not occur before the end of the budget year. The budget year was set to run from 1 September 2008 to 1 September 2009. This meant if no closing occurred before 1 September 2009, those with contracts could rescind. The first closing occurred in February 2009, so everything should have been fine.

However, a tiny error was discovered in the plan so the first closing was actually (inadvertently) required to occur prior to September 1, 2008. As you may recall, the real estate and financial markets were in upheaval at that time, and buyers with contracts leapt at the chance to rescind them in the midst of the Great Recession.

“Make sure contracts that memorialise new transactions are serving your needs”

A comma. A single digit. These oversights resulted in millions of dollars in unanticipated costs. This is why it is so important to carefully review the terms of your contracts. This is especially true when reusing the same foundational contract document, which many companies do. Even lawyers, in the interest of efficiency, will often start with a contract template. So it is very important to review all of the terms to make sure that information from a past deal, or a placeholder term, do not make their way into the contract and change its meaning.

Another area of opportunity when drafting or reviewing contracts is to make sure everyone in the different business units of your company is on the same page and has the same objectives in mind. If the team negotiating a contract does not understand the

priorities of the team making sales or the team performing the maintenance, opportunities for cost savings or revenue enhancements can be lost.

One example we see frequently is the presence of a 'no PMA' clause in maintenance or lease documents. This tiny clause often stands in the way of an opportunity to better service customers and generate cost savings for both your business and your customer. (Disclosure: I am the VP of government and industry of affairs for MARPA, the trade association that represents the FAA-PMA industry).

PMA parts, and their close cousins DER repairs, can offer a maintenance provider an opportunity to better serve its customers due to shorter lead times and lower costs. Shorter lead times improve overall turn time. Lower costs off the shelf allow an MRO to pass some of those savings on to its customers, resulting in lower maintenance costs for the customer and increased profits for the repair station. And while not every customer is interested in PMA solutions, many are



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“An easy error a contract negotiator can make is to gloss over a term with which they are not familiar”

– especially when the price is right. But if you haven’t carefully reviewed your contracts and business goals with your whole team, you might find restrictive language in your contract that gets in the way of a win-win situation.

Contract negotiators (often lawyers) are human. Yes, even us lawyers can be accused of being human from time to time, despite the esteem in which we are all held! The drawback of being human is that errors can be made. And an easy error to make is to gloss over a term with which you are not familiar. If your contract negotiator is in the midst of a 40-page contract and sees a single paragraph forbidding PMA and DER, they may not stop to ask if that provision is one that they should revise; they might not even know what it means.

This is where having everyone on the same page becomes crucial. If you have taken the time to work with your contract team to explain important details to them – for instance explaining that PMA parts and DER repairs are a valuable cost control mechanism that allow you to promise lower prices and faster turn times – they will know during

negotiations that they need to push back against a ‘no PMA’ clause.

Conversely, if you know that a particular customer doesn’t want to use PMA for some reason, your contract team can use the presence of a ‘no PMA’ clause as a bargaining chip to secure some other contract benefit. But none of that can happen if your lawyer doesn’t even know what a PMA is.

Finally, don’t be afraid to review the contract in detail and ask your lawyer questions. If you don’t understand a provision, ask your lawyer to explain it. If they can’t boil it down into simple language to explain what it does, it probably needs to be re-written. Yes, contract language can be complicated, but at the end of the day the goal of the contract is simply to memorialise your agreement and allocate risks and damages if something goes wrong. It is important to remember that contracts do not have to be combative or zero-sum. In fact, the best contracts should strive to make both parties happy if the deal does fall apart.

When we look at contracts, we try to start with the assumption that

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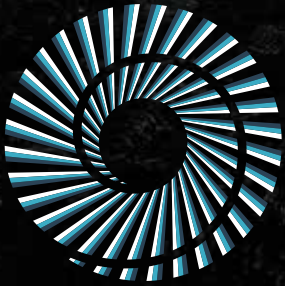
Don’t be afraid to review a contract in detail and ask your lawyer questions

somewhere along the way the deal will go wrong, and then figure out the best way to preserve the business relationship so that we can do another deal (that doesn’t go wrong) in the future. You entered into the contract because both parties saw mutual benefit. Preserving those positive attitudes by clearly assigning risk up front to avoid surprises or hurt feelings can help secure the next contract even if the present contract fails.

So remember, talk to your lawyers. Get everyone on the same page. Review the terms of the contract carefully, and don’t view every contract negotiation as zero-sum combat. Contracts simply serve to memorialise the great deal you reached at the last trade show or on your last sales call and protect both parties if something goes wrong on the deal. Your contracts can serve to keep those positive feelings going, even in the event of a breach.

And, for goodness sake, use the Oxford comma! ☺

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MRO FOCUS

EUROPE

With supply chains and staffing issues big challenges, how healthy is the state of the industry for Europe's MRO companies? *Bernie Baldwin* gets some answers from leading practitioners

Airlines in Europe have had their flight timetables interrupted regularly and considerably so far during 2022. This obviously has a knock-on effect on maintenance schedules.

MRO departments and independent providers headquartered in Europe have therefore been doing what they can to counter any downsides, though the current market status does have some positives, according to Richard Brown, managing director of Naveo Consultancy.

"It's busy in the MRO shops," he reports. "Some feel like they're back to pre-Covid levels. The major issue at the moment is long turnaround times on parts, engines, repairs and components during MRO activity, and also long lead times on new OEM parts. That is down to labour shortages – not having the right skills in the right places at the right times.

"The supply chain has not caught up as quickly as demand has. Many are struggling because of that. And the shortages are not just at the MROs, it starts at the OEMs and their suppliers – the widget manufacturer or raw material supplier.

"We turned off the taps in some places and so now turning it back on is a challenge. I'm not particularly surprised about that. One of the good things about our industry is that it's full of engineers and planners, and this doesn't faze them. We're an industry that is very reactive to a variety of things."

The price of shipping parts is also a problem in places, with one supplier reporting a quote to move an engine that was four times the regular fee. The Ukraine/Russia situation, air cargo capacity and a number of external factors all contribute to this.

Moving forward over the next 12-24 months, Brown highlights the trouble being caused by inflation. "That comes through to catalogue price increases for the new parts, but also the labour inflation and pressures on wages are feeding through to MRO costs," he remarks. "So MROs are trying to pass those costs on to airlines, who naturally want to resist. Some MROs might be on fixed price contracts, or dealing with a long-term contract that had assumed maybe 2-3 per cent inflation, whereas we're seeing 10 per cent. MROs are trying to work with customers to reach a solution. That might be a more repair-rather-than-replace approach, but remember, the repair lead times are very long."



Photo: Juergen Mai/Lufthansa Technik

Using parted out spares (used serviceable material, USM) is difficult currently as stocks are reduced due to aircraft retirements being at historical lows. “The asset owners are playing a wait-and-see game as to whether they’ll operate an aircraft as the traffic recovers, or if they sell it or tear it down for parts,” Brown observes. “Even then, if you’ve got an aircraft or engine to part out, you may have to put the parts through an MRO shop to get them certified. Then the same issue arises with long lead times.”

Roderick Moerland, manager MRO support & engineering at Fokker Services Group, agrees that standard maintenance schedules are slowly returning, but reports that activity

\$97b

> The global MRO market is forecast to reach US\$97 billion by 2023, exceeding 2019 pre-Covid levels

[Source: ICF, Aviation Week, Naveo analysis. Constant US\$]

“The supply chain has not caught up as quickly as demand has. Many are struggling because of that”

levels at the company have remained high. “During periods of decreased demand at our hydraulic, pneumatic, avionics and power generation shops, we make the most of the time. Our technicians work together to develop new capabilities and explore new ways of optimising processes,” he confirms.

“One example of this is with engine accessories. We have supported CFM56 engine accessories for years and then expanded our portfolio to include the CF34 and the LEAP. Along the way, we transferred key learnings from the CFM56 to design new capabilities. Our portfolio is constantly expanding to respond to the latest industry developments.

“In the end, it’s about remaining flexible – an important skill – which will be even more so as our industry continues to recover from the impact of the pandemic.”

AJW Group has also been busy, having recently opened a new battery MRO facility, AJW Technique Europe, which is already experiencing an upturn in the number of units coming in for routine inspection and testing. “It’s about 20 per cent up on last year,” says Frankie McKeown, production manager at AJW Technique Europe.

“As the winter maintenance schedules kick in, we expect further uplift. We are laser focused on expansion right now, with the primary aim being to deliver improved cost and reliability efficiencies for customers. The short-to-medium-term plan is to build out our European MRO hub’s capabilities using AJW Technique in Montreal as a template.”

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Lufthansa Technik sees a buoyant MRO market “with huge demand driven by the pent-up demand for travel”

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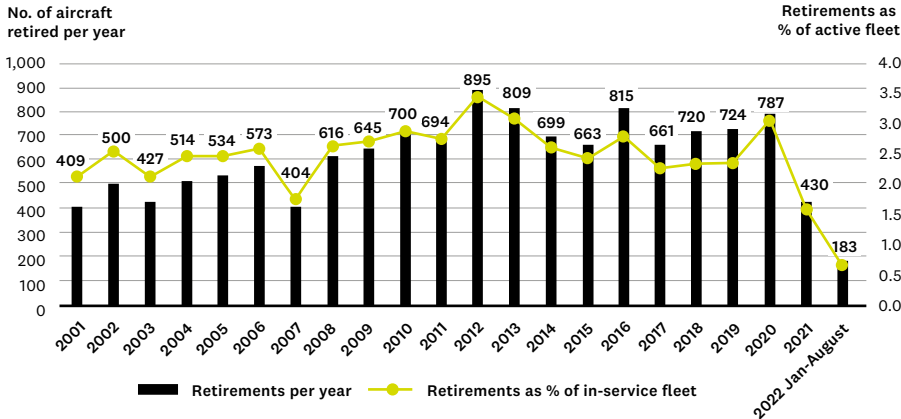


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Air transport retirements 2001 to August 2022



Charts on this page: Stocks of used serviceable material are low due to aircraft retirements being at historical lows, as these charts illustrate

1. Engine, aircraft and component maintenance facilities expect to be extremely busy over the next 12-24 months

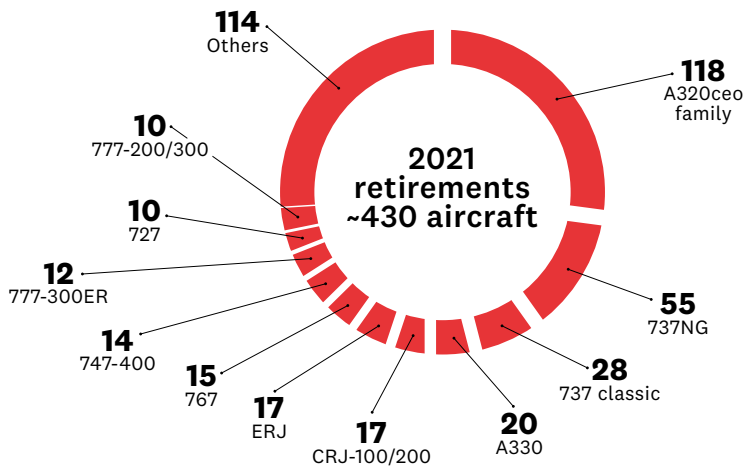
regulations,” he says. “Progressive approaches such as pro-active reliability programmes were a luxury which few airlines could afford and were widely dropped.

