

AVIATION MAINTENANCE

Spring 2022



magazine.com



RAMP SAFETY

Propeller Coatings for Visibility

Also Inside:

PREDICTIVE ENGINE MX

THE POWER OF DATA WILL
DRIVE ENGINE MRO

P2F UPDATE

THE PAX TO FREIGHTER
CONVERSION BUSINESS
SURGES

MRO DIGITIZATION

THE TRANSFORMATION OF
MRO IS UNDERWAY

SEE
YOU AT

AEROSPACE
TechWeek.com

AMERICAS
ATLANTA

NOV 22

EUROPE
MUNICH

MAR 23

**Your parts have
a destination
We know the way**



Aviation Logistics Network



**GLOBAL NETWORK OF
SPECIALISTS IN AEROSPACE
TRANSPORTATION**

Do you have an urgent transportation challenge?

We're here for you 24 hours a day 365 days a year



**ROYAL
AERONAUTICAL
SOCIETY**
CORPORATE PARTNER

Contact us now on

**24/7/365 AOG Hotline:
00 8000 264 8326**

www.aln.aero

DEPARTMENTS

- 04 Editor's Notebook 47 Classified
- 06 Intelligence: News 48 Legal Spin
- 46 Column: Brad Pond discusses emergency preparedness.

42

COVER STORY

A Paint That Can Save Lives

Every year in aviation there are injuries and fatalities related to spinning propellers and rotor blades. There is a very simple, yet effective, way to prevent them — make those spinning devices more visible to people on the ramp. The cover image highlights Sherwin-Williams' AfterGlo paint product. Image courtesy of Sherwin-Williams.



18 Predictive Engine Maintenance

How operators can harness the power of engine sensor data, digital monitoring/transmission tools, AI-enabled big data analysis and more to predict maintenance issues before they occur.

26 P2F Conversion Market Bright

A continued bright spot throughout the pandemic has been passenger to freighter conversions. This complex but desperately needed work is more important than ever as the supply chain struggles on.

34 MRO Digitization

MROs have spent the last two years revamping operations with new or expanded digital capabilities, from software supporting maintenance planning, artificial intelligence-enabled inspection techniques to remote and collaborative inspection.



8-9 November '22 | Atlanta, USA



29-30 March '23 | Munich, Germany

CATEGORIES

- GENERAL AVIATION
- COMMERCIAL
- BUSINESS JET
- MILITARY
- ENGINES
- TECHNOLOGY
- PRODUCTS/ TOOLS
- SPECIAL REPORT
- AFTERMARKET

Aviation Maintenance (ISSN 1090-221X) is published bi-monthly by Aerospace & Security Media Ltd, 2139 Oakview Rd. SE Atlanta, GA 30317. Application to mail at Periodicals postage paid at Atlanta, GA and additional mailing offices. POSTMASTER send address changes to Aviation Maintenance 2139 Oakview Rd. SE Atlanta, GA 30317. The editor welcomes articles, engineering and technical reports, new product information and other industry news. All editorial inquiries should be directed to Aviation Maintenance; Email: news@avmain-mag.com. Subscriptions: Free to qualified individuals involved in the aircraft maintenance industry. All other prepaid subscriptions, see www.avmain-mag.com. Content may not be produced in any form without written permission.

AVIATION MAINTENANCE



+44 (0)20 3892 3050
+1 (920) 214 0140

EDITORIAL

Editor-in-Chief
Joy Finnegan
jfinnegan@avm-mag.com

Contributing Editors

James Careless	Kathryn Creedy
Mark Robins	Ian Harbison
Jason Dickstein	Dale Smith
Jeff Guzzetti	James T. McKenna

ADVERTISING/ BUSINESS

CEO/Owner
Adrian Broadbent
abroadbent@aerospace-media.com

Group Publisher & Sales Director

Simon Barker
sbarker@aerospace-media.com

Key Account Sales Director

Jina Lawrence
jinalawrence@avm-mag.com

Key Account Sales Director

Paula Calderon
pcalderon@aerospace-media.com

DESIGN/PRODUCTION

Lisa Garrison
lgarrison@aerospace-media.com

CLIENT SERVICES

Administration
Maria Hernanz Reyes
maria@asi-mag.com

LIST RENTAL

Statistics
Jen Felling
felling@statistics.com

REPRINT PARTNER

The YGS Group
717 505 9701 x100

PRINTER

Gemini Print
Unit A1 Dolphin Way
Shoreham by the Sea
West Sussex BN43 6NZ



Aerospace & Security Media is a trading arm of ASI Publications Ltd

ASI Publications Ltd
1 Coyners Avenue
Southport
PR8 4SZ
UK

abroadbent@aerospace-media.com

www.avm-mag.com or
www.aerospace-media.com

UK Company registration no 5999781
UK VAT no GB227106044

Parts, Supply Chain and Labor Shortage, Oh My!



BY JOY FINNEGAN
EDITOR-IN-CHIEF

Fresh out of the Covid crisis, the aviation maintenance industry is finding itself, like so many other industries, facing new market stressors. Specifically, those challenges include the parts and supply chain break down as well as the labor shortage that has been predicted for years but finally appears to be happening as well as inflation and threats of new variants of Covid that could prove potent and impact air travel. Other huge concerns are geopolitical instability like the Russian invasion of Ukraine, inflation and rising interest rates. It's never easy, is it?

Recently at an industry conference, Mark Wibben, VP, engineering and programs at Southwest Airlines said of these unusual times that key to dealing with these ever-changing challenges is the ability to adapt. Nothing new there but always good to remember that just because you have always done something one way, doesn't mean you must continue to do it that way. On the contrary, finding new ways to navigate through these crazy times is key to surviving them.

On a positive note, The Oliver Wyman forecast says the global aircraft fleet size grew by 13% last year. There are also reportedly 2000 aircraft that are were parked and stored during the pandemic slowdown that the group believes will be brought back online rather than sold for parts. "MRO demand should recover to pre-COVID levels by 2024, but annual growth in the second half of our 10-year forecast period will be 2.8%," said Brian Prentice, one of the authors of the report. "By 2030, MRO demand is expected to reach \$118 billion, 13% below the pre COVID forecast of \$135 billion."

One of the biggest bright spots in our industry is cargo conversions of passenger aircraft to freighters (P2F). There have been a record number of aircraft — around 100 — that were converted to freighters last year. We look at the very latest in the MRO P2F conversion business in our story "P2F Conversions Surge Through Pandemic," written by Ian Harbison. That story begins on page 26 and covers the need for more aircraft to be converted as the supply chain struggles to find its new normal in this age of online purchases of everything. Harbison talked to several MROs as well as one OEM that specialize in this complex work.

Tied together with cargo conversions is the aerospace supply chain that is under pressure. You can read our story about the aerospace supply dilemma in our Summer 2021 issue starting on page 14. That cover story, "Better Faster Stronger — How to Fix the Aerospace Supply Chain" gives actionable items that businesses can take to improve their part in the supply chain, and it is as relevant today as it was the past summer. As for the Oliver Wyman report, it says, recovery may be complicated by supply chain disruption and delays, as well as labor shortages. "Many aerospace suppliers were forced to cut output and lay off employees in the first year of the pandemic as the airframe and engine OEMs scaled back production with the drop-off in air travel. Given the rebound in

the economy in 2021, employers have been and still are challenged to hire and train new workers fast enough to meet rising demand."

The report goes on to say delays in global shipping and in the industrial ramp-up will make it hard to access parts and raw materials. Having employees out sick die to COVID-19 outbreaks is not helping the supply chain.

Speaking of the workforce shortage, we have been covering it for years, even before it began to manifest. Not to be over dramatic, but we put the shortage front and center of this magazine in the June/July 2018 issue with a cover story called Military Maintainers: Has the Mechanic Shortage Reached the Services?" Also, in May 2019 with the story, "The State of the Shortage," and most recently in our cover story in the last issue starting on page 26 called, "Who Will Fix it? The Helicopter Mechanic Shortage," as we looked at the even more pronounced need for helicopter mechanics.

Surely you know the old quote often (erroneously) attributed to Einstein: "Doing the same things over and over and expecting different results is the definition of insanity." It seems like that is what is happening regarding finding, training and keeping people in aviation maintenance because I only heard the same thing being repeated by anyone asked what they are doing to get more people. The answer: reaching out to local schools and apprenticeships. Yes, those are the ways the industry has been trying to funnel more people onto the shop floor. But that has been happening for years. If it isn't reaping rewards now, maybe it is time to try something different.

Also in this issue is a must-read story by Jim McKenna on the digitization of the MRO industry. It is finally happening. New or expanded digital capabilities, like software supporting maintenance planning, artificial intelligence-enabled inspection techniques and remote and collaborative inspection are finally being implemented to bring MRO into the digital age. As an added benefit, it may help alleviate some of the shortage dilemma. McKenna asked top leaders in the industry what they are doing as well as cutting edge companies about their product offerings for digitization. That story starts on page 34.

If all of the above is overwhelming and you don't know where to start, please read the story on photoluminescent paint for propellers and rotor blades as shown on the cover. This is something you can act on right now and it will likely prevent an injury or even save a life. Sherwin-Williams' AfterGlo paint is easy to apply, makes these invisible spinning parts glow with reflective paint that charges in the sun. As most of us in this industry know, there are too many stories of moving props or blades on the ramp where someone lets their guard down for just a second and is injured or killed — grabbing a hat blown off in a gust or when a child breaks free from a parent's hand and runs...Check it out on page 42 — you may never know whose life you have saved by using it. [AM](#)

CARING
FOR
A
CLEANER
WAY
TO FLY



Like you, we understand just how important it is to look to the future. That's why Airbus Services ensure your aircraft performs as efficiently as possible, while also meeting your environmental goals. To do this, we offer the right services for your aircraft, allowing you to increase aircraft availability while lowering costs. And through sustainable practices that save fuel and minimise noise, together we'll keep the world a beautiful place.

AIRBUS

Boeing Names Northern Virginia Office Its Global Headquarters; Establishes Research & Technology Hub

Boeing announced that its Arlington, Virginia campus just outside Washington, D.C. will serve as the company's global headquarters. The aerospace and defense firm's employees in the region support various corporate functions and specialize in advanced airplane development and autonomous systems. In addition to designating Northern Virginia as its new headquarters, Boeing plans to develop a research & technology hub in the area to harness and attract engineering and technical capabilities.

"We are excited to build on our foundation here in Northern Virginia. The region makes strategic sense for our global headquarters given its proximity to our customers and stakeholders, and its access to world-class engineering and technical talent," said Dave Calhoun, Boeing president and CEO.

Boeing plans to maintain a significant presence at its Chicago location and surrounding region. "We greatly appreciate our continuing relationships in Chicago and throughout Illinois. We look forward to maintaining a strong presence in the city and the state," said Calhoun. "We also want to especially thank Governor Youngkin for his partnership, and Senator Warner for his support as we worked through the process."

Future of Work Enables More Investment in Manufacturing, Engineering, Training

Like many companies during the past two years, Boeing has implemented flexible and virtual solutions that have enabled the company to reduce its office space needs. At its Chicago office, less office space will be required for the employees who will continue to be based there. Boeing will adapt and modernize the workspace to better support future work requirements.

"In today's business environment, we have adopted a flexible



work strategy in parts of our company and are taking steps to be more efficient within a reduced footprint. This helps us channel investments toward our critical manufacturing and engineering facilities and training resources," said Calhoun.

New Boeing Research & Technology Hub

As part of its effort to tap into engineering and technology talent across the U.S and around the world, Boeing plans to establish a research and technology hub in Northern Virginia. The hub will focus on developing innovations in the areas of cyber security, autonomous operations, quantum sciences and software and systems engineering.

"The future of Boeing is digital," said Greg Hyslop, Boeing's chief engineer and executive vice president of Engineering, Test and Technology. "Focusing our R&D and talent development in areas that support digital innovation will fuel the introduction of cutting-edge capabilities. This new hub in Northern Virginia will follow the successful implementation of this technology strategy in other regions."

Jaap Beijer to Succeed Holger Sindemann as Managing Director of MTU Maintenance Hannover

On 30 April 2022, Holger Sindemann, managing director of MTU Maintenance Hannover, will leave MTU after 16 years of service. For 10 years, he managed the Hannover site and the operational maintenance business of MTU. The cross-location function of the head of MRO Operations has now been eliminated as part of a reorganization. Sindemann has taken this opportunity to resign from his position as managing director and leave MTU. His successor will be Jaap Beijer, who is currently the managing director of MTU Maintenance Zhuhai. Beijer began his new role on 1 May 2022.

"We deeply regret Holger Sindemann's departure and thank him for his valuable contribution to the further development of MTU Maintenance and the achievement of the group's long-term growth targets. We wish him all the best and continued success for both his professional and personal future," said Michael Schreyögg, chief program officer of MTU Aero Engines. "We are delighted that Jaap Beijer is taking on the task in Hannover. He has considerable experience in the MRO business from his previous MTU career and will support us in further expanding the services of our MRO network for our customers."

With around 2,400 employees, MTU Maintenance Hannover in Langenhagen is the largest MRO site of MTU and is responsible for the maintenance of mid-sized and large commercial engines. These include the CF6-80C2 and GE90 Growth engines of GE, the PW1100G-JM and

PW2000 of Pratt & Whitney, the V2500 of International Aero Engines, and the CFM56-7 of CFMI. The location is also the competence center for high-tech repairs and is continually developing new processes. With the establishment of this



Jaap Beijer



Holger Sindemann

first maintenance facility in 1979, MTU entered the commercial engine maintenance business on a large scale.

Under the leadership of Sindemann, MTU invested around €200 million in the Hannover site during the past five years. In addition to comprehensive digitalization topics, a new production hall and a modern administration building are in the works. Both will be opened this year. This development will continue under Beijer. Over the past four years, he has intensively promoted the expansion of the MTU site in Zhuhai, China. There, around 1,100 employees specialize in the maintenance, overhaul, and repair of various engines. A second site in the region is currently under construction.



2 of the Top **5** MROs



2 of the Top **5** Global Aircraft Manufacturers



Top **4** U.S. Adversary Air Services Providers



7 of the Top **10** Heli-operators

TRUST RAMCO AVIATION ERP



Scan the QR Code



Pratt & Whitney GTF Engines Power Inaugural A321neo Flight by Delta Air Lines

Pratt & Whitney, Airbus and Delta Air Lines completed the first revenue flight of the airline's first Airbus A321neo aircraft powered by Pratt & Whitney's GTF engines. The event was commemorated with a gate celebration at Logan International Airport in Boston, Mass., after which the plane departed for San Francisco International Airport. Delta announced the selection of Pratt & Whitney GTF engines to power its A321neo fleet in December 2017, with a total of 155 purchase commitments through 2027.

"Our GTF-powered A321neo fleet extends our long and successful partnership with Pratt & Whitney," said Mahendra Nair, senior vice president, fleet and TechOps supply chain. "We're seeing unprecedented demand for the summer travel season, and we look forward to offering our customers an elevated experience on board our new state-of-the-art aircraft."

Pratt & Whitney powers more than 230 aircraft in Delta's fleet today including Airbus A220 and A330 aircraft, as well as Boeing 757 and 767 aircraft. The airline's GTF-powered A220 fleet is the largest in the world, with 55 aircraft. In 2019, Delta TechOps joined the Pratt & Whitney GTF MRO network, which supports GTF operators of Airbus A220 and A320neo family aircraft around the world.

"Today we celebrate another milestone with the Delta team as they enter service with their new GTF-powered A321neo aircraft," said Rick Deurloo, chief commercial officer at Pratt & Whitney. "We thank Delta for their confidence in Pratt & Whitney and look forward to building upon our 90-year relationship."



Delta TechOps, Asiana Airlines Enter Engine Maintenance Agreement

Delta TechOps will be a maintenance, repair and overhaul provider of Asiana Airlines' CF6-80C2 engines over the next five years, bringing the engines powering the South Korean carrier's Boeing 747 and 767 aircraft under its extensive global portfolio.

Delta TechOps people will expertly carry out scheduled engine overhaul shop visits during the five-year period. Additionally, Delta TechOps will support any unscheduled or AOG engine work.

"We are so pleased to have a new agreement with a prominent CF6 MRO, Delta TechOps," said Hoon Bae, General Manager of Aircraft & Supplies Purchasing, Asiana Airlines. "With this new business, we are confident that Asiana Airlines and Delta TechOps will build up our long-term partnership into the future."

"We are looking forward to getting started on this significant new work with Asiana that is all possible thanks to the well-established track record of safety, excellence and quality by Delta TechOps people," said Don Mitacek – S.V.P. – Delta Technical Operations and President – Delta TechOps Services Group. "We look forward to expanding our portfolio of more than 150 MRO customers around the world with Asiana in the years ahead."

As the maintenance division of Delta Air Lines, Delta TechOps



has over 35 years of experience operating and maintaining CF6-80C2 engines. The work will be conducted by Delta TechOps Aviation Maintenance Technicians primarily at its Atlanta Technical Operations Center.

StandardAero Acquires EB Airfoils

StandardAero has signed an agreement to acquire EB Airfoils, a leading fan blade, compressor blade and vane maintenance, repair and overhaul (MRO) provider for the aero-engine and aero-engine derivative markets.

EB Airfoils is a privately held company operating from two facilities located in Palm City, Florida. With nearly 20,000 square feet of operations and approximately 50 employees, EB Airfoils' unique capabilities and unequalled expertise, have enabled the company to become one of very few organizations in the world to be granted OEM source approval or source demonstration for the repair and overhaul of fan blades, compressor blades and vanes on leading aero-engine and aero-engine derivative platforms.

"EB Airfoils expands StandardAero's existing airfoil capabilities at our Cork, Kansas City and Singapore facilities to provide a more comprehensive offering of hot and cold section airfoils

with immediate growth for our component repair capabilities for blades, vanes and other cold section component services to our portfolio," said Russell Ford, chairman and CEO of StandardAero.

EB Airfoils maintains a leading portfolio of source approvals across Pratt & Whitney, General Electric, CFM International, and International Aero Engines platforms and is in the process of receiving additional approvals through source demonstrations. The company's decades of experience and broad range of repair capabilities has allowed it to establish a steady base of recurring business with OEMs, operators and MRO providers.

"This acquisition marks another strategic initiative to continue to expand our worldwide portfolio of MRO and component repair services. Like StandardAero, customers choose EB Airfoils for its repair quality, quick turn times and prompt customer service," Ford added.



Day in. Day out.

CFM Services. Supporting your engine throughout its lifecycle.

At any point in time – from entry into service to mid-life and through maturity – we have the capability, resources and experience to deliver all of your engine service requirements. From customized programs to tailored transactions, we ensure your CFM engine is maintained to meet your needs and cost of ownership objectives. Wherever you are in the world, whatever day in your engine's life.

Expertise. Choice. Flexibility.

cfmaeroengines.com/services

CFM International is a 50/50 joint company between GE and Safran Aircraft Engines



FEAM AERO Appoints James Kimball as Vice President of Technical Operations

FEAM AERO announced the addition of James Kimball as their new vice president of technical operations, based out of their Miami headquarters. Kimball brings 35 years of aviation experience leading multi-site aircraft maintenance and materials operations for organizations including Spirit Airlines and JetBlue Airways.

"In his newly appointed position, Mr. Kimball will apply his years of technical experience and leadership to identify and implement operational improvements across our business as FEAM continues striving to be the best-in-class MRO in the industry," said Wayne Sisson, former VP of Tech Ops and FEAM's current COO.

In the midst of an active, global recruitment campaign, FEAM says it is acquiring talent to fill more than 300 positions throughout the country. With the announcement of their second 150,000 square

foot base maintenance facility at Cincinnati/Northern Kentucky International Airport (CVG) and international acquisitions of Northern Aerotech and BOSA, FEAM continues to grow at an exponential rate both stateside and abroad.

"I'm thrilled to have been selected to join the growing FEAM family and to be a part of the exciting growth of this forward thinking company," Kimball said. "I also look forward to sharing my experiences as a lifetime aviation maintenance professional to support the team, and to continue the standards of excellence that have become synonymous with the FEAM brand."



Rolls-Royce and Schaeffler Enter a 12-year Partnership

Schaeffler was awarded a contract lasting 12 years by engine manufacturer Rolls-Royce. Schaeffler says this cooperation presents a "win-win" for both companies. Rolls-Royce is securing the rolling bearing supply chain until 2035 with Schaeffler's products and manufacturing technologies, whereas Schaeffler is making an important step in its growth initiative by supporting Rolls-Royce with their products, R&D and manufacturing.

Schaeffler will continue to offer the latest production technology and support engine development with optimized manufacturing processes through its "High Performance Bearing Manufacture" program. The focus of the cooperation is on rolling bearing systems for aircraft engines in the growth areas of business aviation and widebody aircraft.

Schaeffler will be responsible for 100% of Rolls-Royce's supply volume in Europe. The majority of the product portfolio will be manufactured at Schaeffler Aerospace Germany in Schweinfurt, the company reports. Moreover, Schaeffler will support new development programs with its capabilities from simulation and design to manufacture and rig-testing, supporting the joint Rolls-Royce/Schaeffler technology roadmap.

"We are very proud that a company as large and important as Rolls-Royce has committed itself to us with such a long-running contract. Our two companies have achieved so much together. This is not only down to our expertise and quality



demands, but also our common understanding of how business developments must take place in the future," said Dr. Stefan Spindler, CEO Industrial at Schaeffler.

"With our solutions we can contribute to the target of Zero Emissions in the aviation industry," added Armin Necker, managing director at Schaeffler Aerospace Germany.

Building on the 12-year contract, intensified MRO activities (maintenance, repair and overhaul) are planned which will cover the supply of refurbished bearings.

AAR's Landing Gear PBL Program wins 2021 Secretary of Defense PBL Award

AAR was awarded the 2021 Secretary of Defense Performance-Based Logistics (PBL) Award for its Landing Gear PBL (LGPBL) Program. The Award acknowledges Government-industry teams that have demonstrated innovative sustainment solutions. The LGPBL Program is the largest commodity-level U.S. Air Force (USAF) PBL contract, supporting C-130, E-3, and KC-135 aircraft landing gear system sustainment.

As the prime contractor, AAR provides total supply chain support for these assets, directing procurement, inventory management, and commercial and USAF depot remanufacturing operations. The USAF-AAR team has driven industry best practices and innovation at the USAF Ogden landing gear remanufacturing facility, while balancing performance metrics and optimizing availability.

"The outstanding partnership between the USAF and AAR has

generated increased readiness at a reduced cost," said Lisa Smith, Deputy Assistant Secretary of Defense for Product Support. By aligning long-term product support planning and sustainment activities, the team has achieved a 97% reduction in Mission Impaired Capability Awaiting Parts (MICAPs), realized an 88% reduction in backorders, shortened requisition fulfillment times, repatriated remanufacturing workload to the USAF, and diversified the supply chain through new source identification and approval.

"The USAF-AAR team has developed and successfully delivered a pioneering PBL solution, leveraging commercial best practices to optimize C-130, E-3, and KC-135 mission readiness," said Nick Gross, AAR senior vice president of Integrated Solutions. "AAR is honored to receive this award and looks forward to continuing our strong and effective partnership with the USAF."

Keep More Of Your Fleet Up Here.



Over **50%** of all flights in the U.S. are supported by **EmpowerMX**.

EmpowerMX software solutions ensure the shortest turn-around times in fleet maintenance so Airlines, MRO, and Defense organizations are able to keep more of their fleet in the air.



Cloud-based



Mobile-first



Real-time

empowermx
sales@empowermx.com

SAS Group Selects ULTRAMAIN ELB for Paperless Ops

Scandinavian Airlines System (SAS) has selected Ultramain Systems to provide its market leading electronic logbook software. ULTRAMAIN ELB fully replaces the aircraft paper technical log, cabin log, journey log, damage log, and fueling logs providing a validated electronic Certificate of Release to Service (e-CRS). The ELB application will be used by Flight Crews, Cabin Crews, and Mechanics on iOS and Windows devices to provide integrated workflows with SAS maintenance and operations systems. Once implemented, ULTRAMAIN ELB will provide a variety of benefits including enabling accurate, real-time global operational visibility of the SAS fleet, resulting in fewer maintenance related disruptions, reduced defect life cycle time, higher dispatch reliability, and increased aircraft utilization. Ultramain's off-line eSignature validation capabilities will ensure reliable electronic operations even when connectivity is unavailable.