“The re-activation of fleets and boom in summer travel has created a huge peak of maintenance demand for this winter season. This is stretching the limits of available hangar and manpower capacity. Combined with OEM material availability and supply chain issues, these are bigger concerns than flight disruptions.”

Naveo’s Brown shares the concern regarding staff numbers. “Some people say it’s [currently] as bad as it will get. Others say that, as demand recovers, unless we can train new people, it will get worse before it gets better. There’s another school of thought that says a downturn or slowdown helps labour sort itself out,” he notes.

“There’s a mismatch at the moment between the skill levels. Some MROs have lost senior talents, who retired or took a package early, so that institutional knowledge has partly gone. You can recruit new people, but it takes time for a new hire to be as productive as a senior person who left.

“If we look at MRO capacity as soft capacity and hard capacity, then hard



Charts: Naveo Consultancy

“We are laser focused on expansion, with the primary aim being to deliver improved cost and reliability”

While many supply chain service providers were de-stocking and cutting costs to preserve cash, Farsound was doing the opposite, according to Lee Kelsey, the company’s group sales director. “It is critical to give manufacturers long-term visibility of our demand, increase investment in stock when lead times are increasing rapidly and, above all, ensure we can continue to deliver what the customer needs. In some cases we have placed orders over two years in advance on high volatility parts,” he states.

“We are creating something within the aerospace MRO sector that others are not. We strongly believe in giving customers a choice and are pushing the boundaries as we continue to grow. We understand our customers’ needs and that there is not a ‘one size fits all’ solution.”

Kelsey acknowledges that the main challenge right now is supply chain stretch. “Farsound has been able to rely on previous hard-won experience and has positioned the business to be at the forefront of the post-pandemic sector recovery,” he confirms. “Our supply chain and inventory management solutions deliver aircraft parts to the aerospace MRO sector – supplying kitting, direct line feed, carousels and vending solutions as well as scheduled and ad hoc deliveries.”

Dan Hepworth, head of corporate sales Europe at Lufthansa Technik, says the challenge for airline technical departments in the first half of 2022 was to get aircraft back into operational readiness following parking. “During the peak of the crisis, maintenance was deferred to the extent permissible under the



Photo: Gregor Schläpfer/Lufthansa Technik

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Photo: Lufthansa Technik

capacity could be the size of your facilities, buildings, test rigs and so on. Soft capacity is the people you have, how many shifts you've got. You can have a massive building with lots of machines, but if you can't put an extra shift on, you're limited. Right now the big issue is the soft capacity in the market, which is driven by labour."

The staffing issue will continue to be a challenge, but looking ahead, Lufthansa Technik's Hepworth believes there are real positives. "The overall market is extremely buoyant with huge MRO demand driven by the pent-up demand for travel which has not yet been exhausted," he says. "Late and slow deliveries of new aircraft have forced many airlines to extend existing leases and/or hold on

\$27b

Europe as a generator of MRO spend will grow from US\$22 billion in 2022 to \$27 billion by 2031, a CAGR of 2.3%

"You can recruit new people, but it takes time for a new hire to be as productive as a senior person who left"

to aircraft for longer than anticipated, which has also led to an increase in overall maintenance demand.

"Engine, aircraft and component maintenance facilities expect to be extremely busy over the next 12-24 months. Some consolidation may occur and some legacy airlines may be forced to downsize their operations somewhat. On the other hand, low-cost carriers continue to grow their market shares. However, there are several headwinds – inflation, material costs, supply chain issues – which could dampen the outlook and will cause airlines to be cautious."

Fokker Services Group is seeing "a real uptick" in airlines across Europe temporarily leasing more aircraft, according to Moerland.

"This is to meet increased demand in travel now that some global Covid-19 restrictions have been lifted.

It has allowed continued operations during the busy summer months without the commitment to bring on an aircraft year-round," he explains.

Farsound Aviation, meanwhile, has committed fully to a comprehensive growth plan over the next couple of years that will see the company expand its facilities and capacity for supplying small hardware and other fast-moving consumable parts.

"Our business has doubled in size since 2020," Kelsey reports. "We have a very strong pipeline of growth with many new customers wanting Farsound to help them to lift their supply chain solutions to the next level. Our new UK facility will give us eight times the capacity of our current UK facilities.

↑
Lufthansa Technik Aero Alzey recently celebrated 30 years of MRO work on CF34 engines



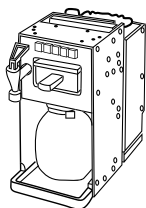
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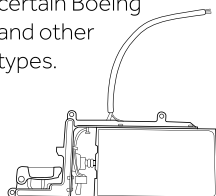
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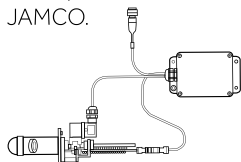
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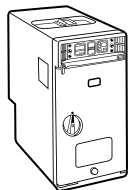
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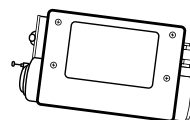
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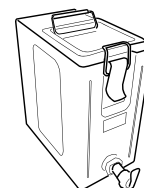
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1. Lufthansa Technik Budapest offers maintenance services for Boeing 737 and Airbus A320 families
2. The company's portfolio is "constantly expanding" in response to industry developments
3. Activity levels at Fokker Services Group remained high during Covid

Photo: Lufthansa Technik



“Digitalisation is a tool that can make us more efficient, making parts more reliable, and aircraft and engines too”

“We will shortly be opening a new Farsound facility in Spain to accommodate increasing demand from one of our European airline customers. This facility will continue to add to our rapidly growing footprint.”

At AJW Group, McKeown expects the biggest challenge over the next 12-24 months to play out when the Brexit arrangement between the UK Civil Aviation Authority (CAA) and the European Union Aviation Safety Agency (EASA) ends on 31 December 2022. “After that, the CAA will no longer be able to recognise all EASA certificates, approvals and licences,” he explains.

“This will have implications across the aviation industry, from pilots with EASA licences operating UK-registered aircraft and air carriers holding Third Country Operators (TCO) certificates, to maintenance organisations with EASA approvals for UK-registered aircraft. The CAA is encouraging all to apply for UK licences as soon as possible.”

Beyond the overarching picture, there will quite naturally be certain individual areas that will be hot topics

over the coming years. Sustainability is an obvious example (it was certainly the ‘word of the week’ at this year’s Farnborough International Airshow) and so is digitalisation. Brown offers another topic as key.

“The focus at the moment for MRO leaders is managing their business for the here and now. Beyond that, the need to be efficient and to think smarter, faster, leaner are ways to insure against things like labour and supply chain issues,” the analyst states. “Digitalisation is clearly a tool that

can make us more efficient, by making parts more reliable, and aircraft and engines too, improving the time on wing or creating smart repairs.

“On sustainability, MRO has its part to play as one tool in the toolbox, because we’re repairing aircraft. Parts and engines are not designed to be simply thrown away and the more we can repair rather than replace has an environmental benefit.

“This isn’t new, though. We haven’t woken up as an industry and suddenly said, ‘let’s do more repairs, because that’s better for the environment’. It’s actually better for the bottom line too.”

As noted though, much discussion will be about the labour pipeline, training and people power. “The MRO industry must make sure that it offers an employment that is attractive to people,” Brown contends.

AJW Group’s McKeown sums up the state-of-the-industry scenario for Europe’s MROs. “We cannot get away from one absolute – that aviation is being challenged to deliver the capacity and efficiency that a travel hungry customer base expects,” he declares. **M**





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Leandro Rodrigues Oliveira, Engine Module Technician

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DIVERSITY OF SUPPORT

In April 2022, **Oscar Torres** was named president and CEO of Kellstrom Aerospace Group, where he has served for more than 20 years. Here, he discusses his vision for the aftermarket solutions company, which includes adding capabilities and expanding technical services, as well as embracing digitalisation

MRO Management: How do you assess Kellstrom's position in the market? What are the next steps?

Oscar Torres: Over the past several years, Kellstrom has been focused on transitioning and developing a suite of products and services that are geared towards supporting all of the major participants in the commercial aftermarket. Kellstrom's business has always been focused around commercial, and aftermarket in particular, but we operate in a couple of different components of that.

Broadly speaking, we have three different business units. One of these offers new parts distribution and represents about 30 different OEMs, providing new parts to the overhaul facilities and the airlines in the industry.

We also have a technical services group that provides on-wing support and hospital visit repairs for commercial aircraft engines, supporting owners and operators of commercial aircraft.



Oscar Torres is president and CEO of Kellstrom Aerospace Group



1

Then we have our used serviceable material trading and leasing unit which provides used material, again to operators and owners of aircraft and engines.

We feel that the combination of all three of those products and services provides a lot of benefits all geared around reducing operating costs, reducing the downtime of aircraft, and ultimately increasing asset values. Everything that we do is focused around these three central tenets, and my view is that over the course of the next year or so we will continue to add capabilities to that suite of services in line with this focus.

What specific capabilities are you looking at?

There are a couple of different things. On our repair side, through our Vortex Aviation subsidiary, we've always been very engine-centric in

terms of providing that hospital visit, on-wing support at a global scale in the US and European facilities. I think expanding our ability to provide different types of repair capabilities is a natural extension of the services and product offerings that we have in the marketplace.

Is the technical services business growing in importance at Kellstrom?

Historically, Kellstrom has been heavily concentrated around parts support into the industry, through USM, engine trading and leasing or new parts distribution. The Kellstrom Technical Services Group (KTSG) component of our business is a relatively new addition to our product offering but is vitally important, especially in light of coming out of Covid.

Our KTSG division enables the power of our three business units' strengths, Kellstrom Aerospace's engine on-wing and engine heavy maintenance shop management, Vortex Aviation's engine field service and engine hospital shop management, and The Aircraft Group's airframe heavy maintenance & modifications' management and records management.

Everybody is always focused on reducing costs but understanding the implications that had for the industry – the need that the airlines and MROs have to find ways to reduce their costs, to reduce the downtime of their assets, to keep those assets flying – all of our technical services offerings leverage everything that

1. Kellstrom Aerospace Group acquired Vortex Aviation – a specialist in worldwide AOG on-wing engine maintenance services and quick-turn engine repairs – in 2017
2. One of the company's key services is to provide quality USM parts to the market

we capture in data to bring those types of solutions.