According to SAS, ULTRAMAIN ELB will enable process efficiencies that will avoid disruptions and reduce turn times. The removal of paper-based processes will increase productivity by 6,500 man-hours per annum. As part of the SAS digitalization and paperless initiative, ULTRAMAIN ELB reinforces the SAS commitment to providing sustainable travel. Implementing ELB will avoid the consumption of 300 logbooks per year across the SAS group of airlines.

"We are pleased to welcome SAS to the ULTRAMAIN ELB family. As the launch customer of ULTRAMAIN Electronic Line Checks, a companion product to ELB, SAS will further increase productivity with digital line maintenance check sheets. This is an important step toward the SAS goal of reducing the environmental impact for the communities in which they serve," said Mark McCausland, president and CEO of Ultramain Systems.

AVIATAR Expands its Aircraft Health Monitoring Portfolio for Boeing 737s

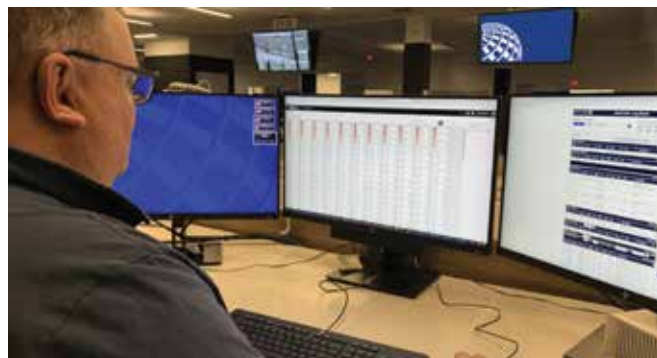
Lufthansa Technik has recently enhanced its AVIATAR digital platform with various new digital fleet management applications for the Boeing 737 NG, which are now made available to 737 operators around the world. The new Condition Monitoring and Prediction offerings were co-created with United Airlines, which partnered with Lufthansa Technik starting in early 2021 on the 737 NG and Airbus A320 family to jointly develop unique predictive maintenance solutions by combining world class engineering know-how and industry leading data science teams.

By integrating the Boeing 737 NG into AVIATAR's Condition Monitoring troubleshooting solution, United Airlines and all other customers can now manage technical operations for their Airbus and Boeing aircraft side-by-side on a single screen. In addition, they can now benefit from a growing number of Predictive Maintenance use cases developed for the Boeing 737 NG that help to avoid unplanned maintenance events or AOGs (Aircraft on Ground). AVIATAR now also offers integration with United's M&E (Maintenance & Engineering) system logbook and embeds OEM documentation linking features for the 737 NG amongst other new features.

"As one of the world's largest airlines, we are proud to see our world class engineering and industry leading data analytics teams contribute to the success of this service," said Kurt Carpenter, United Vice President of Technical Operations Planning and Strategy. "Our goal entering this effort was to focus on operationalizing new predictive maintenance alerts and data to provide decision support and prescriptive maintenance outputs to our frontline teams.

AVIATAR team and United teams worked to consolidate Condition Monitoring and Predictive Maintenance alerting for the 737 NG and A319/A320 fleets into a single platform in just one year. Our Digital Technology teams also collaborated to integrate our maintenance logbook, in-house predictive alerting and technical manual workflows. We look forward to continuing this relationship and to co-developing new and unique predictive maintenance models with the AVIATAR team."

"By using Condition Monitoring, United is the first airline in the Americas that uses the full extent of seamless Boeing and Airbus efficient troubleshooting with a fleet of over 500 aircraft on the AVIATAR platform," said Georgios Ouzounidis, Lufthansa Technik Head of Corporate Sales for the Americas. "Our AVIATAR team did an excellent job in customer centric development and customized the interface to United's Maintenance software adding a new interface into our



open system landscape. The outstanding and successful transatlantic cooperation and teamwork during the pandemic between the digital teams of AVIATAR and United's Tech-Ops, is an excellent blueprint for partnership projects in digitalization, Tech-Ops and MRO."

Based on aircraft and maintenance data, Condition Monitoring provides an overview of the overall operational aircraft condition. The immediate detection of faults increases troubleshooting efficiency and enables proactive corrective actions leading to higher aircraft availability. With Condition Monitoring aircraft data (e.g. from the central maintenance computer, the aircraft condition monitoring system, or the aircraft movement message) is collected via the Aircraft Communications Addressing and Reporting System (ACARS) or SITA network and visualizes the aircraft status and flight schedule. In addition, this health data is combined with work orders and position data. Condition Monitoring provides customizable alerts and notifications on aircraft or fleet level as well as for Air Transport Association chapters. Thus, the user gains an excellent overview of potential corrective actions for respective maintenance and repair operations.

Launched in 2017, AVIATAR is the independent platform for digital products and services developed by Lufthansa Technik. The platform offers its users digital solutions ranging from predictive maintenance to automated fulfillment solutions. AVIATAR combines fleet management solutions, data science and engineering expertise to provide a comprehensive range of integrated digital services and products for airlines, MRO companies, OEMs and lessors that seamlessly integrate with physical fulfillment in TechOps and beyond.

For more on predictive maintenance see our feature story starting on page 16.

Magnetic MRO Introduces Modular Plug-in Workshop Solution

Magnetic MRO is introducing a unique solution allowing for a "hassle-free" setup of a wheels and brakes workshop for its customers. The Plug-in, modular workshop is a unique solution in the market – it combines the offering of the equipment as well as the prepared-to-use modules that can be installed at the customer's location as a fully functional workshop, with installation taking minimum time.

"The Plug-in Workshop is designed for the companies wishing to start their own workshop without undergoing lengthy constructions of the building as well as a selection of tooling which would be necessary for operations – our solution can provide it all. It is a flexible service, too, as we can provide as many modules for the workshop with different equipment as the customer would need for their individual work scope," said Margus Graf, workshop manager for the company.

According to Graf, the idea to offer the modular, plug-in-type workshops came from the experience of the company's previous projects. After delivering and attempting to install the equipment, Magnetic MRO professionals were facing obstacles related to construction. Fixing such issues is known to be time-consuming and therefore delays the launch of the shop. "Understandably, it is difficult for clients who are focused on their core business to refocus on construction and developing of the Workshop. Therefore, we want to offer them a solution where they can remain a focus of their core business, and we will take care of the construction and necessary equipment of the Workshop," added Graf.



T-RX

Avionics Radio & Pulse Tester

Built for Maintenance Engineers. Engineered for Safety.



Streamline your avionics radio testing process with the CCX Technologies T-RX Avionics Radio and Pulse Tester.

The T-RX is an all-in-one avionics tester that conducts 100+ tests on over 16 systems with only 1 device!

CCX
TECHNOLOGIES

Call +1 (613) 703-6161 Email info@ccxtechnologies.com
www.ccxtechnologies.com

European Enquiries:



EVOLUTION
MEASUREMENT

call +44 (0)1264 316470 Email: enquiries@evolutionmeasurement.com
www.EvolutionMeasurement.com

HAECO Landing Gear Services and Liebherr-Aerospace Extend Agreement In China

HAECO Landing Gear Services and Liebherr-Aerospace have extended their initial landing gear service agreement to offer landing gear maintenance, repair and overhaul (MRO) services to Embraer E-Jet E1 operators in the Chinese Mainland.

Riding on the stable market demand for MRO services in the region, the partnership combines HAECO Landing Gear Services' expertise in landing gear MRO services with Liebherr-Aerospace's original equipment manufacturer (OEM) expertise for the Embraer E-Jet E1 landing gear system. Under this agreement, HAECO Landing Gear Services' quality landing gear MRO services is made available to aircraft operators through cost-competitive solutions offered by Liebherr-Aerospace, bringing planning flexibility to overhaul slots for return-to-service needs.

"We are very honored to see our valuable long-standing partnership with Liebherr Aerospace elevating to the next level for supporting E-Jet E1 operators," Christian Pinter, director and general manager of HAECO Landing Gear Services, said. "HAECO Landing Gear Services is offering additional capacity and 100% on-time performance to Liebherr Aerospace's customers in the Asia Pacific region and the guarantee of a world-class overhaul service to the highest standard of quality within a state-of-the-art facility that is ideally located in Xiamen, a very dynamic and vibrant location for aviation maintenance and overhaul services."

HAECO Landing Gear Services offers a full range of inspection, repair, maintenance, modification, overhaul and leasing services for landing gears at the Xiamen Gaoqi International Airport. As part of the HAECO Group Component Services division, HAECO Landing Gear Services offers expertise support and complements other major aircraft-related projects during aircraft in-hangar checks and conversions, or during modifications within the group's global operations.



AWS Welding Summit to be Held in Houston, Texas

The American Welding Society will hold their Welding Summit August 25-26, 2022, in The Woodlands, Texas. The Welding Summit comprises two days of presentations, demonstrations, and exhibits where the industry comes together to discuss, dissect, and educate on key issues affecting the welding industry, the summit organizers say.

The week kicks off with the Pre & Post Heat Treatment seminar on Wednesday, August 24. It will feature interactive presentations on applying new methods and workforce sourcing to projects to alleviate costs and scheduling issues associated with Post Weld Heat Treatment. The following day, The Welding Summit will feature two tracks: emerging trends in welding and attracting and retaining talent in the workforce.

"The Welding Summit is intended to bring the best and highest quality of information and welding professionals together for

a series of interactive presentations on how more value can be brought to welding operations and the best way to execute successful welding plans into projects," said Gary W. Konarska II, executive director and CEO. "We believe you should have a seminar experience that provides quality information that results in your ability to put some of the information presented into your operations immediately."

To preview the event, Joe Young and Steve Snyder, experts in the industry, will host a complimentary webinar on June 15, 2022, at 1 PM EST. Attendees will learn actionable tips they can implement immediately into their practices. Additionally, the AWS Careers in Welding Trailer will be present at the Welding Summit and available for attendees and local high school groups.

For more information about the AWS Welding Summit, go to aws.org/WeldingSummit.

Kano Laboratories Introduces Kroil Penetrant with Graphite

Kano Laboratories is rebranding the product Penephite to Kroil Penetrant with Graphite and introducing new packaging. Kroil Penetrant with Graphite is a blend of oils, solvents and graphite engineered to penetrate the smallest gaps of corroded metals to loosen seized parts. The graphite is designed to stick to metal and provide long-lasting lubrication, which will remain in place in operating temperatures up to 700°F (371°C).

"Kroil products have been used and trusted by pros and experienced DIYers alike since 1939," said Liza Klein, VP

– marketing, Kano Laboratories. "We are adding the product, formerly known as Penephite, to the Kroil line with a new name and new packaging to better align it with the brand."

Kroil Penetrant with Graphite assist in easing the removal of large metal components and equipment parts. The penetrant can be used on nuts and bolts, fan shafts, valve stems, hinges, gaskets, transfer belts, bearings, locking mechanisms, leaf springs and more. Kroil Penetrant with Graphite is available through distributors.



GO BEYOND

FLY RESPONSIBLY.

MEETING THE DEMAND FOR CARBON OFFSETTING

Our turnkey Carbon Offset Service offers customers an efficient, convenient, and cost-effective method of compensating for their carbon emissions. The service is available to all Pratt & Whitney Canada-powered aircraft that are enrolled in an Eagle Service™ Plan (ESP™) maintenance program or a Fleet Management™ Program (FMP™). Join us as we ensure a healthier planet, and leave a legacy we can be proud of together.



LEARN MORE ABOUT OUR CARBON OFFSET SERVICE AT [PWC.CA/CARBONOFFSET](https://www.pwc.ca/carbonoffset)

Lufthansa Technik Reports Continued High Demand for Special Aircraft Services

Lufthansa Technik's Special Aircraft Services unit is experiencing a continuation of the high demand for technical services for VIP, government and business aircraft even as international commercial air traffic recovers. The company has an excellent workload for the next few years, with only a few slots still available.

Michael von Puttkamer, Vice President Special Aircraft Services at Lufthansa Technik, commented: "Our Special Aircraft Services business was one of the few areas of Lufthansa Technik that was not affected by the massive pandemic-related impact on international aviation in recent years. The extensive technical support provided to VIP, government and business aircraft during the crisis period was a central pillar of the company's economic recovery over the past twelve months. It is all the more important that the high level of demand continues in the coming years. Our current order situation is one of the best in the company's history. We have therefore already taken various measures in recent months, such as adding more staff, to adjust our structures and processes so that we can handle all projects to the absolute satisfaction of our customers despite high capacity utilization."