We can then anticipate where there could be items that are going to create a maintenance event and swap out a particular component that might create that maintenance event. Or if you're retiring a fleet, we can help manage when aircraft are best retired with an optimal strategy that reduces the overall cost of maintenance and increases the value as the fleet is retired. So the KTSG element of our business we think is particularly valuable in an environment where the airlines need to recover from the challenges that they have had over the past couple of years, and it's something that we are extremely focused on as we continue to recover from the impact of the pandemic.

How do you see the commercial aftermarket right now?

If you look at not only Kellstrom's financial results but also what companies in general are reporting, and what industry analysts are saying, there is a pretty steady improvement in the marketplace.

We have seen that, especially in the early parts of recovery, there was a tremendous amount of activity by the airlines to find every mechanism to defer heavy maintenance events; with aircraft still parked, and with them not being back to their full schedules, they had a lot of options available.

Engines that may have been available on a parked aircraft that still had green time could be utilised.



2

"We don't feel there's a lot of companies that have the combination of the products and services we do"

Leasing companies that still had a significant portion of their assets that weren't being fully utilised could bridge short term requirements. Some of those things have continued to push out recovery or have at least caused the MRO industry to rebound at a slightly slower pace. But we have seen consistent and continued recovery in the commercial aftermarket and we expect that to continue for the foreseeable future.

There is a lot of noise about a global recession coming, the impact of oil prices, supply chain issues, and the ability to access labour and technicians. These all impact the ability of MROs to recover, but I characterise a lot of this as noise around the edges that today hasn't had a large impact but is maybe causing the recovery to be a little bit less steep.

What is the biggest challenge that is keeping you up at night?

The availability of labour, and technical labour in particular, is probably the biggest challenge

that I see both for portions of Kellstrom's business, including our technical services product offering, and for our customers, which in many cases are the MRO facilities.

Their ability to attract and retain the labour required in order to meet the demand that's coming down the pipeline is probably the single biggest area of concern that could adversely impact the pace of recovery as we go forward.

What differentiates Kellstrom from its competitors in the market?

Kellstrom's been doing this for 40 years, so we've got 40 years of experience in providing very focused aftermarket support for commercial business.

One of the things that we think is the 'secret sauce' in our capability is that we don't feel there's a tremendous amount of companies that have the combination of things that we do through our used material platform combined with supporting new OEM parts. Most companies are either a new parts distributor or a USM shop – there

40

Kellstrom Aerospace has been providing aftermarket services supporting aircraft owners, operators and MRO companies with cost-saving solutions for over 40 years

1. Inside the Vortex Aviation facility in Davie, Florida

2. Kellstrom is preparing to offer an enlarged suite of services

aren't too many that do both, and those that do both don't necessarily bring into the equation some of the technical services that we provide.

We offer advisory services through The Aircraft Group, with part of the business specialising in records management and overseeing and assisting lessors and operators with managing their fleet and the paperwork associated with their business.

The combination of those three business elements provides a tremendous amount of information and data from different participants in the industry, whether that's OEMs, MROs, operators or lessors, and we leverage all of that data to provide solutions that we feel puts us right at the top in terms of the ability to achieve those three objectives of reduced cost, lower downtime and greater asset monetisation on the back end.

How do you leverage the experience Kellstrom has gained in its 40 years of operations?

That experience is absolutely a significant value and asset to us: the fact that for such a long period of time Kellstrom has been providing different products and services to major airlines and MRO facilities all over the world. I'd be hard pressed to think of a single airline or MRO where we're not on their approved supplier list, and I'd be hard pressed to find a single airline that we haven't done business with and generated activity from across



2

one or more of those product lines. In most cases we find that our customers are leveraging each one of those business units. That long legacy of supporting our customers and building trust and building relationships with our customers I think is invaluable.

What steps is Kellstrom taking in digitalisation?

We have been pretty aggressive on this and we used the period during Covid to make investments in our technology infrastructure to improve the ability to capture data, to analyse that data, and to utilise it in a mechanism that not only supports our business but also allows us to share that data with our partners, and our customers, to find ways to increase value to them.

Artificial intelligence is of interest to us and, while we haven't yet moved very aggressively in that space, it is something we talk about internally. Some of the technology investments we have made have built-in AI capabilities that we are trying to see how we can harness the power of that to dramatically improve the product offering that we make available to our customers.

How will you measure Kellstrom's performance and its success?

There are two different ways that we look at it. Financials are

always a component, as we look at demonstrating continued growth in the marketplace, and seeing that we are achieving financial growth that is ahead of what the market shows.

For us, I focus on non-financial metrics, understanding how we are continuing to increase the depth and breadth of relationships that we have with our customer base and our supplier network.

To assess success going forward, we need to be able to show from the supplier standpoint that we are building additional partnerships and relationships with those partners that provide different product offerings to the marketplace; while from the customer standpoint that we are seeing more connectivity and greater partnerships with some of those customers. Over the course of the next months and years that will drive a greater connectivity with our customers and our partners and will drive the financial portion of our business.

Where would you like to see the company in five years?

I would like to see us being a much larger participant in the marketplace driven by the fact that we are providing a dramatically expanded suite of products and services all leveraged around those three central tenets of what we're trying to bring to our customers. **M**



1

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Paints and coatings are everywhere on an airliner, protecting components, promoting brands and colouring the world's aircraft, but what happens when they need repair? And what goes underneath and on top of that glossy livery? **Paul E Eden** spoke with some market experts to learn more

The finished quality of the final paint starts with the bare substrate, and every layer will either positively or negatively impact the outcome," explains Jill Kokkinen, global product & commercialization manager at AkzoNobel Aerospace Coatings. "Metals must be protected against corrosion, composites against moisture and UV, and all of it needs to be protected from erosion. Each substrate and every part of the aircraft presents different challenges in both protection and achieving the desired visual image.

"Surface pre-treatments, exterior protection primers and exterior surfacing primers are designed to work together, building additional protection into every layer. After stripping, an aircraft needs to be cleaned and the surface 'prepped' for paint. Pre-treatments, including our 'Metaflex SP1050', create an ideal surface for primer to adhere to. Exterior corrosion primer is then applied to protect the airframe. These exterior corrosion primers are some of the toughest coatings made and go through thousands of hours of extreme testing prior to use."

Fully agreeing that pre-treatment is essential to corrosion protection and paint adhesion, Mankiewicz's executive managing director René Lang considers the additional demands of composite substrates: "Composites in general, and particularly on the wings and engine cowlings, are very flexible and place high demands on paint systems.

"Traditional primers match this flexibility only to a limited extent, but with 'ALEXIT FlexPrimer 493-23' we've developed and qualified a highly flexible primer that satisfies the requirements of a normal exterior primer and is chromate free. It prevents the formation of cracks and other defects in the outer surface."



Photo: Mankiewicz

“Exterior corrosion primers are some of the toughest coatings made and go through thousands of hours of testing”

Structural primers

Chromium has traditionally been a key component in primers and structural coatings, but high-quality alternatives have increasingly become available. Sam Millikin, global director of aerospace coatings and sealants at PPG, explains chromium's legacy role on metallic substrates, outside and in. “Chemical conversion coatings and primers traditionally use chromium as a sacrificial metal in the oxidation reactions that take place along the aircraft's surface. Chromium, though extremely effective in corrosion prevention, is not the most environmentally friendly substance,” he says.

“In the last decade, PPG has committed many resources to finding new chromium-free materials that provide equal or even better corrosion protection, while offering a more environmentally friendly and sustainable option.” Among several such products, he highlights ‘Desoprime CA7521’, a low-VOC, chromium-free primer approved by OEMs for application on structural and exterior components.

Much of an aircraft's internal structure remains hidden except during deep maintenance, while some of it may never again be revealed until the airframe is broken down. These components demand

1. Mankiewicz offers a wide range of primers and top coat products
2. Beyond minor touch-ups and repairs, aircraft painting requires considerable skill and experience

a lifelong protective coating, with no maintenance requirements, yet perform a critical safety function and chromium has been essential to their formulation.

AkzoNobel's Kokkinen says: “Structural primers are the core of our product range. Most structural primers used today are based on technology developed in the 1950s and 1960s. Since they are integral to the structure and strength of an airplane, change has been slow and that means it has been difficult to move away from strontium and zinc chromate primers.

“A significant portion of our R&D resource is working on developing primers for aluminium aircraft structures without the use of chromates. It's a difficult task because these products are expected to protect structures for 30 years or more, but we've made significant progress with patented inhibition technologies and obtained a few smaller qualifications. We have also been able to obtain qualification programmes at multiple large OEMs and we're expecting testing and product listings to be updated in 2023.”

The story at Mankiewicz is similar. Lang concedes that chromates remain critical for corrosion protection but explains: “The development of chromium-free alternatives is proceeding at pace.



Photo: AkzoNobel

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Photo: AkzoNobel

“Much of our R&D resource is working on primers for aluminium aircraft structures without the use of chromates”

“Historically, paint for structural parts has also been high in VOC values, but our coatings have very low VOCs and chromate content while delivering a level of corrosion protection that meets OEM specifications.”

Since paints and coatings are also prevalent in the cabin, so too are primers and other surface preparations. Noting the prolific use of honeycomb sandwich panels in airliner cabins, Lang continues: “Surface preparation on these panels requires lots of manual work, applying multiple layers of primer and putty, combined with sanding. As an alternative, we developed ‘ALEXIT FST PrimeFill’, which has strong pore-filling capacity, is easy to sand and has low weight.”

With the growing acceptance of additive manufacturing, or 3D-printing, especially in the production of spares parts and cabin refurbishment, PrimeFill has found another important application.

Components produced by 3D-printing are characterised by their rough surface texture, a problem

commonly hidden under a thick layer of filler. This adds weight, while the accumulation of filler often fails heat release rate tests, making it unsuitable for the aerospace industry. Lang explains: “PrimeFill produces a thin, smooth layer on the component while filling the furrows, even if they are relatively deep. The product then serves as a base for further finishing.”

More than colour

On the outside, an aircraft’s glossy, visible finish is often the result of two coatings. Millikin explains: “More traditionally, exterior top coats were the last layer applied to the aircraft and provided adequate protection from the elements. In the last decade, however, there’s been a trend towards base coat/clear coat exterior systems.

“With these top coat systems, we’ve found we can provide an overall thinner coating thickness between the two layers than we would with a traditional top coat, and the clear coat layer provides stronger UV and chemical resistance.

↑

Surface treatments are an essential component in achieving a quality finish and provide critical airframe protection

“This means we can save weight on the aircraft and the colour and gloss of the top coat stay brighter, longer. We can also make some really cool effects by modifying the gloss levels of the clear coat over the top of a special effect base coat.”

Still though, a painted finish is only as good as the surface it covers and on an aircraft that surface includes myriad functional gaps and excrescences. Sealants are therefore important gap fillers, applied as coatings or ‘tapes’ on exterior surfaces and within the deeper structure.

Millikin says: “Almost every joint and fastener on the fuselage is sealed to maintain cabin pressure and where the wing structure and centre wing box function as fuel tanks, every joint and fastener is sealed to prevent leaks. Regularly scheduled maintenance checks ensure these parts and

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Photo: Sherwin-Williams

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“Aerospace paint products are made for sustainability, relative ease of use, flexibility and consistency”

products are maintaining their integrity, and sealants are removed and replaced if needed, but there are many aircraft still in service with the original Pro-Seal or PRC sealants applied more than 50 years ago.”

The company's portfolio includes the uniquely packaged ‘Semkit’ sealants, providing a pre-measured dose of both product components, easy and clean mixing within the cartridge, and more efficient application method onto components than was the case before. “These products are traditionally provided as aluminium can kits, where the components were mixed, usually in the can, with a tool and then applied by hand. This led to inconsistencies with quality of mix, air entrapment and, frankly, made a mess.”

50

There are many aircraft still in service with the original Pro-Seal or PRC sealants applied more than 50 years ago

GORE, meanwhile, offers ‘SKYFLEX Aerospace Materials’, a sealing material that is not a coating in the traditional sense. Uniquely manufactured from expanded polytetrafluoroethylene, it is highly conformable and compressible, suiting it to multiple uses.

Global channel manager Matt Herweck has many years of MRO experience behind him and notes: “Most MROs servicing commercial aircraft stock SKYFLEX Aerospace tapes and/or gaskets specific to the aircraft on which they are working. The product is specified by most major aircraft manufacturers by part number or OEM spec and simplifies aircraft maintenance because it is easier and faster to repair or replace.”

GORE SKYFLEX Aerospace Materials is an easily replaced product, but how do MROs manage the minor surface paint bumps and scrapes that are an inevitability of airline service and regular maintenance? Mankiewicz has a ‘Smart2Mix’ product, offering customised repair solutions that mix small quantities of individual colours for touch-ups.

1. Sherwin-Williams manufactures the Jet Pen for exterior paint and interior coating surface touch-ups

2. GORE SKYFLEX Aerospace Materials tape applied to structural members in the floor of an Airbus cargo hold

It allows accurate colour matches combined with no minimum order quantities and reduced waste, and is available in a variety of packages. Lang notes: “No mixing, special equipment or painting skills are required to achieve an easy and economic repair.”

The base coat/clear coat system is offered by several manufacturers, Sherwin-Williams among them. Julie Voisin, global marketing manager – aerospace market & automotive interiors says the clear coat option may render minor scrapes easier to repair, but for easy touch-ups the company offers ‘Jet Pen’. “It’s available for cabin and exterior finishes,” she explains. “It’s a multi-component pen. The technician ‘cracks’ it, shakes it and then uses it on small repairs.”

Where damage goes down through layers of coatings, however, she says repair work needs to be more thorough. “All the layers would need to be reapplied and melded into the surrounding area, because the painter would need to ensure mechanical and chemical adhesion were restored to the substrate and coats.”

Aerospace paint, she comments, is complex. Products are made for sustainability, relative ease of use, flexibility and consistency but, beyond the smallest touch-up, skilled application, building through the layers, is essential to protect the airframe and restore a pristine finish. **M**



Photo: GORE

2

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CONTINUALLY DEVELOPING

With business now buoyant, both the short- and long-term future is promising for Joramco, says **CEO Fraser Currie**, as he discusses developing people, processes, capacity and capabilities



MRO Management: How do you assess 2022 so far for Joramco?

Fraser Currie: Joramco has just recorded its best H1 figures on record, and this is truly a sign that the effects of the pandemic are behind the maintenance sector. We are on track to break more records this year, with particular focus on efficiencies, productivity and booked labour.

What recent developments at the company can you share?

Recent developments include an increased capability to produce 8 metre seat tracks in-house.

With the industry still suffering from logistics issues, we have taken proactive steps where possible to mitigate the risk of critical shortages by developing back shops.

How do you see the commercial aviation MRO industry currently – what are the biggest trends?

The wider MRO industry appears to be buoyant with many MROs reporting that they are full, with little or no capacity to accept last minute demand from airlines and operators.

Some trends are less positive, with supply chains still severely struggling to match MRO demand in terms of materials, components and technical advice.

The currently global situation on energy is also starting to take effect, with prices starting to hike. In an industry where margins are typically small this is a trend that we hope to see reversed quickly; sadly, there is no sign of the effect changing anytime soon.



1

What are the biggest challenges that are keeping you up at night?

As with any large, complex business, every day, week and month contains a variety of challenges. I'm glad to say that the internal challenges we set ourselves are well planned and managed; therefore, the challenge is ensuring you are organised in advance.

The challenges that are unexpected and arise out of a situation that is not under your control pose a different opportunity, and experience

shows that the key to eliminating stress in these situations is early and regular communication both internally and externally if a customer is being affected.

Therefore, in summary, there is no one challenge that keeps me up at night but what allows you to sleep is knowing you have done all within your power to mitigate any effect of challenges.

One global issue affecting the MRO industry is maintenance training and the shortfall of technicians and engineers. Joramco has put a lot of emphasis on this with Joramco Academy. Can you describe your current strategy and future plans?

Our academy is going from strength to strength and will remain a central focus of the business. The industry in general is suffering from labour shortages, a topic we have all been talking about for at least the last 20 years.

It's hard for the industry to react as a whole; therefore, it's important that every company follows its own strategy on developing the future workforce.

1. Fraser Currie has been Joramco's chief executive officer since his appointment on 1 October 2021

2. He says the company is "on track to break more records this year, with particular focus on efficiencies, productivity and booked labour"

**THE KEY TO ELIMINATING STRESS IS
EARLY AND REGULAR COMMUNICATION
BOTH INTERNALLY AND EXTERNALLY**

1. Joramco's current focus is to increase its capacity and its capabilities on existing types
2. Differentiation from competitors comes from quality of service and customer experience, says Currie

Recent developments within the Joramco Academy have been gaining our own EASA Part 147, and this coupled with the ability to provide experience training within the Joramco Part 145 is a winning formula. The academy has also expanded its offering and is now providing training to external customers, a concept that I would encourage others to take advantage of.

The industry as a whole needs to plan well in advance for future labour demand and not manage in a reactive manner. We welcome other MROs and airlines approaching us to take advantage of our academy courses.

Which areas of Joramco's business are you seeing the most demand for currently, or are you focusing on the most?

We are very focused on what our service offering is and where our strengths are, concentrating on delivering continuous improvement as part of our 'Commitment to Excellence'. We have recently rolled out an updated vision, mission and sustainable behaviours strategy; this is a key element of our continuing drive to improve efficiencies.



1

OUR ACADEMY IS GOING FROM STRENGTH TO STRENGTH AND WILL REMAIN A CENTRAL FOCUS

Safety remains our number one focus. This, combined with developing people and processes, is what will continue to see Joramco go from strength to strength. In terms of the check type and customer profile, we are seeking out long-term customer continuity where we can achieve consistent nose to tail volumes throughout the year. Multiple line, multiple year contracts, where the customer can deliver consistency of demand and we can offer consistent turnaround times to the right standard, are where we as an MRO can excel.

In your view, what differentiates Joramco from its competitors in the market?

Differentiators and unique buying propositions come from the quality of service and the customer experience.

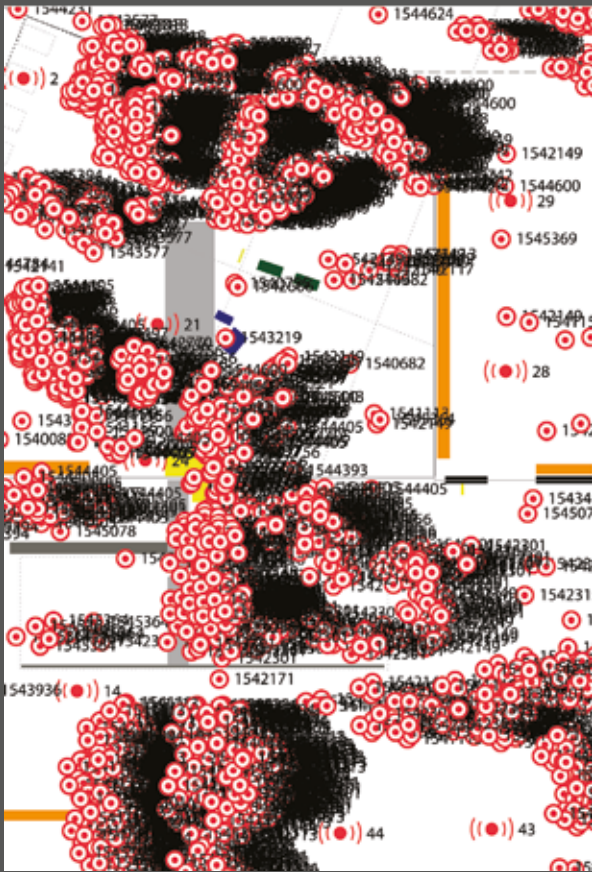
Airlines and operators buy from Joramco for the same reasons we all choose certain brands and shops in our personal lives: we sell what you want to buy at a location that is convenient for the customer, and we are committed to excellence which means we are always striving to exceed customer expectations.

Do you have any plans to add capabilities in the future or is the intention to remain focused on what you do already?

Our focus is to increase our capacity and increase our capabilities on existing types. Our portfolio is considerable, covering both new generation and legacy platforms. You can be sure that Joramco is continually developing, and the short-, mid- and long-term future has some exciting developments to look forward to. 