The excellent order situation relates not only completions with their high-quality new cabin installations for aircraft of government and private VIP customers, but also to the corresponding modification and maintenance services. In addition to its core business with this clientele, Lufthansa Technik has long been providing technical services for military customers, such as the German Air Force, but also for the air forces of other Western nations. In both areas the company sees very good growth opportunities for the next few years, for example in the field of security products, which are currently experiencing increased demand, especially from government customers. Lufthansa Technik has also established a new business unit, Defense Programs, to further strengthen its activities with military customers.

"In addition to our decades of experience and our well-known high quality standards, our extremely broad product portfolio is another reason for our customers to entrust themselves to us,"



Wieland Timm, head of sales VIP & Special Mission Aircraft Services at Lufthansa Technik, added. "No other provider in this particular business segment can offer such a range of services from a single source for both the entire Boeing and the entire Airbus family in the areas of cabin, airframe and engines. This is because we offer not only technical services but also comprehensive engineering and design capabilities, as our latest VIP cabin concept "EXPLORER" clearly demonstrates. Our international network and mobile maintenance services also help us to be as close to the customer as possible."

Lufthansa Technik has been providing technical services to VIP and government customers for more than 60 years. Among other things, the company has already implemented more than 150 completions and major modifications. Last year, as part of a restructuring, the company reorganized the "Original Equipment and Special Aircraft Services (OES)" segment as one of a total of five major business segments. This segment combines all competencies in the areas of cabin completions and conversions, cabin products and maintenance services. As a result, the broad customer group of VIP and special mission customers with their individual requirements can be optimally served from a single source, from individual production to series production of cabin products designed by Lufthansa Technik, such as in-flight entertainment and cabin management systems, as well as special engineering services.

alufase
Height
solutions

ALUMINUM SCAFFOLDING

HOUSTON
6060 Brookglen Dr Suite
Houston, TX 77017
T. +1 (713) 910 5600

SPAIN
Ctra. M-114, Km. 1
28864 Ajalvir, Madrid (Spain)
T. +34 91 884 49 06



EUROPE • SOUTH AMERICA • USA
www.alufase.com

CONTACT: export@alufase.com



FL Technics Invests in Hanover-Based Wheels and Brakes Business

FL Technics is entering a segment of wheels and brakes maintenance as the group launches a dedicated business line and a specialized shop with an experienced team of engineers and technicians in Germany, Hanover International Airport.

The dedicated facility for servicing commercial aircraft wheels and brakes, as well as tires and components, started operations under FL Technics name in early April and will serve as a support hub within the global network of groups' MRO markets, ranging from Americas to Asia-Pacific.

The company says the expansion is a natural continuity of current FL Technics groups' operations, including a global integrated supply chain and the largest independent line maintenance network with more than 70 stations in service worldwide. Established infrastructure and pool of partners create a perfect ecosystem to develop operations that create new prospects as well as the ability to tailor FL Technics' solutions based on market needs to both lessors and operators.

"The successful start of the wheels and brakes business marks a new era for FL Technics and FL Technics group as we fill in a service area, previously outsourced by our MRO and sales teams," said Zilvinas Lapinskas, CEO at FL Technics. "The expansion is our next step in strengthening FL Technics' position as a global one-stop-shop service provider of MRO services."

Looking at 2022, this is the first major launch of a new business line for FL Technics this year, symbolizing successful continuity of the company's long-term strategy, powered by both organic growth and



mergers & acquisitions.

A solid foundation of financial background, ambitious vision, and sound strategy is shaping FL Technics operations as well as attracting highly experienced professionals within the aviation industry.

"I am personally engaged in every stage of the business model we are now launching," said Saulius Bajarunas, COO at FL Technics. "Thus, I am confident this step is a recipe for success, with all the key ingredients: a highly skilled team of engineers, purpose-built facility, certifications, and capabilities in high demand, as well as a strong backup by the global MRO group of FL Technics."

FL Technics says it will continue to invest in new assets and infrastructure, expand current and enter new markets, as well as grow the team of aviation professionals worldwide.

“Yesterday's home runs don't win today's games

Babe Ruth; 724 home runs in 22 seasons

Who would have thought that complex CAMO and MRO schedules, procedures and tasks could have become even more so? Increasing digital transformation should have taken care of all that, surely?

The problem is that established ways of working pre-COVID have been ruptured by the same restrictions that have beset all areas of the economy, all industries, and all operational approaches.

OASES is driving improved operational efficiencies for over 130 aviation organisations globally, digitising workflows faster, driving closer collaboration, and ensuring compliance.

We're helping the tough to get going, no matter how much tougher the going has become.

Game-changing anywhere MRO software: From frontline to back office



Ask for a demo of our Cloud-enabled portfolio, including OASES Mobile & ETL applications, or just get in touch to talk about how to empower your people and up your game.



PREDICTIVE ENGINE MAINTENANCE: HARNESSING THE POWER OF DATA



James Careless

Predictive engine maintenance harnesses the power of engine sensor data, digital monitoring/transmission tools, artificial intelligence-enabled big data analysis, and modern digital modeling techniques such as “digital twins” (creating virtual versions of engines whose “operational lifespans” mirror their physical counterparts) to predict maintenance issues before they occur.

By using this predictive approach, engine MROs can address issues for their aviation customers before they become serious, expensive, and likely to cause Aircraft on Ground situations. PEM also allows aircraft owners/operators to base some of their maintenance cycles on actual needs rather than fixed time periods. In this way, less money is spent on maintenance, without compromising safety or aircraft availability.

These reasons explain why PEM is proving

to be a popular option for aircraft owners/operators. To get a sense of what kind of PEM solutions are available today, trends in PEM evolution, and how this approach is catching on, **Aviation Maintenance** magazine spoke with three “PEM players.” They are Rik van Lieshout, digital products and services manager for Air France Industries KLM Engineering & Maintenance; Ville Santaniemi, customer success manager and partner with QOCO Systems Ltd.; and Dr. Michael Bartelt,



director of industrial engineering at MTU Maintenance.

What They Have to Offer

To put their expertise into context, **Aviation Maintenance** asked each company about its role in the PEM marketplace.

Since 2016, AFI KLM E&M has included predictive engine maintenance as part of its PROGNOS predictive maintenance suite, which also handles “health monitoring” for aircraft. “Based on our extensive knowledge

of operations and data generated by aircraft engines, AFI KLM E&M’s engineering teams have developed algorithms to provide early warning of engine failures (or of their components) before they occur, and to provide corroborating data to support the Maintenance Center in assessing engine remaining health in order to extend engine Time-on-Wing,” said van Lieshout.

For the record, AFI KLM E&M uses its own algorithms to drive its PEM application PROGNOS for Engine. PROGNOS for

Engine is an integral part of the PROGNOS predictive maintenance suite, which also includes PROGNOS for Aircraft, PROGNOS for APU and PROGNOS for Inventory.

MTU Maintenance is also harnessing digital technology to support its PEM services. “We are working towards the point where developments could be called ‘prescriptive’ in that data gathered from operations — such as operational environments, derate, and engine performance — is getting connected in such a way that we are able to forecast remaining on-wing time and optimal engine and module removal points,” Bartelt said. “For that purpose we use our proprietary Engine Trend Monitoring (ETM) called WebETM 3.0, which we have been continuously enhancing for over 15 years.”

MTU Maintenance’s WebETM 3.0 is designed to serve as a full-scale performance analysis tool. In addition to its continuous monitoring of all relevant engine parameters (including specific fuel consumption, rotor speeds, vibrations, oil pressures and temperatures), this tool has a built-in alarm function that alerts users whenever engine conditions are about to exceed critical parameters. WebETM 3.0 is also designed to predict performance degradation on an engine module level.

When taken as a whole, these PEM capabilities allow MTU Maintenance “to create customer-specific worksopes,” said Bartelt. “Combining WebETM 3.0 with other digital services, like our own fleet management tool CORTEX, also allows for better assessment and prediction of material consumption.”



MTU says their product, CORTEX, can help reduce maintenance and operating cost and help increase dispatch reliability by combining their technical expertise with data, algorithms and artificial intelligence. MTU Maintenance image.

AI-enabled CORTEX allows MTU to generate engine fleet management scenarios and worksopes for its customers that are customized, relevant and proactive. "With CORTEX, we provide optimized support by calculating a multitude of scenarios that can be immediately and endlessly adapted to financial, technical, operational, and market considerations as they change — which we are experiencing regularly at this time," he said. "Furthermore, we have developed our own scrap rate prediction tools. Based on engine and maintenance data, such as engine operations, severity, material data of parts, and modification status of parts, our AI can predict default probabilities of high-cost material. This information also helps us design individualized maintenance strategies for our customers."



Dr. Michael Bartelt
MTU Maintenance

Meanwhile, QOCO Systems plays a different role in PEM. Rather than do engine monitoring and repairs itself, QOCO Systems provides the data pathways to enable "the leading players in the market to seamlessly share data needed for PEM," said Santaniemi. "By collaborating and sharing data, airlines and OEMs can jointly improve the utilization of the assets for the benefit of both parties. For aircraft engines, this means extended time on-wing, less unscheduled maintenance,

and longer maintenance intervals, leading to improved cost and resource efficiency and streamlined operations at the airline."

To be specific, QOCO Systems provides the data exchange platform — EngineData.io — that enables bidirectional maintenance and engineering data flows between operators and OEMs/ analytics service providers. "EngineData.io is a key element of our customers' PEM solutions in making the real-time digital twins of their assets possible," he said.



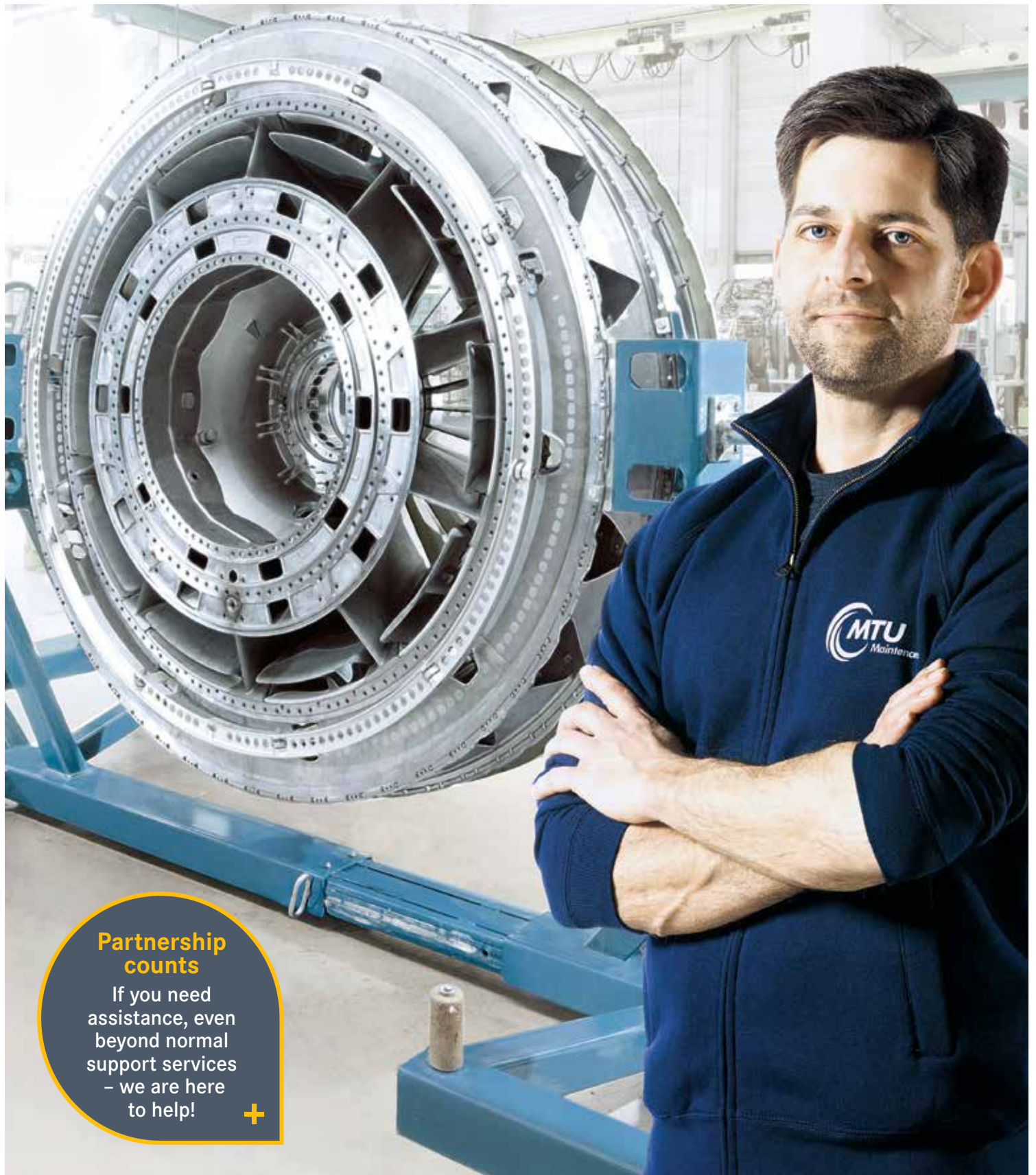
Ville Santaniemi
QOCO Systems

PEM Trends

Having established what roles these companies play in the PEM marketplace, Aviation Maintenance asked what specific trends are influencing the development and availability of PEM to aircraft operators.

For AFI KLM E&M's van Lieshout, the two trends making a difference are the ones that make PEM possible, namely the ability of engines to generate data and the progress in artificial intelligence in analyzing this data and drawing conclusions, predictions, and recommendations based on it. "The latest generation of engines allow these developments," he said. "However, it is the engineering expertise linked to the knowledge of the operations that allows the interpretation of these data and information flows."

According to QOCO Systems' Santaniemi,



**Partnership
counts**

If you need
assistance, even
beyond normal
support services
- we are here
to help! +

We are your engine experts



Our people make the difference. We are passionate. We are dedicated. We marry engineering with intelligent creativity. And we never give up unless an optimal solution has been found. As the global market leader in customized solutions for aero engines, MTU Maintenance supports you with the right product across the lifecycle of your engine. From innovative maintenance, repair and overhaul (MRO) services, to integrated leasing and asset management. Contact us and find your solution today.

www.mtu.de/en



AFI KLM E&M has included predictive engine maintenance as part of its PROGNOS predictive maintenance suite, which also handles "health monitoring" for aircraft since 2016. AFI KLM E&M image.

the ever-increasing range, detail and selection of data being generated by today's engines are driving a trend toward ever-improving PEM capabilities, accuracy, and results. "The more data available to learn from, the more accurate the predictive maintenance solutions are," he said. "As a result, PEM systems developed by OEMs and analytics service providers will far outshine those developed by individual airlines themselves.

To maximize results, data sharing between airlines and PEM service providers is essential."

One more trend is driving PEM performance improvements, namely the ongoing evolution in data sampling technologies and the AI-enabled software to analyze their results.

"We see a trend towards working with continuous data at higher sampling rates in order to cover critical operational conditions and maneuvers," said MTU's Bartelt. "Going forward, we will see an increase in the amount of data available, such as higher sampling rates, more collected data points, and so forth."

In saying this, Bartelt noted that further progress will be governed by how much sampling and data transmission technology improves going forward. "In that same vein, the development of new AI methods to better

evaluate operational data and predict engine conditions will play an important role," he said. "Ultimately, we will see a move from predictive maintenance towards prescriptive maintenance, where recommendations for action are provided automatically."

PEM's Payoffs

The real value of PEM is its promise to provide customers with proactive engine maintenance that is tailored to each engine's unique needs, on an as-needed basis that minimizes time in the shop while maximizing aircraft availability. And let's not forget money/time saved through avoiding unneeded maintenance and AOG situations, all of which are major points in PEM's favor.

So is PEM paying off on its promise to aircraft owners/operators? According to the experts interviewed for this article, the answer is a resounding yes.

"When it comes to predictive maintenance, it is important to maximize time on wing, but also to prevent costly operations by anticipating breakdowns before they occur," said van Lieshout. "Removal before failure avoids costly shop visits but also prevents AOG situations that generate multiple costs. These include maintenance intervention and temporary unavailability of the total asset — the aircraft — plus compensation to passengers and a lower brand reputation."

"Time on wing for engines may even double thanks to the advanced digital services that are enabled through maintenance and engineering data exchanges," added Santaniemi.



Rik van Lieshout
AFI KLM E&M



Over the 15 years that it has offered its proprietary ETM to engine clients, MTU Maintenance has seen a number of positive payoffs from this technology in terms of engine availability, reliability and servicing costs. The big one is alerting customers any time the monitoring data indicates something amiss: "We have an ETM support team that evaluates and communicates the technical recommendations to our customers on a daily basis," said Bartelt. "These recommendations cover line maintenance and shop visit actions to avoid additional damages or performance losses. As a result, this creates savings and shorter turn times."

"We combine ETM with our engineering and workscope expertise to optimize solutions for customers," he added. "Essentially, it is always a holistic and highly customized process, where failure cases can be identified, identification and confirmation can happen earlier, and troubleshooting efforts can be reduced, leading to higher engine reliability and time on wing."

PEM's Impact on the Industry

PEM's usefulness to aircraft owners/operators is clear. But what does the PEM model mean to MROs and supporting companies such as AFI KLM E&M, MTU Maintenance and QOCO Systems? What is PEM's impact on their businesses, and the aviation maintenance industry as a whole?

The answer: PEM is proving to be good for business. "QOCO's data exchange service is already enabling PEM for more than 10 airlines

and about 200 aircraft, and we have ongoing projects for doubling these figures in the next year," said Santaniemi. "We see that there is definitely a place for us to grow and bring the leading aviation industry players together to jointly develop win-win-win solutions for the industry."

PEM is also helping MTU run its business better by supporting targeted shop visit planning and preparation. "In addition to fleet staggering, the information is used for strategic material planning," Bartelt said. "At the same time, by offering these continually improved upon services to our customers, it is possible to increase their engine reliability and optimize shop visits staggering and cost across their engines' lifecycles."

What's Coming Next

PEM benefits everyone in the aviation industry, from aircraft owners/operators to passengers and others who need reliable air travel, plus the OEMs, MROs and related companies that keep them all flying.

Going forward, "predictive maintenance, whether for engines or other aircraft components, will gradually evolve with new developments and innovations," said van Lieshout. "Meanwhile, predictive maintenance is making a major contribution to a more sustainable aviation industry. This is why our PROGNOS predictive maintenance suite has been awarded the right to use the Solar Impulse label." (This label is provided by the Solar Impulse Foundation, which has identified 1000-plus clean and profitable solutions on

Experts agree that predictive maintenance is changing how aircraft are designed, operated and serviced and will continue to evolve and improve.
AFI KLM E&M image.



The use of predictive engine maintenance processes may lead to environmental benefits like reduced flight cancellations and reduced Quick Return Flights which also means less instances of required fuel dumping, says AFI KLM E&M's Rik van Lieshout, digital products and services manager. AFI KLM E&M image.

the market today.)

PROGNOS' environmental benefits include reduced flight cancellations that would otherwise result in extra flights to recover grounded passengers, and cutting the number of Quick Return Flights (return of the aircraft to its departure airport) on technical alerts, which requires fuel to be dumped prior to landing. "It also optimizes overall aircraft fuel consumption by monitoring the status of equipment more precisely," van Lieshout said.

The technology behind PEM can be extended to other parts of the aviation industry, noted Santaniemi. "We see that by enabling efficient data sharing, there are huge opportunities for many additional services that will eventually drive maintenance costs down," he explained. "By sharing data, parties that are in the best position to offer services can do so for the benefit of the whole industry."

"Big data is expected to transform the industry by enabling proactive analysis, as opposed to the reactive analysis seen up to this point," agreed Bartelt. "There is certainly a lot of potential in digitalization, but also a lot of work and analysis that still needs to be done. Integration of multiple data sources will be key. We expect this to be a continual process over the coming years."

Faced with these possibilities, the three companies are making plans to capitalize on the PEM/predictive maintenance trend.

"AFI KLM E&M's main focus is to create value for its 200 airline customers by maximizing fleet availability and

asset value," van Lieshout said. "Future developments will take advantage of progress in terms of AI and big data via new algorithms for more transparency, access to more and more targeted information, and thus cooperation focused on value-added actions."

"QOCO Systems is constantly improving and extending the EngineData.io platform to support wider maintenance and engineering data scope and to provide additional services for all parties involved," said Santaniemi. "These include continuous verification and validation of data quality, extended use of common data models/standards."

At MTU Maintenance, "we believe the next technology advancements in the MRO business will be driven by digitalization, and that is where the greatest development will take place across the industry," Bartelt said. "To make this happen, we're working towards full data integration throughout the entire product lifecycle and as a result, improving the predictability of engines. It is our aim to enable ETM to provide technical guidance to our customers with maintenance decisions. This is a development area and will be our focus for the next few years."

All told, the data, technology and AI-enabled software that are driving PEM today will drive the entire aviation industry in the years to come. In fact, predictive maintenance will likely define how aircraft are designed, operated and serviced in all aspects, making AOG situations an unusual oddity rather than common occurrences. One can only hope. **AM**



We pioneer motion

Control Costs without Compromising System Reliability

You already know Schaeffler Aerospace as a leading OEM supplier to the aerospace industry. But did you know that we also offer industry-leading repair and overhaul services that can help your maintenance team ensure supply chain reliability and control costs across a global network? We'll make sure your bearings and associated components are restored to OEM new condition in accordance with all applicable technical standards.

Schaeffler Aerospace is an FAA- and EASA-licensed repair station in the USA, and a TCCA-, EASA- and CAAC-approved maintenance organization in Canada. Our global footprint includes repair stations in Germany, Singapore and China.





P2F CONVERSIONS SURGE THROUGH PANDEMIC

Ian Harbison



ne aviation sector to have reaped benefits from the COVID-19 pandemic has been the freight business.

The initial flurry came from rapidly delivering urgently needed personal protection equipment and medicine, demands that were met by empty passenger aircraft flying belly cargo and then by various means of securing cargo in the cabin.

It then became clear that the already increasing amount of e-commerce was skyrocketing as people in lockdown became ever more used to ordering online. As the residual values of all those grounded airliners slowly ticked down, opportunities arose for freighter conversions on much younger aircraft than the traditional 20-year old veteran.

However, there is still a need for more freighters — IATA reported that,



Shown here is the 737-800 as converted for Allied Air by Aeronautical Engineers, Inc. (AEI). There is a huge demand for conversions according to Robert Convey, senior vice president - sales & marketing at the company, who says the surge in ecommerce has brought the the market forward by about five years. AEI images.

while capacity in February this year was 12.5% above February 2021 (8.9% for international operations) and above pre-COVID-19 levels, it still remains 5.6% below February 2019 levels.

AEI

Robert Convey, senior vice president - sales & marketing at Aeronautical Engineers, Inc. (AEI), reckons increased e-commerce demand has brought forward the market by about five years. The problem in the narrowbody sector is a lack of feedstock. His company specializes in the Boeing 737. He says all the 737-300/400 Classics that have been converted are in service and not changing hands, while there is very little feedstock left. That leaves the 737-800, for which there is a huge pool of aircraft and huge demand.

In 2019, AEI had received its STC and were working on two aircraft for GECAS and waiting for a third to arrive, while Boeing had had its STC for about a year and was doing just a handful of conversions. Feedstock was scarce because the aircraft were worth about \$20 million and passenger demand was high. Once COVID-19 hit in March 2020, the passenger market dried up, with aircraft grounded and values starting to drop. As a result, the market for the 737-800 started picking up in May 2020 and AEI is booked out for around the next two years. It had already established a network of conversion partners and now has 10 dedicated -800 lines producing over 30 aircraft a year at five facilities (Commercial Jet Inc at Miami International Airport and Dothan, AL; HAECO Xiamen in China; KF Aerospace in Kelowna, Canada; and Taikoo (Shandong) Aircraft Engineering Company (STAECO) in China).