2



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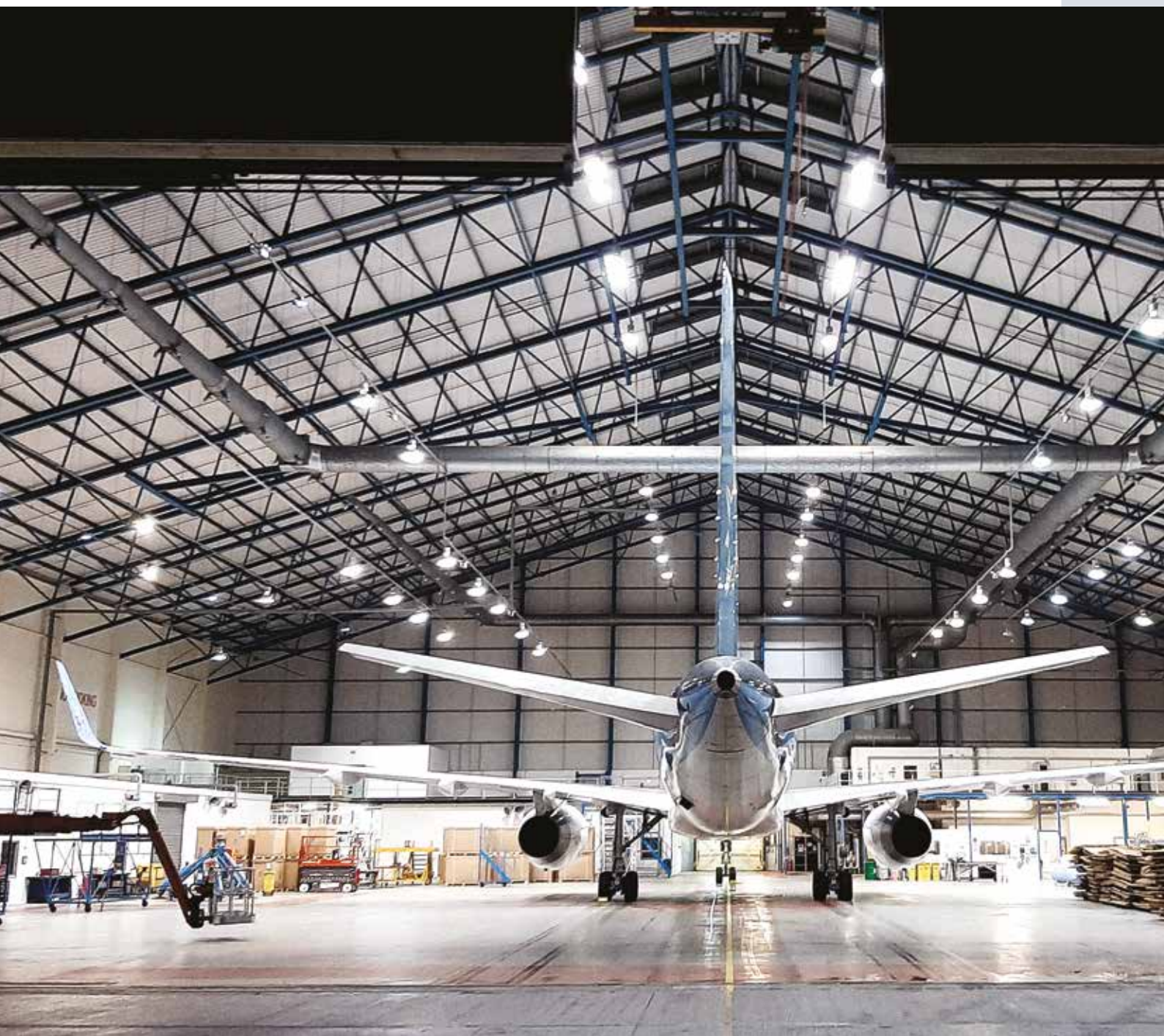


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HOW CAERDAV KEEPS CLIMBING



Founded in 2012, Caerdav is one of the few independent UK-based MROs, specialising in the A320 and 737 families of aircraft



A game-changing contract, a major investment and a successful turnaround plan – independent UK MRO Caerdav is now positioned for growth and to become one of the industry's major players. **Jason Holland** finds out how the company did it

Caerdav is celebrating its tenth anniversary this year – but it is perhaps only in the past few years, and even the past few months, that the company has really soared to new heights. Given that legendary Iron Maiden singer Bruce Dickinson is Caerdav's owner and chairman, and a key driving force, you could say that the company is – in line with one of the band's albums – truly entering a *Brave New World*.

The independent Wales, UK-based MRO specialises in maintaining the A320 and 737 families of aircraft, but also has pilot training, consultancy and storage capabilities. The company began life as Cardiff Aviation, but in 2019 rebranded to Caerdav and underwent a turnaround phase overseen by group CEO Joachim Jones that will be completed in November 2022.

Last year, Caerdav signed an important agreement with GE Aviation to provide

engine change support; in July this year, a £4 million investment in the MRO from independent asset manager BOOST&Co was announced, supporting its growth plans. However, Jones tells *MRO Management* it was the winter maintenance agreement signed with Ryanair a few months ago that represented the “massive game-changer”. Ryanair will undertake two lines of heavy maintenance with Caerdav at the MRO's facility in Cardiff.

“The contracts we signed with them, that's something we have built our future on. So every five months during winter we basically become a Ryanair MRO because we're not going to bring any other business into the hangar during that time,” explains Jones. “We will purely focus on the Ryanair aircraft during winter and it is fantastic for us as an independent MRO to have such a strong partnership.”

A decade of change

Reflecting on the positive position Caerdav now finds itself in after a rollercoaster ten years, Dickinson says that it “has been quite a journey for the business to get to this point”. And the challenging nature of the MRO's journey so far was “capped off with a global pandemic that practically put the aviation industry on its knees. For Caerdav to have emerged in such a strong position and to be thriving is testament to the hard work and dedication of our entire team,” he says.

“I'm extremely proud of the fact we didn't make any redundancies during the Covid-19 crisis; we were committed to our staff and wanted to repay them for their commitment to us. The work Joachim [Jones] has been doing in the business meant we had a level of flexibility that allowed us to pivot and focus on different areas, helping us to keep a steady revenue stream until the industry started to recover.”

Jones, too, considers that the past ten years has “certainly been a journey”. “When I started [in 2019], the company wasn't in great shape, and Cardiff Aviation's reputation wasn't the best in the industry, and I had to rebuild it all

£4m

Caerdav received a £4 million investment from independent asset manager BOOST&Co in July to help support its growth



1



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“We will purely focus on Ryanair aircraft during winter and it is fantastic for us to have such a strong partnership”

basically from scratch,” he says. “I was able to bring in great people, but we also had great people in the business already. We have a lot of loyalty in the business, which is not something you should take for granted, because it was a very difficult time for us to rebuild the company and rebuild relationships that had been destroyed previously, and to basically create a new company, and a new brand – coming back as Caerdav.

“The rebrand was successful and showed companies that we are a very professional independent MRO. We attracted professional talents, so I have a very strong team around me which makes my life easier, but now the company is where it should be – and where it should have been years ago – working with Tier 1 airlines. They come in and take us seriously

now and we have a great relationship with TUI, for example. We recently had DHL in for a check, so that’s something we’re looking into; trying to build long-term relationships with airlines and companies.”

As Dickinson notes, even the Covid crisis could not dent Caerdav’s growth path. Jones credits Dickinson for “always supporting the business even during the most difficult times. Having Bruce in the business is a blessing and he’s a great chairman. He believed in the people that worked for Caerdav, and he believed in the turnaround, and he continued to support the business financially all the time,” says Jones, who adds that the Welsh government was also supportive during the crisis and “never let us down”.

Every crisis also offers opportunities, according to Jones. “During Covid we were looking into the business model again, streamlining things, and made the company more efficient. We launched internal projects during the quiet periods. That’s when we found more things we could change to make the company more profitable,” he reports. “Of course, we could still feel the effects of Covid, and we now deal with the aftermath. What’s hit us as an independent MRO is deferred maintenance. It was an

unprecedented crisis but we dealt with it professionally and we emerged stronger, which is fantastic.”

The long process of turnaround at Caerdav is now nearing completion and for the first time in company history it is “generating healthy net profits – so Bruce is very happy about that”. The focus now is on “nurturing and strengthening relationships so that we can build long-term pipelines of work, especially during summer, which is a low season for most MROs”. Jones says this year the company has started to secure pipelines for the coming summer months. “It’s all about thinking ahead now that we have more time to think about the future,” he adds.

The journey continues

Dickinson says that the next phase for the company “will hopefully be an expansion of our footprint in South Wales, allowing us to further increase the services we offer, leading to even more jobs”.

The £4 million investment will be key to this. “We will invest in equipment and training,” states Jones. “We have started a significant recruitment process so we are going to employ 80 more people in the next couple of months, so the company will grow to a



3

1. Low-cost carrier easyJet awarded Caerdav a contract in early 2020 to carry out essential aircraft end-of-lease checks and repairs

2 and 3. The company hopes to grow to 250 or 260 employees onsite in 2024

A large commercial airplane is shown in a hangar, with its nose and front landing gear visible on the left. On the right, a large engine is shown with a glowing digital overlay that includes a circular radar-like pattern and various data points. The background shows the interior of a large hangar with structural beams and windows. The overall color scheme is dominated by blues, purples, and oranges, with a futuristic, digital feel.

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“I believe it’s clear that we are committed to supporting the industry in the UK and the next generation of aviation engineers”

size of up to 200. Going forward, 2023 and 2024 will be very strong years for us so I expect the company to grow to 250 or maybe 260 employees onsite, so we’re expanding the business.

“The investment will also help us to open new revenue streams, to generate more income, and although we can’t talk about what these will be at the moment, there are attractive projects that we are looking into at the moment.”

One potential new income stream is technical in nature. Another is Caerdav’s consultancy business, which is set to expand. “We had a few requests from airlines and some other

things that will be announced over time – so there will be more engine changes coming our way onsite. We have a very good relationship with them and they are very happy with the service we provide. They like the way we deal with things and our flexibility, and how we adapt to certain scenarios. We’ve also thought about drop rotations so we’d bring people from GE onsite, and vice versa, sending some of our engineers to GE to have a visit to see how they do things.”

The GE and Ryanair contracts emphasise how Caerdav’s standing in the market has skyrocketed.



Owner and chairman Bruce Dickinson (left) and group CEO Joachim Jones have been instrumental in implementing a turnaround plan and driving growth

Meeting new challenges

Two other central elements to Caerdav’s future strategy are embracing digitalisation, and addressing the challenge of attracting and retaining maintenance technicians. On the first point, Jones believes “part of becoming a super-efficient MRO is to become paperless”. He explains: “We have launched a project where by the end of 2024 we want to become completely paperless and a fully digital MRO. We call it ‘e-Caerdav’. That’s also part of the investment. This reduces the amount of paperwork and will definitely help us to become more and more efficient.



1

companies asking if we’d consider helping them improve their operations and their organisation, especially after Covid,” says Jones. “We have plenty of people in the business that are very experienced consultants, so we will offer more consultancy services. Our services mainly involve streamlining organisations, offering support, making the companies more efficient and becoming more profitable.”

Jones also reports that Caerdav’s contract with GE will grow with “more

“The dynamics have changed,” asserts Jones. “Tier 1 airlines and leasing companies approach us now having read the news and press, and they can see that things have changed at Caerdav and that we’re delivering aircraft on time and on budget in a very professional way. They approach us and ask if we have slots available – so that has changed. We have an amazing commercial team too, who are also doing a fabulous job attracting more business.”

11-15

Caerdav will induct between 11 and 15 new apprentices every year going forward in an attempt to create its own workforce

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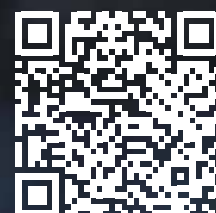
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“I want Caerday to be a major player in the industry with a group of companies offering various services to the industry”

“Artificial Intelligence (AI) and predictive maintenance are part of this project too. We have approached a couple of companies that will look into this, and there are some interesting projects going on at the moment internally.”