Until the summer of 2021, feedstock remained plentiful but then started tightening as more aircraft returned to passenger service and residual values climbed. Currently, prices are around \$12 million but older aircraft are once again being converted. He expects this trend to continue for some time.

He adds that the aircraft that have been ordered over the last two years have not come from leasing companies disposing of assets, rather that companies like Aero Capital Solutions (ACS), BlackRock, GA Telesis and Macquarie AirFinance saw an opportunity to get into the project at an early stage craft using aircraft already in their inventory or bought on spec in the open market.

The U. S. and Europe are important markets, with the U. S. leading on the 737-800 as there is a significant fleet of 737-400s already operating in Europe. China is a small player, perhaps less than ten aircraft a year, as are Central and South America. Most of the customers are operating services on behalf of major shippers such

as DHL.

A unique aspect of the AEI STC, developed at customer request, is that the belly holds have been converted to Class E compartments, with detection and depressurisation to combat fire. This enabled the AEI conversion to be ETOPS 180 approved and is currently the only conversion provider with this approval. It was used with immediate effect by Ethiopian Airlines, which used the aircraft on services across the Indian Ocean, although it also important given the lack of diversionary airports in much of Africa. Convey suggests Alaska and Hawai'i as other good examples where ETOPS can be used.

He says there is a balance to be struck on the levels of investment to be made in infrastructure. With Boeing charging ahead on its own 737-800 programme, he thinks there is too much capacity. With 80 aircraft to be converted by the industry in 2022 and an estimated 100 in 2023, he believes there will be a leveling off of demand starting in 2024.

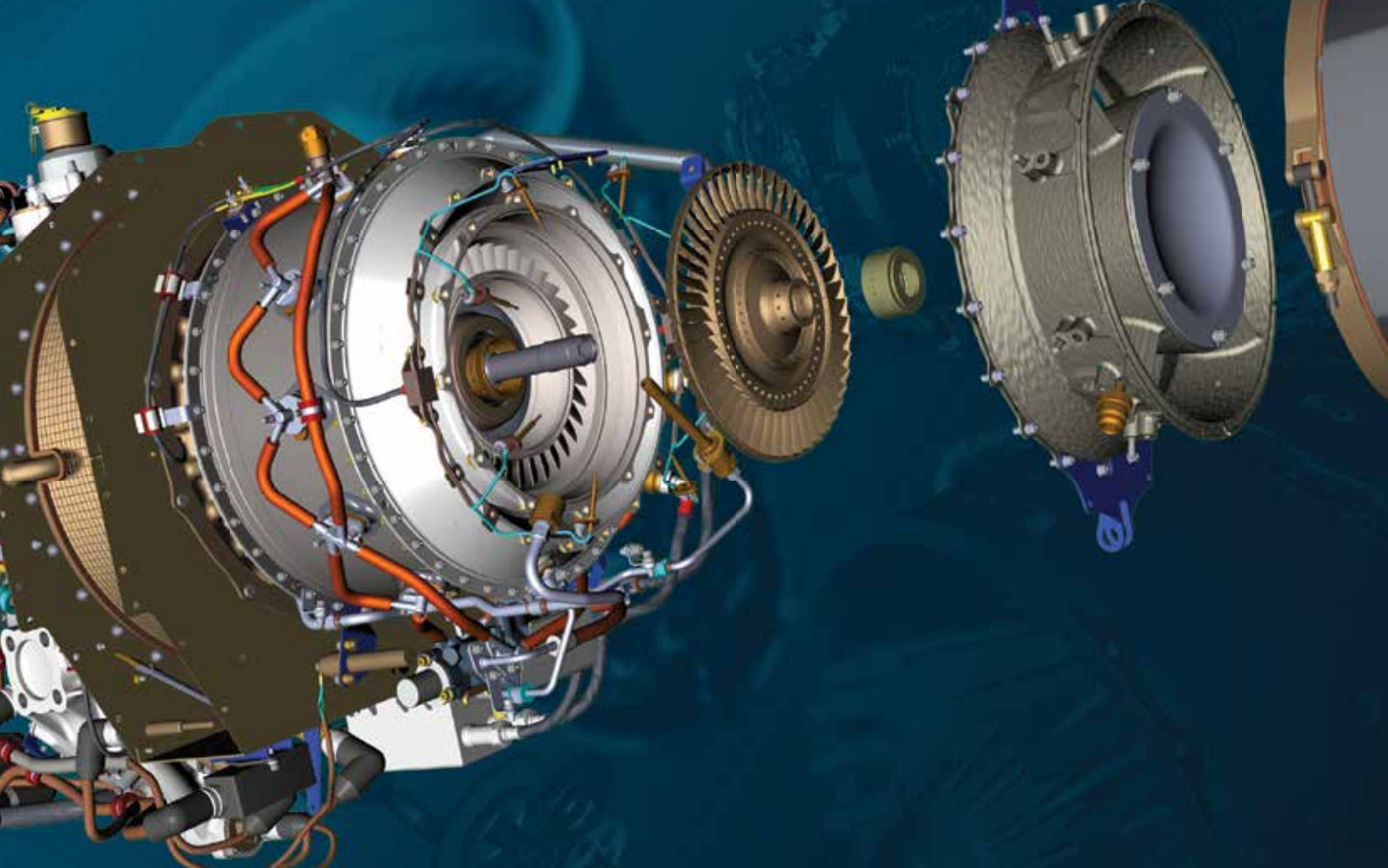
While the focus is very much on the 737-800, the company also has its legacy conversions – the Bombardier CRJ 200, Boeing 737-300, Boeing 737-400 and McDonnell Douglas MD-80 – all of which are ticking over, with five lines. Aeronaves TSM in Mexico has six CRJ on order that will allow a line to run until the end of 2023. The last MD-88 order was in March 2021 for six aircraft for USA Jet Airlines (USA JET) and he says there is an engine corrosion AD that is making customers a little wary of adding to their fleets until that is resolved. While there is strong demand for the 737-400, there is simply no feedstock.

As a result, he expects the legacy products to fade away in a few years' time. That would leave just the 737-800, so there are initial plans to look at another aircraft model to avoid dependence on a single type.

Boeing

According to Boeing's most recent Commercial Market Outlook, we anticipate the global freighter fleet (production and conversions) will grow more than 70% from 2019, amounting to 2,610 new freighter deliveries in the next two decades. Of these, 890 will be production freighters and the remaining 1,720 will be converted freighters.

Specifically for freighter conversions, it is forecasting demand for 1,720 converted freighters over the next 20 years to replace aging freighters and accommodate



ENHANCED TRAINING

PROVEN RESULTS

For 10+ years, FlightSafety International (FSI) and Pratt & Whitney Canada (P&WC) have collaborated to develop, improve, and implement cutting-edge technology for aviation maintenance professionals around the world. Together, we are now introducing virtual engine training that provides real-time, interactive animation of the engine. This allows technicians to take their skills to new heights by exploring engines down to the component level. The result—enhanced engine-specific understanding and elite performance in the sky.

Prepare to lead with FSI.

+1 201.584.8262 | [FlightSafety.com](https://www.flightsafety.com)

FlightSafety
INTERNATIONAL



Boeing has several conversion lines for the 767-300BCF including three active lines at ST Engineering in Singapore and one at GAMECO in Guangzhou. The company is planning to add additional lines at GAMECO and at ST Engineering in Guangzhou. Boeing image.

future growth. This includes 1,200 narrowbody conversions and 520 widebody conversions.

It has 13 active conversion lines for the 737-800BCF. In China there is Boeing Shanghai Aviation Services (2), Taikoo (Shandong) Aircraft Engineering (STAECO) in Jinan (6) and GAMECO Guangzhou (3), plus single lines at COOPESA in Costa Rica (1) and at Boeing's London Gatwick MRO facility in the United Kingdom.

Although the first COOPESA line opened only recently, it is already planned to add another, along with another line STAECO and two more at KF Aerospace in Canada. However, the company does not reveal production rates.

The first aircraft has just been inducted into the Gatwick facility. This will be delivered to Icelease, a Reykjavik-based leasing company by ASL Aviation Holdings (ASL). At the end of March, the company added 10 firm orders and 10 purchase rights for the 737-800BCF, taking its total orders and commitments to 40 aircraft. Some of the aircraft will also be converted at STAECO. Meanwhile, Texel Air in Bahrain, which accepted its first aircraft in January this year, has just added a further two.

At the end of April, STAECO completed its 50th conversion. The first aircraft for ICBC Leasing, it was delivered to Ethiopian Cargo. So far, a total of 75 aircraft have been converted globally.

For the 767-300BCF, it has three active conversion lines at ST Engineering in Singapore and one at GAMECO in Guangzhou, with another to be added at GAMECO and one at ST Engineering in Guangzhou.

The most recent transaction was in March, when ATSG announced that its leasing subsidiary Cargo Aircraft Management had placed a second order with Boeing for the conversion of four CAM-owned 767-300 aircraft, with an options for a further four. The conversions are scheduled to begin in late 2023.

EFW

Elbe Flugzeugwerke (EFW) has been a long-term player in the conversion market, dating back to 1996, since when it has produced over 200 Airbus A300 and A310 freighters. Now jointly owned by Airbus and ST Engineering, it is currently involved in A320, A321 and A330 P2F programs, with conversion sites in Dresden, Germany, Singapore and VT SAA in San Antonio, TX. This year, ST Engineering will open a new facility in Shanghai, China, while VT MAE in Mobile, AL, will join the program. It holds the STCs for all conversion programs.

Dresden is dedicated to the A330P2F, with six lines, while Singapore is focusing on the single aisle models. China and the U. S. will each have two lines, one for A320/321 and one for A330. The company says that, despite the recovery in passenger traffic, there is sufficient and suitable feedstock available for the three types.

By April, it had converted five A330-200P2F and 11 A330-300P2F, which have been in service since 2017, and seven A321P2F, which entered service in 2020. In March, the A320P2F received EASA STC approval. The prototype A320P2F is owned by the aviation leasing arm of ST Engineering and it will be the first of five to be leased to Vaayu Group. Delivery is

IAI to Convert Four B777-300ER Aircraft for Canada's Cargojet

Israel Aerospace Industries (IAI) has signed an agreement to carry out passenger-to-freighter (P2F) conversions for Cargojet Canada's Cargo Airline. The agreement was signed as a result of the growing global demand for cargo aircraft, and includes the conversion of 4 B777-300ER aircraft and additional options in the future.

IAI has recently signed a number of new agreements for cargo conversions, including converting B777-300ER aircraft for Emirates and establishing new conversion lines worldwide, including in Abu Dhabi, Ethiopia, and other locations around the world. This agreement with Cargojet strengthens IAI's strategy to expand its growing cargo conversion lines globally.

Cargojet is Canada's leading provider of time sensitive premium air cargo services to all major cities across North America, providing dedicated ACMI and International Charter services and carries over 25,000,000 pounds of cargo weekly. Cargojet operates its network with a fleet of thirty-one (31) aircraft and is a long-term IAI customer for aircraft conversions. Currently, IAI is converting the first B777-300ER aircraft for AerCap Cargo, who is also the co-investor on the program, in a process which is expected to finish in 2022. This is the first conversion of this model in the world.

"We have been experiencing a rise in demand for converted cargo aircraft," confirmed Boaz Levy, IAI president and CEO. "The rise in e-commerce, coupled with the COVID-19 pandemic, has resulted in cargo aircraft becoming a central player in the world of aviation. IAI has decades-long experience in aircraft cargo conversions, and combines advanced technologies with its expert production capabilities in aviation to provide the best solution on the market. Cargojet's selection of IAI to carry out the B777-300ER aircraft conversions is a testament to the trust and customer satisfaction in IAI's conversion process and in the final product, and we thank Cargojet for the trust they have placed in us."

"IAI is an important aviation partner and the B777-300ER



conversions supports Cargojet's international expansion and further strengthens the relationship between our two companies," said Paul Rinaldo, Cargojet's senior vice president maintenance and engineering.

expected in 2Q22 on sub-lease to Astral Aviation, based in Nairobi, Kenya.

In March, it signed a major deal with ATSG for 29 A330P2F. The conversions will run from mid-2023 through 2027, mainly at EFW's facility in Dresden, Germany, but also in Shanghai and Mobile.

Mike Berger, CCO of ATSG, said: "The A330-300 passenger-to-freighter conversion is a natural next step for ATSG as it is an excellent complement to the Boeing 767-300 medium wide-body freighter, which has long been the freighter of choice for the e-commerce air cargo market. The customer response to the news that we will have A330-300 freighters available for lease has been exceptionally strong, and we already have customer deposits toward future leases for half of these 29 converted freighters."

In February, CDB Aviation added 12 A330P2F aircraft, taking its commitment

to 14 aircraft. Two months later, the first converted A330-300P2F was handed over on lease to Mexico-based mas. As the airline already operates an A330-200P2F leased from Altavair, delivered in January, it becomes the first to operate both types. The A330-300P2F will be operated mainly on routes to Europe, while the A330-200P2F will be operated on new scheduled routes to China, which will start before the end of the 1H22.

Such is demand that EFW is planning to increase production to 60 aircraft by the end of 2024, consisting of 31 A320/A321P2F and 29 A330P2F and it expects these types in future to dominate in both the narrowbody and widebody sectors. It does acknowledge that the pandemic has affected the supply chain, trained manpower and availability of hangar slots but says its global network gives it flexibility to cope with the situation.



Mammoth image.

Mammoth

A new entrant in the widebody sector is Mammoth Freighters. Set up in 2021 by industry veterans Bill Wagner and Bill Tarpley and backed by private investment funds managed by Fortress Investment Group, it has ten ex-Delta Boeing 777-200LRs as its initial feedstock. With a Boeing data licence, it also plans to convert 777-300ERs as well.

In September last year, it entered into a strategic partnership with GDC Technics to use the latter's 840,000ft² facility at Alliance Airport in Fort Worth, TX, which has six widebody hangar bays and, in November, it announced that Cargojet Airways of Canada had become the launch customer with the signing of a sales agreement for two 777-200LRMF freighters, plus options for a further two -200LRMFs and two -300ERMFs.

Brian McCarthy, vice President marketing and sales, says the U. S. MRO industry is facing challenges with finding skilled labour, while wages are increasing, and GDC seemed a good choice of base, being in the middle of the country and well established. Eventually, up to 400 people could be employed at Mammoth, as the cargo doors and surround structures will also be built on site, ensuring tight control of the supply chain.

The plan is ramp up to four conversion lines in Fort Worth. After certification, two additional lines will be established at another North American facility. This should be followed by a facility in the Asia Pacific region and another in Europe or the Middle East.

He says selection of the 777 was not so much to do with dropping values as there being plenty of feedstock available. There have been plenty of lease returns, unrelated to problems caused by the pandemic, with many more to come – he reckons there are around 100 in the

desert. While the situation has been helped by some -300s being parked a bit prematurely, he thinks this will tighten up eventually. Mammoth has enough feedstock until 2026, as does the industry as a whole.

The main reason for so much availability is the extreme cost of refurbishing the cabins. Transitioning an aircraft to a new customer can cost up to \$15 million with upgrading IFE, introducing connectivity and in-seat power.

He says those people who moved quickly when they heard about the project and reserved slots are going to be the leaders in this fleet type.

At the moment, the tooling is arriving at Fort Worth to support the prototype aircraft (MSN 29742) during the conversion process. He says the company is less focused on the "ceremonial metal cutting ceremony" than on getting the interior prepared. It should look like a freighter at the end of 3Q22, when it will be presented to the FAA. Entry into serviced is predicted by Cargojet to be in late 2023 or early 2024.

Interest is coming from a wide range of operators. He points out that, for narrowbody conversions, people will wait patiently up to two years but, for widebody conversions, they tend to play a longer game, unless they are acquiring a large number of aircraft. This partly due to the amount of planning required to get such an aircraft into service, so the interest level extends to three to three and a half years. That means sales efforts are concentrated on slots in 2026.

With four lines at Fort Worth and three additional sites running two lines, production levels should be four aircraft per year per line. There will be a "bow wave" for the next few years before it settles down to a more normal level.


He comments that while plenty of

parked aircraft is good for conversion feedstock, it is bad if they are parked too early. The burden of looking after aircraft in storage to the highest OEM technical standards is labour intensive and very expensive and will work for several years. However, longer than that, there will be deterioration and the cost of return to service is very high.

He adds that there is a possibility that operators waiting for new aircraft deliveries may postpone release or retirement of 777s until they get a clear picture of orders or, at the very least, a realignment of promised deliveries.

There are two widebody markets. The 777-300LRMF is ideally suited for the e-commerce and integrator industry because of its cargo density and payload. For governments, logistic companies and general cargo haulers, he feels that that there is a movement where nobody wants to get caught short of lift again, as happened in the pandemic, with the loss of billions of dollars. Having found themselves unable to get their products to market at a fair price, they are no longer willing to leave it to the airlines. They want to create relationships where they have a high degree of control over the aircraft.

This is perfectly illustrated by an agreement between DHL and Cargojet signed in March. Cargojet will provide ACMI, CMI, charter, and aircraft dry lease services to DHL's international requirements for Europe and North, South, Central and Latin America, as well as Asia. The airline already utilizes 12 freighters to service DHL's current requirements but will add five 767 freighters during the 2022-23. DHL intends to be Cargojet's inaugural launch customer for the 777-200LRMF.

McCarthy says long range, high-capacity freighters with new generation engines with reduced fuel burn are the future, removing older gas guzzlers. 

Cabin Air Quality Monitored on every flight

Teledyne ACES™, Aircraft Cabin Environment Sensor, is a complete and autonomous solution to efficiently monitor and measure the air quality in the cabin and flight deck. The system provides comprehensive environmental data so aircraft operators can continuously verify the air quality in the airplane, identify potential emerging issues, and ultimately deliver the safe cabin environment that crew and passengers expect.





MROs SHARPEN DIGITAL TOOLS AS COVID YIELDS TO NEW CHALLENGES

James T. McKenna

Maintenance, repair and overhaul (MRO) outfits are honing digital capabilities to capture Covid's lessons learned just as new problems challenge their ability to prosper.

Easing now are disease-related fears and restrictions that since 2020 depressed demand for air travel and MRO services that support it. Rising is the number of people who can fly without wearing masks or

proving they are free of Covid. From Albania to Zimbabwe, dozens of countries have lifted travel constraints.

That fueled flight hours, a key MRO demand driver. According to the latest MRO forecast, narrow-body aircraft on average flew 7.3 hours each day this year (through late April) and wide-bodies averaged 10.8. That's 92 and 94 percent of 2019's rate, respectively.

"The good news is we have a very tangible recovery under way," said Airlines

for America Chief Economist John Heimlich; the group represents leading U.S. airlines. "Covid seems to be legitimately behind us."

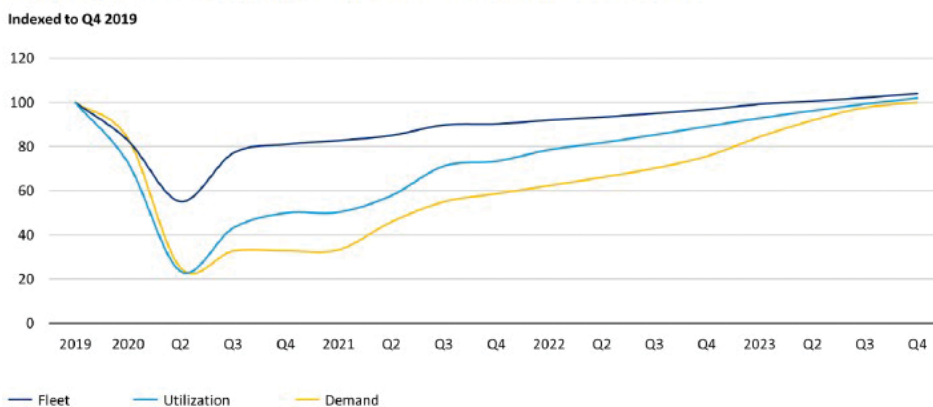
But headwinds abound — inflation at a 40-year high, rising interest rates, a depleted pool of skilled aviation labor and



John Heimlich
Airlines for America



Exhibit 13: Fleet, utilization, and demand recovery curves, 2019-2024



Source: Cirium Fleets Analyzer, Aviation Week Intelligence Network Fleet & Data Services, Oliver Wyman analysis

Recovery curves are trending up faster than many predicted after two years of pandemic chaos. Most are hopeful the worst is in the rear view mirror, even as Covid surges are being reported in various areas around the world.

intensifying geopolitical instability. Russia's February invasion of Ukraine jacked up tensions and inflation. "It's really a matter of the ability of our revenue recovery to keep up with cost escalation," Heimlich said.

In addition, MROs face high expectations to reduce their environmental impact and guard against cyber threats.

Fleet Facts

MROs have spent the last two years revamping operations to counter Covid challenges that included thousands of aircraft parked or retired, revenue streams disrupted, supply chains broken and operations being run remotely.

Many MROs' responses involved new or expanded digital capabilities, from software supporting maintenance planning, artificial

intelligence-enabled inspection techniques, and remote and collaborative inspection.

"A year ago, when in retrospect we correctly thought the worst of Covid was behind us, a lot of companies began preparing for the future, asking what it will look like," said Alex Youngs, director of Sales and Marketing Business Intelligence for Airlines and Fleets at StandardAero, the large



Alex Youngs
StandardAero

independent MRO. "People started to say, 'Digitalization needs be part of my go-forward strategy,' both from an airline and an MRO perspective. Covid forced a lot of companies to reassess how quickly they were going to embrace some of these new technologies."

Global consultancy Oliver Wyman's annual outlook, "Global Fleet and MRO Market Forecast 2022-2032," sums up what the industry faces.

"Covid took its bite," said Brian Prentice, global lead for Operations, Manufacturing, and MRO for the firm. By 2032, global MRO spending should reach \$126 billion, up from \$79 billion this year. "That's back to where it used to be before Covid." But it would be \$160 billion short of the firm's pre-Covid, 2020 forecast.

On January 1, the report notes, the world's airliner fleet was the size of 2017's fleet. It is not expected to top its January



Brian Prentice
Oliver Wyman



Lufthansa Technik's AVIATAR is a platform for digital products and services from predictive maintenance to automated fulfilment solutions. The company says AVIATAR combines fleet management, data science and engineering expertise to provide a wide selection of integrated digital services and products. Lufthansa Technik image.

2020 apex of almost 28,000 until 2023's first half. The fleet should grow from about 25,580 now to nearly 38,200 in a decade, with the North American fleet growing from 7,762 to about 9,600 — still one percent short of pre-Covid size.

Driving this fleet growth would be a push by manufacturers to increase production, Prentice said. By mid-decade, production should exceed 2018's peak, with narrow-bodies growing from 58 to 64 percent of the world fleet by 2032.

As airlines pursue younger, more efficient fleets, Prentice said, more than 40 percent of the North American fleet will be retired. By 2032, 80 percent of new North American narrow-bodies will be sustainable-generation aircraft.

A fleet in transition is redefining the MRO market, the forecast says, with higher retirements of aircraft due to enter intensive maintenance. Demand should recover to pre-Covid levels by 2024, but growth after 2027 would be 2.8 percent annually.

Slower growth won't occur everywhere, Oliver Wyman says. MRO demand for the active China-based fleet exceeded pre-pandemic levels by 2021's end. But demand in Western Europe likely won't recover until 2025.

Oliver Wyman also released its annual MRO survey of 150-plus senior executives. Eighty-five percent said finding workers was their biggest headache. "Already labor shortages are causing delays and flight cancellations," Prentice said, "and that squeeze is expected to get tighter."

Their second biggest concern is inflation.

Sustainability Soars

A new concern was sustainability imperatives. Many executives were unsure how these would affect their business, Prentice said. But almost all "recognized sustainability as a top priority moving forward" to meet reduction commitments, curb public ire over climate change, and avoid more regulation.

"The next few years are pivotal as Covid, economic forces, traveler sentiment, and government policies compel the industry to re-imagine its future," Prentice and Oliver Wyman Senior VP/General Manager Anthony DiNota wrote in the forecast.

Current challenges may overcome the reluctance some aircraft operators and MROs feel to move on from paper-based systems and clunky, in-house electronic solutions based on Microsoft Excel and Access, according to numerous executives.



Why do airlines and MROs need to invest in digital transformation?

[Download the white paper](#)

ifs.biz/avi_transformation

ifs.com



"I think we are on the cusp of airlines now saying of digital capabilities, 'This should be general practice,' rather than, 'Convince us to do this,' said StandardAero's Youngs.