Addressing the second point, Jones says that Caerday will induct between 11 and 15 new apprentices next year. “Our first batch are doing amazingly well, and one of the girls became ‘apprentice of the year’ which made me very proud,” he says. “This shows that we picked the right people, and they are very smart young people.

“They love aviation and are developing well; they are now onsite after a year of college so they can be integrated into our organisation. It’s great to see young people moving into aviation. Inductions will continue every year, with between 11 and 15 each year, to create our own workforce. Training them up takes about three years.

“We are also offering engineering training courses and have been

approached by the University of South Wales to join their programme to train engineers. So we are investing heavily in training, to give people a vision, a perspective and a career progression within our company.

“The next thing we are doing is to become a sponsor, so we have applied for a sponsorship licence so we can get visas for talents outside the UK. If you can’t recruit within the UK then you have to go abroad and attract the talent outside the UK. We’re always looking. The market has changed and people have left during Covid, and it’s hard to get them back. There’s also the salaries people are being paid outside the industry to consider. But we’re very happy with the sponsorship and apprenticeship programmes.”

Dickinson emphasises that with the continued development of Caerday’s apprenticeship scheme, “I believe it’s clear that we are committed to supporting the industry in the UK and the next generation of aviation engineers”.

Stepping up

With its remarkable turnaround now virtually complete, with key contracts in the bag, and with future strategies set out, there are many reasons for positivity and optimism at Caerday – and a 10-year anniversary worth celebrating. So now that the first ten years are in the books, will the next ten be easier? Or perhaps even more challenging?

Jones certainly has a vision for where he’d like the company to be in ten years’ time. “I want Caerday to be a major player in the industry with a group of companies offering various services to the industry, having a strong portfolio of customers and services,” he says. “I want to grow the business and at the moment it’s all about growth and making Caerday a serious player within the industry.”

↑
Caerday is aiming to open new revenue streams; one technical in nature and another related to its consultancy business

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ROAD TO RECOVERY

Wheels, brakes and landing gear MRO providers are looking ahead with optimism as aircraft return to the skies, although challenges remain. **Emma Kelly** reports



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according to Alan Doherty, vice president sales MRO. “We are seeing an increased demand for landing gear overhauls on narrowbody aircraft, with some very significant contracts being awarded,” he says. “The long-range market is taking longer to recover and a lot of aircraft have been returned to the lessor and overhauls are delayed as they search for future customers for these aircraft. We expect the overall volume of activity to surpass pre-pandemic levels shortly.”

Safran has landing gear MRO facilities and capabilities worldwide, including at Gloucester, UK, and Querétaro, Mexico for Airbus and Boeing single-aisle aircraft; Dinard, France for regional aircraft, business jets and helicopters; Molsheim, France for Airbus widebody aircraft; as well as a Singapore-based joint venture with SIAEC; the A Pro joint venture with Dassault Falcon Services in Florida; and the XIESA joint venture with China Eastern Airlines Technic in Xi'an, China.

“The capability [of each facility] includes all electrical components and actuators associated with the landing gears and hydraulics equipment,” says Doherty. Safran is currently servicing more than 80 airlines, not including lessors, across all aircraft types, with in excess of 2,500 legs going through its facilities.

AMETEK MRO group companies AEM and Antavia fared well during the pandemic. “AEM’s landing gear overhaul business has continued to prosper,” reports Andy Wheeler, vice-president and managing director of AEM AMETEK MRO based in Ramsgate, UK. AEM capabilities include full machining, plating and treatments, focusing on Classic and NG Boeing 737s. The

company has a worldwide customer base and long-term contracts with airlines, OEMs, FBOs and lessors.

“Our wide capability complemented with full in-house treatments makes us a viable proposition for those needing a quick turnaround, in the knowledge that all work is carried out within our facility by our team of specialists,” says Wheeler. “We also recognise that some of the smaller owner-operated aircraft require a high level of support through a landing gear overhaul event. We are able to offer enhanced levels of service.”

He notes that AEM was able to “realign our strategy at the onset of the pandemic and as such we were also quick to offer support to those carrying out freighter conversions as clearly the need for freight has been unprecedented worldwide”.

1. AAR has both landing gear and wheel and brake MRO services in Miami, Florida

2. The company repairs and overhauls approximately 1,500 legs of gear and 6,000 wheels and brakes each year

Business is on the rise for companies involved in the maintenance, repair and overhaul of wheels, brakes and landing gears as the aviation industry is on its post-pandemic recovery path.

MRO providers are looking to expand activities and capabilities as new aircraft come online and fleets grow again. Challenges persist, however, most notably supply chain issues and labour shortages.

Safran Landing Systems remained busy during the pandemic as landing gears reached their time between overhauls (TBO), although some operators received TBO extensions due to reduced cycles,

“We have experienced some increased removals due to corrosion”



2

1. Business is up for companies performing wheels, brakes and landing gear MRO
2. AEM capabilities include full machining, plating and treatments, focusing on Classic and NG Boeing 737s
3. Lean practices and new equipment can help improve efficiencies



1

With “new capabilities on the horizon”, namely another landing gear platform, AEM is aligned for growth, he adds.

Antavia offers landing gear MRO in Campsas, France for CL215s, CL415s, small business aircraft and Viking/De Havilland aircraft; and wheels and brakes MRO at Paris Charles de Gaulle Airport and Campsas for all aircraft types, from small business aircraft up to the Beluga XL, maintaining around 4,000 wheels each year. Business aviation continued to “flourish and coped with the Covid crisis better than the rest of the industry”,

4,000

Antavia offers landing gear MRO in Campsas, France; and wheels and brakes MRO in Paris and Campsas for all aircraft types, maintaining around 4,000 wheels each year



2

says Laurent Bouissou, managing director of Antavia and divisional vice-president of AMETEK MRO, although the Ukraine situation and pressure from environmental lobbies could strongly impact this business in the future.

Liebherr-Aerospace says the pandemic disrupted maintenance planning, requiring it to work closely with its airline customers to reschedule. Liebherr has landing gear MRO facilities in Lindenberg, Germany and Saline, Michigan, US, as well as a joint venture in China called Liebherr LAMC Aviation Changsha. As an OEM, it handles all landing gears it manufactures, which are on aircraft including the A220, A350, A300-600, Embraer E-Jet E1, COMAC ARJ21 and C919. Earlier this year, the OEM signed a long-term collaboration agreement with Airbus to meet the airframer’s future landing gear requirements.

Liebherr says that as an OEM it continuously works closely with its airframe customers to extend the on-wing time of its landing gears. “Except in cases of accidental damages or hard landing beyond structural limits, all landing gears can be restored to their full potential with a complete overhaul,” says Joël Cadaux, director business and services – customer services. Depending on the model, the TBO is 10 or 12 years,

or 20,000-30,000 flight cycles. “Landing gears are structural parts and they have a specified life limit,” he adds. “Once this has been reached, they have to be taken out of operation and no life limited sub components can be used.”

While corrosion is an issue for landing gears, the grounding of aircraft during the pandemic exacerbated it, including for wheels and brakes. “Aircraft parked for long periods are subject to specific procedures to avoid tyre deformation and degradation, but we have experienced some increased removals due to corrosion,” says Antavia’s Bouissou.



3



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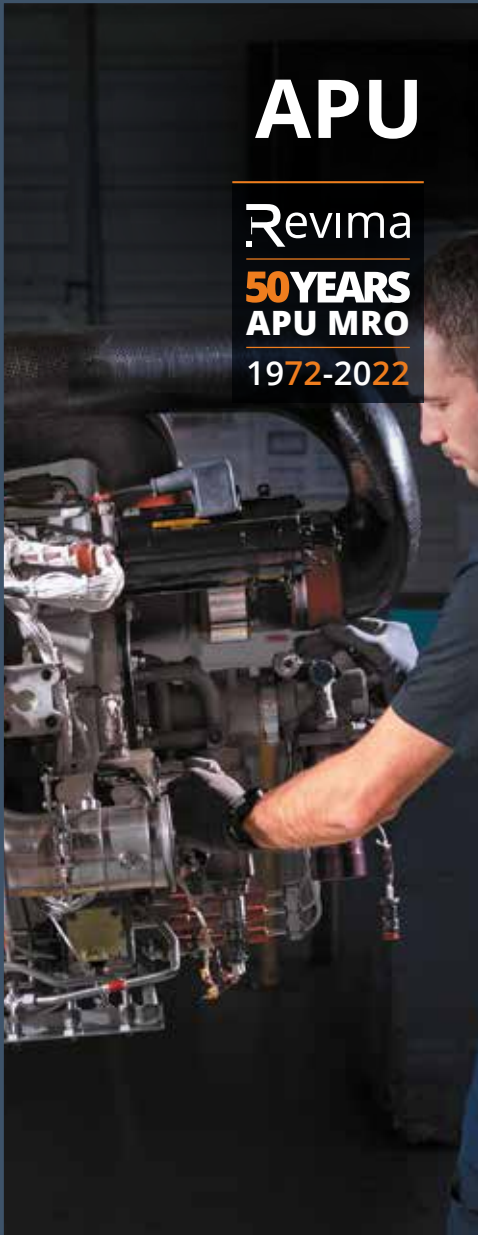
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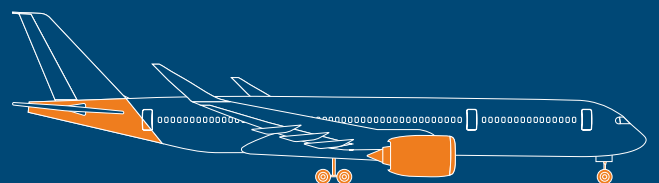


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1. World Aero is dedicated to wheels and brakes MRO, supporting both corporate and commercial aircraft
2. Liebherr-Aerospace continuously works closely with airframe customers to extend the on-wing time of its landing gears



1

“When flying, wheels and brakes are subjected to regular increased temperatures during the operation of the brakes. This removes the moisture from certain areas on a daily basis. When parked for a long period, moisture settles and more corrosion will appear.”

While business recovers, supply chain and labour shortage issues persist. “We are analysing the impacts for us and our

3,500

From its facility close to London Gatwick Airport, World Aero has a throughput of 3,500 wheels and brakes per annum

“The main issue as aircraft were returned to service was supply chain logistics”

2

supply chain on a daily basis and are in close contact with our customers and suppliers around the globe discussing how to tackle the challenges together,” says Liebherr’s Cadaux.

UK-based wheel and brake MRO specialist World Aero’s CEO Phil Randell comments: “Business is strong, but like all, the sector is facing supply chain issues caused by production shortfalls during the pandemic and current logistics difficulties. Tyres in particular are very difficult to source at the moment, but we were fortunate to have carried a lot of stock before and during the pandemic which has kept us ahead during the resurgence.”

World Aero is dedicated to wheels and brakes MRO, supporting corporate and commercial aircraft – from Learjet 45s up to the Boeing 747-8 – from its facility close to London Gatwick Airport. It has a throughput of approximately 3,500 wheels and brakes per annum.

AAR, which has both landing gear and wheel and brake MRO services in Miami, Florida, is facing similar challenges. “The main issue as aircraft were being returned to service was supply chain logistics,” says Joshua Florio, vice

president and general manager, landing gear services. “Catalogue lead times have doubled and even tripled for critical parts and reliability on those quoted lead times has decreased significantly. OEMs faced labour shortages and, as a result, lead times were increased and inventory was seriously depleted.”

Florio adds: “Business has picked up significantly this calendar year as airlines rush to increase aircraft availability. We have encountered fluid and condensed maintenance schedules adding pressure to an operation already constrained by labour shortages.”

However, the business outlook is optimistic as the demand for travel increases and airlines seek maintenance partners to help bring aircraft back into service, he says.

AAR covers a comprehensive capability list, ranging from the smallest regional jet to the largest commercial and military types, says Florio, repairing and overhauling approximately 1,500 legs of gear and 6,000 wheels and brakes from more than 45 regular customers each year.

In preparation for growth, AAR is “always looking to expand its capabilities

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1. Liebherr points to the need to be ready for new generation aircraft
2. AEM's landing gear overhaul business has continued to prosper and the company is aiming to add to its capabilities



2



“We are widening our partner network with MRO providers to meet market requirements”

1

and footprint”, he says. The landing gear business has more than doubled its footprint in the last few years by adding a new building and high velocity oxy-fuel (HVOF) coating capability, he adds.

World Aero's Randell says expansion for his company is “on the near horizon, with larger floor space in order to improve efficiency of our processes”.

Liebherr, meanwhile, is “deeply looking into expanding our facilities and widening our partner network with other MRO providers to meet the market requirements”. It points to the need to be ready for new generation aircraft, including the A350 and A220.

Safran plans to grow its global network in terms of productivity improvements and shift patterns to absorb additional business volume, according to Doherty, with growth particularly anticipated around new products, including the Boeing 787-8/9/10 and A350-900.

AEM is adding to its landing gear capabilities, while Antavia is looking to add wheel MRO for business jets in Asia at the same time as increasing its capabilities for commercial airlines at Charles de Gaulle, says Bouissou.

In a highly competitive environment, MROs are constantly looking to improve service and efficiency, with digital

transformation initiatives the latest tool. “We are extremely competitive through continuous improvement initiatives in all industrial fields, including of course digital,” says Safran's Doherty. The Safran Group's Digital Academy, for example, is designed to “lead to improved operations – management and robustness – and will also allow the customer to be better updated on the work in progress”.

Doherty says Safran challenges its MRO shops to adopt new practices, innovation and new technologies, pointing to a recent investment in HVOF grinding in preparation for new 787s and A350s.

In pricing, Safran is also working with its customers on package deals to reduce cost exposure and allow airlines to budget for future spend as accurately as possible.

AAR is always looking for ways to improve efficiency through lean practices and new equipment, says Florio. The company also seeks to improve cost projections for customers through programmes including cost per landing, all-inclusive flat rate repair, and overhaul and tyre management programmes.

Antavia's Bouissou says his company maintains flexibility in terms of pricing, from a labour-only service to full cost-

per-landing, in addition to focusing on improving responsiveness and customer service.

Liebherr launched its digital transformation programme a couple of years ago, comprising the Customer Service Platform, which focuses on the customer and improving communication and information exchange, and the Digital Smart MRO, which develops new tools to increase workshop efficiency and improved data exchange.

“Liebherr-Aerospace continuously exchanges with its customers to better understand their needs, especially in times like these, where the entire aviation industry is in a restructuring process,” explains Cadaux.

“Our interpretation of how to improve the benefits of our MRO services lies in a combination of further developing salvage repairs for piece parts through our design organisation approval agreement and extending our portfolio to component health management with Liebherr-Aerospace analytics.”

This allows engineers to “carefully select and develop solutions with a single objective to increase aircraft availability, reduce unscheduled maintenance burden and help optimise assets and part maintenance”, he says. **M**

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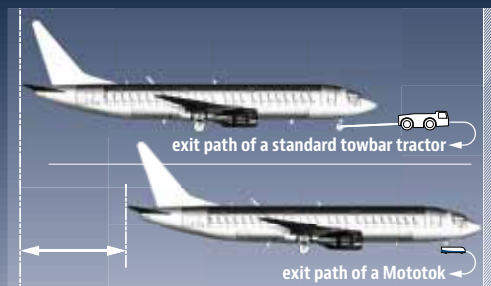
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COMPLETE VISIBILITY

How can MROs add Industry 4.0 efficient real time locating systems to keep their facilities running at top speed? WISER Systems' chief marketing officer *Cris Masselle* explains

Real time locating systems – or RTLS – refers to technologies used to locate objects' whereabouts in real time. While RFID or a barcode identifies an object, RTLS gives you its identity and the current location of the object.

RTLS often incorporates other data such as storage parameters, expiration dates, and so on. When paired directly with identification-only systems like barcodes and RFID, it can tell precisely where a scan occurred. Knowing where things are at any given moment can be immensely powerful for making sense of work in progress applications.

With today's supply chain challenges, controlling the cost of your manufacturing process once you have the materials at your doorstep is critical. This is equally important in other types

of processes, such as busy MRO facilities that often deal with large amounts of work orders each day. Knowing where each work order is and at what stage of the process it is can be a highly inefficient undertaking if it's not automated.

Automating work in progress processes is key to a smooth and efficient workflow that will help reduce downtime, prevent lost or misplaced inventory, and ensure work safety. That's not easy to accomplish without RFID.

For many MRO facilities, tracking parts and work order flow management can be a huge issue. Many of these facilities see numerous airplane engines and parts arrive daily. These engines and parts are disassembled, and parts are sent to various machine stations for repair; these parts need to be tracked and some facilities need the ability to track thousands of parts simultaneously each day – an overwhelming task without the right technology.

WISER's patented 'Redundant Radio Localization and Tracking' (RRLT) technology delivers immediate, live asset visibility and tracking for real-world environments of any size with any number of tracked assets. This technology is what gives WISER's 'ATLAS' real time location and tracking system its superior edge in industrial settings, where it can track manufacturing work in progress with unprecedented precision and reliability.

ATLAS is currently in production in



TRACKING PARTS AND WORK ORDER FLOW MANAGEMENT IS A HUGE ISSUE

many industrial locations and is helping to automate inventory, eliminate manual scanning and searching, enhance security, ensure safety, prevent loss, and streamline operations, among many other uses. It's in heavy industrial settings, such as MRO facilities, with thousands of moving metal parts, where other RTLS systems fail.

In addition, if there is a need, ATLAS can track inventory at the enterprise level across multiple sites in real time.



CRIS MASSELLE
is WISER Systems' chief
marketing officer



For instance, WISER's user-defined zones can identify process inventory movement as they enter and leave an established zone. You can create zones specific enough to understand what part is waiting in a queue, and when the part has moved to the next zone, giving you a better estimate of when it will be completed. There is also no need for a single RFID scan or portal.

The WISER ATLAS system is flexible, and simple to install. As a result, facilities can modify floor plans either minimally or extensively at any time. Antennas can easily be added, moved, or removed from the mesh and the system recalibrates with the touch of a button.

The software is easily optimised simply by uploading a new floorplan. This allows facilities to make future modifications to allow for growth, new equipment or workflow changes easily, without the need for engineers or technicians or even extra infrastructure.

For all the above reasons, many MRO operators, like other facilities optimising WIP via automated processes, are selecting the WISER RTLS as their first-choice adoption when choosing among the various new Industry 4.0 technology offerings. 

1 and 2. MRO hangars, with thousands of moving metal parts, can benefit from immediate, live asset visibility and tracking in the palm of their hands

Location data can provide affirmative updates – marking an item's progression from assembly to quality control, for instance, or triggering status updates as manufactured parts advance from one step to another.

Location-based WIP tracking delivers a granular, in-the-moment picture of how far key processes have progressed. It also helps reduce the number of manual scans and processes required.

Many shops currently must rely on knowing the final operation that had been performed on a part to estimate its location, then manually search to find it. WISER's ATLAS system eliminates the headaches caused by failed or erroneous manual scans in unknown locations.

Instead, each worker has an accurate, instant update of each work order's location in their entire shop, especially important when working with someone else's inventory, or with calibration tools, where the need to account for every item is imperative to ensure no inventory can ever be lost or misplaced. Since WISER continually reads current location data, facilities can also measure turnaround times of all part operations. Work orders can be tracked entering and exiting each machine it visits, enabling the user to accumulate weeks' worth of real data, to help find and address bottlenecks in their processes. Knowing the location of work orders is a major benefit in multi-step, nested, and linked processes.

For more information about the WISER RTLS offerings and the ATLAS solution you can visit [wisersystems.com](https://www.wisersystems.com)



DEFUSING A TICKING TIME BOMB

As the recovering aviation industry begins to surpass pre-pandemic levels, what can be done to ensure that shortfalls of maintenance technicians and engineers – compounded by the effects of the Covid crisis – are adequately addressed? **Charlotte Bailey** reports



←
The growing global shortfall of maintenance technicians and engineers has been described by analysts as a ‘ticking time bomb’

While the dramatic disruption among frustrated fliers this summer has been well documented in the mainstream media – with cancelled services and chaos at many major European airports – attention has often centred on the airport operations themselves. However, alongside the strike actions, flight delays and constant cancellations sits another ‘ticking time bomb’: a growing global shortfall of maintenance technicians and engineers, who form the backbone of any aviation operation.

With passenger traffic expected to grow at 3.6 per cent between 2019-2041, according to Airbus’ *Global Market Forecast* of July 2022, it’s clear that these concerns require immediate action.

Indeed, among the top factors predicted to disrupt the MRO industry over the next five years, a shortage of maintenance technician labour has jumped from sixth place in 2021 to take this year’s top spot, according to a survey conducted by consultancy Oliver Wyman titled *The Quest For Stability*. The annual survey engages more than 150 of the world’s largest MRO providers, and anticipates that MRO spend “will approach US\$80 billion in 2022 and come close to matching 2019 (pre-Covid-19 levels) in 2023”.

However, across four key areas – comprising airframe heavy maintenance, line, components and engine – “nearly half of respondents indicated that securing labour would be extremely or very challenging”, with airframe, the most labour-intensive, seen as the “most challenging for recruiting talent”.

Perhaps indicative of rising global concern, in June this year the Regional Aviation Association of Australia (RAAA) called on the country’s federal government to add aircraft maintenance engineers to its priority migration skilled occupation list.

Unravelling the causes behind this so-called ‘perfect storm’ reveals a number of contributory factors, not least the ongoing repercussions of Covid-19 on a recovering industry. Aircraft emerging from storage are requiring additional inspection, repair and restoration work to return them to airworthiness following an unprecedented period of inactivity – and that’s on top of MROs’ ‘usual workload’. The welcome expansion of fleet sizes post-pandemic is also creating further work as additional airframes are acquired; often bringing technological advances requiring evolving skillsets.

That’s around an additional 30,000 skilled personnel a year worldwide. However, while the International Air Transport Association (IATA) predicts the number of air passengers to reach a record 7.2 billion by 2025, this can only be achieved by the “effective training and an adequate supply” of personnel “critical to maintaining the health, safety and prosperity of the aviation ecosystem”.

Filling these vital roles – whether attracting new talent or holding onto existing staff – may not be easy. “[Technicians] are leaving the workforce through retirement and natural attrition, and retirements will

↓

An estimated 610,000 new technicians will be required in the next 20 years, according to Boeing

The net result: retiring personnel not being replaced at a steady rate, let alone sufficient to accommodate the predicted growth in demand. The irreversible loss of two key groups during the pandemic – those made redundant and those who opted for an early retirement – is also being keenly felt today.

Although some MRO providers, such as US-based FEAM Aero, which has an additional 12 European line maintenance stations, managed not



Despite the reassuring resurgence in demand for skilled personnel, it’s not as simple as upscaling staff numbers

However, despite this reassuring resurgence in demand for skilled personnel, it’s not as simple as upscaling staff numbers – as shortages will attest. An estimated 610,000 new maintenance technicians will be required to “maintain the global commercial fleet over the next 20 years”, according to Boeing’s *Pilot and Technician Outlook*, which was published earlier this year.

accelerate over the next five to ten years,” noted Boeing’s outlook; adding that “in mature aviation markets, the average age of the technician workforce keeps rising, while the number of new entrants to the profession tapers off”.

The average Federal Aviation Administration (FAA)-certified mechanic is 53; 11 years older than the average US worker according to the US Bureau of Labor Statistics.

7.2bn

➤ The International Air Transport Association predicts the number of air passengers will reach a record 7.2 billion by 2025

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Photos 1 and 2: Lufthansa Technik

“The average age of the technician workforce keeps rising, while the number of new entrants to the profession tapers off”

to implement redundancies during the pandemic, not all employers could make such investments in their staff.

It's not just retirement that's accelerating the loss of qualified technicians. FAA-accredited airframe and powerplant (A&P) mechanics' skillsets are in demand from other sectors, from automotive applications to theme park operations. Although arguably these industries offer more inherent stability than the cyclical 'boom or bust' nature of the aviation sector, could wages be detrimentally impacting decisions too? In the USA, although the 2021 median pay for a qualified technician was \$65,500 a year (\$32.52 per hour), many regional carriers pay significantly less – in the area of \$15-20 per hour – which,

combined with unsociable hours and changeable schedules, leaves many candidates unenamoured with an increasingly challenging role.

Demand for the job is clearly evidenced. In their projections for 2020-2030, the US Bureau of Labor Statistics cite an anticipated 11 per cent growth in demand for aircraft and avionics equipment mechanics; a rapidly expanding requirement. However, the Aviation Technical Education Council (ATEC) noted in its October 2021 *Pipeline Report* that the FAA issued 30 per cent fewer airframe and powerplant mechanic certificates in 2020 than in the previous year – a “devastating drop”, given that more individuals achieved FAA mechanic certification in 2019 than in “any of the previous 17 years”. Although the report referenced the plausibility of a pandemic-induced anomaly, the figures are still concerning.

Christophe Phonnet, maintenance training operations director for Airbus Customer Services, says that attracting, training and retaining skilled personnel to a job that “may not have the same esteem as being a pilot” is a challenging task best approached from multiple angles. Raising the profile of a profession many may view as hard, manual work for relatively

restrictive pay and conditions starts with the likes of STEM [science, technology, engineering, and mathematics] outreach programmes, engaging with, and inspiring, young people to take up a variety of aviation-oriented careers.

Choose Aerospace – a non-profit partnership of 501 aerospace stakeholders – believes the “most effective way to recruit students” is through high school partnership programmes. Once interested, it's also imperative that prospective graduates have a clear indication of how a career within the MRO sector might progress.

In one promising initiative, Hawaiian Airlines announced a partnership with Honolulu Community College in August to enable local students to graduate as FAA-certified maintainers, with the carrier hoping to double its intake to 100 students a year by the Autumn 2023 enrolment. Hawaiian believes this ‘home-grown’ approach will ensure a steady stream of maintainers and engineers with local roles to take up.

“Our programme is the only one of its kind in the Pacific Basin, so this unique initiative will allow us to educate and train more aviation



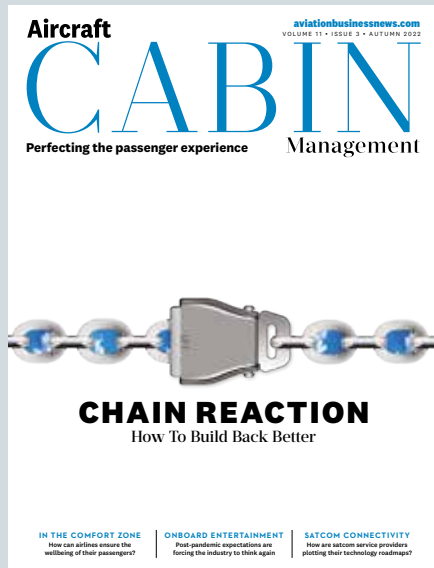
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1 and 2. Lufthansa Technik's apprentice training programme this year has returned to roughly where it was in 2020 in terms of numbers

3. Joramco Academy students are given employment priority with the company upon graduation

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“It’s imperative that prospective graduates have a clear indication of how a career within the MRO sector might progress”

technicians who are ready to enter the workforce in Hawaii,” reports Honolulu Community College’s Karen Lee. Working across a fleet of 61 aircraft – ranging from three to 20+ years old – graduates will combine ‘legacy’ skills with the contemporary expertise an evolving fleet of aircraft require.

Elsewhere, and also in August, Airbus signed a contract with aviation infrastructure developer GMR Group to offer a four-year aircraft maintenance engineer programme in Hyderabad; another collaborative concept and one which hopes to help fulfil India’s requirement for some 45,000 new technicians over the coming two decades.

Securing funding to complete an apprenticeship or educational programme can also be instrumental in attracting and retaining new candidates. The total of US\$10 million granted by the FAA between 2020 and 2021, recognised as a “long-term commitment” by the Aircraft Mechanics Fraternal Association (AMFA), will “encourage collaboration

between schools, aviation companies, unions and government to find new solutions to the skills gap and help more Americans pursue aviation careers”. Through the support of its industry sponsors, Choose Aerospace was also able to offer over \$50,000 worth of scholarships and additional funding to scholarship winners, recognising the considerable training costs incurred on the path to a career as a licensed engineer.

As ever-newer aircraft enter service, so too will evolving technologies augment a more ‘traditional’ maintenance regime. By 2041, Airbus’ *Global Market Forecast* predicts new-generation aircraft will represent more than 98 per cent of the global fleet (compared to a current 20 per cent share). Options such as the use of video to issue airworthiness approval (an example of which was granted by the FAA in 2020) will not only expedite inspections but streamline MRO roles, allowing more work to be done remotely and offering flexibility in working practices.

98%

➤ By 2041, Airbus’ *Global Market Forecast* predicts that new-generation aircraft will represent more than 98 per cent of the global fleet

Ultimately, recruiting and retaining candidates goes hand-in-hand. Continuing to engage across an increasingly diverse spectrum of potential candidates, be it through private-public partnerships or STEM outreach programmes, plays a vital role in attracting the MRO champions of the future. Just how individual organisations will continue to strive towards creating attractive working environments with regards to pay and conditions remains to be seen, although with an additional 610,000 jobs to fill over the next 20 years, let’s hope that lasting and loyal relationships can be achieved. **M**

↑
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The facility supports a newly expanded cooperation agreement with Japan's Ministry of Economy, Trade and Industry.

Boeing reiterated its commitment to supporting Japan's SAF industry and has been accepted as the latest member of 'ACT FOR SKY', a voluntary organisation of 16 companies that works to commercialise, promote and expand the use of SAF produced in Japan.

It was founded by Boeing airline customers All Nippon Airways and Japan Airlines, along with global engineering company JGC Holdings and biofuel producer Revo International.

Finally, Boeing will represent the aviation sector in a global alliance, jointly established by the US government and World Economic Forum, to accelerate clean technologies and reduce carbon emissions. The First Movers Coalition was created in late 2021 to leverage the purchasing power of major companies to speed up the pace of decarbonising industrial sectors.

Boeing, a founding member of the coalition, will serve as the 'champion' for the aviation sector.

As part of its new role, Boeing has committed to supporting greater commercialisation of SAF and advancing other low-carbon technologies. Boeing said it would leverage current technologies and increase industry partnerships in expanding sustainable aviation fuel supplies, while shaping strategies for developing new solutions. 

Working together

Boeing says innovative technologies and partnerships are the two key ingredients to creating a more sustainable future – as it hopes three new initiatives will prove

Multiple initiatives are underlining Boeing's commitment to sustainability as one of the commercial aviation industry's 'big two' aircraft manufacturers – including its ecoDemonstrator programme, a new research centre, and a new advocacy role.

The company's 2022 ecoDemonstrator, a Boeing-owned 777-200ER, will test about 30 new technologies aimed at improving sustainability and safety for the aerospace industry. During six months of flight and ground tests, Boeing will evaluate: SMART vortex generators – small vertical vanes on the wing – that improve aerodynamic efficiency during take-off and landing (in collaboration with NASA); a system to conserve onboard water; additively manufactured airplane

and engine parts; an environmentally preferred refrigerant and a new fire suppression agent; and a heads-up enhanced vision system for pilots. The manufacturer will also continue to analyse sustainable aviation fuels (SAF).

"The Boeing ecoDemonstrator programme brings together the two most important ingredients to a more sustainable future – innovative technologies and partnerships with customers, suppliers, government agencies and academia," says Boeing's chief sustainability officer Chris Raymond.

In a second initiative, advancements in SAF, electric/hydrogen propulsion, robotics, digitisation and composites will all be explored at a new Boeing research and development centre in Japan.

The Boeing Research and Technology centre in Nagoya – home to many of Boeing's major industrial partners and suppliers – will expand Boeing's research and development footprint in the region, which includes centres in Australia, China and Korea.

Boeing is a founding member of the coalition, serving as a 'champion' for aviation

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 ACT FOR SKY is a voluntary organisation of 16 companies that works to commercialise, promote and expand the use of SAF produced in Japan

1. The 2022 Boeing ecoDemonstrator will test about 30 new technologies

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