Today's predicament may spur MROs to re-think Lean philosophy and practices that have underpinned industrial operations for decades.

Supply Chain Sputters

"There's tremendous supply chain pressure," said Matt Medley, Aerospace & Defense Manufacturing industry director at IFS, which develops and delivers enterprise software to maintenance operations worldwide. "There are chip shortages. Oil is hard to come by. Shipping is a nightmare. The traditional Lean philosophy of not carrying any inventory is not always the best when you don't have the most stable supply chain."

Southwest Airlines is among those digitally transforming MRO operations and moving away from paper. It has deployed

IFS solutions as the enterprise maintenance management standard to help optimize aircraft reliability and availability. In addition, the transformation is improving compliance "by



Landon Nitschke
Southwest Airlines

providing real-time validation at the point of maintenance," said Landon Nitschke, Southwest Airlines senior vice president, Technical Operations.

The IFS product is live across Southwest's fleet of almost 730 aircraft. It provides Southwest maintenance with information to streamline configuration control and compliance management processes and helps drive efficiencies and automation of processes enabled with a mobile user experience.

"IFS gives us the peace of mind and control we need to not only maximize the airtime of our fleet but deliver" on-time flights and a great travel experience for customers, Nitschke said. He called the change "the largest single MRO system migration in the history of our industry."

Southwest joins IFS airline customers that include Air France-KLM Group, China Airlines, and Qantas.

Medley and others said good information technology is among the best ways to extract efficiency from MRO operations

while adjusting to Lean's newly emphasized shortcomings.

"There's been more and more cost pressure on airlines" and by extension MROs, said Elliot Margul, maintenance planning

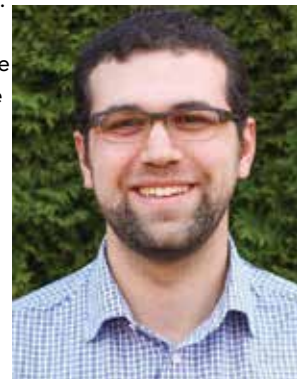


Matt Medley
IFS

software company Aerostrat's co-founder and CEO. "The future for them is to continue to run as lean as possible. One of the best ways to do that is IT tools."

Margul started Seattle-based Aerostrat with co-founders Cody Morris and Frankie Angai in 2015 after working in heavy maintenance planning and Maintenance & Engineering finance for Alaska Airlines. He found the tools available insufficient for planning maintenance tasks. They did not provide enough functionality to properly forecast and budget an aircraft's visits years into the future.

A proper plan needed to take in details, time requirements, and costs that can vary significantly airframe to airframe due to individual characteristics (such as corrosion tendencies



Elliot Margul
Aerostrat

and past repairs). "If an airline has an aircraft program that's in C1 through C8 inspections, each aircraft has different lower-level tasks," Margul said. "One C1 might take 20 days, one might take 27 days."

Aerros is a secure, Cloud-based planning tool that helps customers manage such complexities. It enables detailed planning of individual tasks over the aircraft's entire life all while maintaining a database of past work done. Aerros is designed to help manage factors such as timing and task requirements of airworthiness directives, service bulletins, engineering change orders, access overlaps, as well as labor staffing and skill requirements of future tasks.

A key benefit is Aerros' ability to help maintenance planners understand consequences of decisions made today. "When you're inducting an aircraft in a couple of weeks, all the decisions you're making today affect you down the road,"

Margul said. "If I decide to push tasks out because of budgetary reasons, how does that affect me a year, four years from now?"

Aerostrat is adding collaboration tools to support working remotely or with people in different locations. It has added a commenting section, and is working on integrating Aerros with Microsoft Teams. "Our priority is collaboration," Margul said. "That's becoming the new normal."

Aerostrat's customers include Alaska and sister carrier Horizon Air, FedEx Express and JetBlue.

Tech = Efficiencies

"MROs are very aware of digitization's benefits," said Adam Frost, product manager at OASES. "Most have ambitious targets to get it done." He, Margul, and others said the challenge for IT providers is to meet MROs' need with minimal disruption. "We have an opportunity to make huge improvements to efficiencies with fully digital processes."

As customers worked at reduced capacity during the pandemic, OASES accelerated development of its use of the Cloud, implementing it for 20 new and migrated customers. It is preparing to launch a Maintenance Control feature focused on short-term planning that will "provide a clear view of the current maintenance situation, allowing our users to react appropriately to defects and scheduling changes," Frost said.

OASES this year signed contracts with Estonia's Skystream Airlines, start-up AirConnect of Romania, and Bulgaria's Holiday Europe.

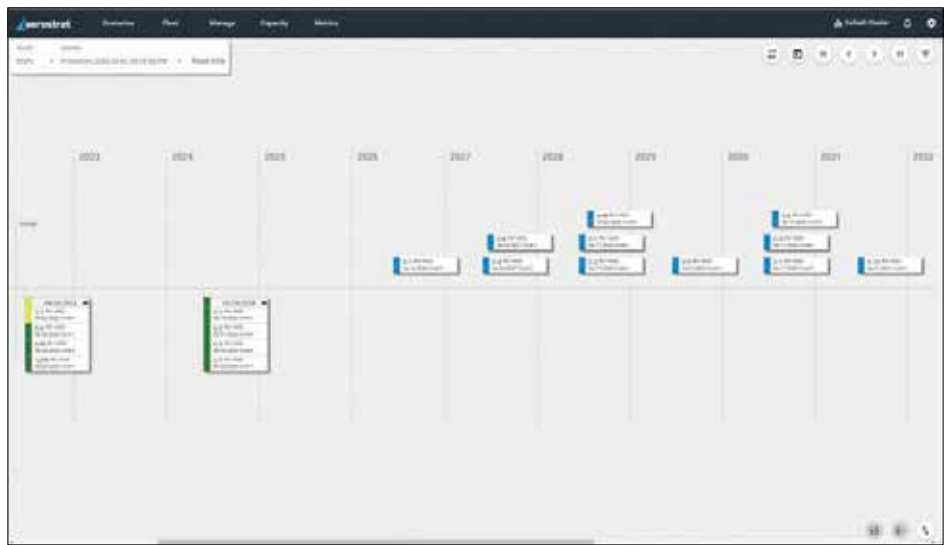
Numerous MROs and vendors seek to analyze maintenance data through artificial intelligence. Drones are one vehicle for doing that. Among those working on using drones



Adam Frost
OASES

to speed and supplement visual airframe inspections are AAR Corp., Korean Air, and LATAM.

Lufthansa Technik recently concluded a three-year project to explore using AI-enabled drones in base maintenance. Base mechanics must examine an aircraft's outer skin in a crouched or crawling position, secured by harnesses to stay



Aerostrat says a key benefit of its heavy maintenance scheduler, Aerros, is the ability to help maintenance planners understand the consequences of decisions made today. For example, if an airline pushed tasks out due to budgetary reasons, the product helps show how that will affect maintenance a year from now or four years from now. Aerostrat image.

safe at great heights. "What if this process could be performed by inspection drones that eliminate poor ergonomics and ensure job safety and digital data output?" said Jan-Christopher Knufinke, the MRO's Lean innovation manager.

Researchers set out to verify whether visual inspections for damage or irregularities could be optimized with an autonomous drone flying about 3.3 feet (one meter) from an airliner.



Jan-Christopher Knufinke
Lufthansa Technik

Tests showed that a drone with automatic collision-avoidance/obstacle detection and an HD camera could capture high-resolution images of damage as small as 0.2 inch (5 mm) square.

"Implementation cannot be accomplished overnight," Knufinke said. Infrastructure adjustments must be made, including 3D imaging of hangar infrastructure, aircraft and ground support equipment, to enable the drone to fly safely inside. Legal requirements must be addressed. "The next step will be to identify further use cases."

Connected Aircraft Will Transform MRO

Others are using advanced systems to streamline inspections.

Safran Landing Systems and ATR have developed a landing gear diagnostics service using state-of-the-art data analysis to optimize the regional turboprop manufacturer's response times after hard



Safran Landing Systems and ATR have developed Smart Lander, a landing gear diagnostics service using data analysis that reduces diagnostic time from 10-20 working days to less than one hour. ATR image.

landings. Smart Lander draws on hundreds of thousands of hard-landing simulations to recommend maintenance actions to operators based on a landing's hardness and the landing gear load level sustained. The process takes less than an hour.

"Our former process could take up to 10 to 20 working days," said ATR Customer Support and Services Senior Vice-President David Brigante, and required analyses by ATR and Safran before the aircraft could return to service.

In March, Structural Monitoring Systems won FAA supplemental type certificate (STC) approval for a system that allows expedited structural crack inspections. It has been working with Delta Airlines to prove out its

Comparative Vacuum Monitor (CVM) sensor technology. The test case was crack inspections around the Gogo Wi-Fi antenna atop a Boeing 737-800.



David Brigante
ATR

CVM uses vacuum and differential pressures to detect a skin crack surface by cycling air through a sensor and measuring whether

outflow matches or exceeds inflow. Dave Thompson, Delta TechOps vice president for engineering, quality and safety, said the CVM system can be installed within a day and allows mechanics "to do this inspection in an hour, compared to a full day and a hangar visit."

Digital capabilities will benefit from more communications-capable airliners entering service. Oliver Wyman says new-generation aircraft of the 2010s made up two percent of the world fleet in 2019. By 2032, they should be 51 percent of the fleet.

"Connected aircraft will digitally transform the way airlines operate." Inmarsat Aviation's senior vice president of technology, Kurt Weidemeyer says. And MROs, too. **AM**



Dave Thompson
Delta TechOps



Kurt Weidemeyer
Inmarsat Aviation



ULTRAMAIN[®]

Digital MRO Solutions

SimpleMobilePaperless

SAFETY COATINGS ON PROPELLERS

REALLY NEED TO STAND OUT



This is an industry that goes to such extreme (and vital) safety efforts; from aircraft ground de-icing to lighted and marked runways; from radio altimeters to regularly scheduled 'A' – 'D' maintenance checks; from traffic advisory systems to terrain altering ones; and even pre-flight checklists, exterior walkaround inspections and weather forecasting. Some planes are now equipped with onboard airframe parachute systems – not for the pilot or passengers – for the plane itself. In essence, the industry has always focused on the fact that there can't be enough

effort, attention and technology devoted to safety.

Then why is it, almost annually, there are severe injuries and fatalities from propeller strikes to individuals caught up in an aircraft's flightline?

- In 2019 a Florida woman lost her right hand and two toes when a propeller blade hit her as she was helping prepare for a take-off.
- That same year a Louisiana woman was seriously injured when she walked into an air-plane propeller at a small airport at night.
- In 2018 a Cleveland-based pilot was killed by an airplane propeller when he was stuck in the head.

And it's not just passengers or the

unknowing public. Since the 1990s, the United States Department of Labor's Occupational Safety and Health Administration (OSHA) has tracked more than a dozen severe flightline injuries/fatalities by aviation maintenance personnel.

According to the Aircraft Owners and Pilots Association (AOPA) Air Safety Institute, injuries or fatalities related to crew, ground personnel, passengers, or bystanders walking into a turning prop are reported almost every year. Fortunately, adhering to proper safety precautions can easily prevent these incidents. Here are several safety considerations to ensure greater propeller safety on the ramp:



Chris R. Lynch

In real estate it's the three most important words: Location. Location. Location. In aviation – it's a similar pattern: Safety. Safety. Safety.

- Always treat the propeller as if the ignition is on.
- Never attempt to load or unload an airplane with the engine running.
- Make sure your passengers understand areas to avoid.

"Safety should be a main concern for everyone in the industry, not just pilots and operators. I particularly believe that it's the duty and obligation of those on the MRO side to make sure their customers know that products such as AfterGlo coatings and other safety enhancing upgrades are available for their aircraft (and helicopters)" according to Dave Coleman, president, Coleman Jet Solutions, and a former executive with Duncan Aviation, one of the largest

MROs in North America.

Even if the customer declines to apply it, there is value in the conversation you are having with your customer regarding the benefits of the product. At the end of the day, we want our customers and their passengers to be safe and come back and do business with us. Ironically, it's an opportunity for the MRO to generate additional revenue by suggesting and applying safety propeller coatings."

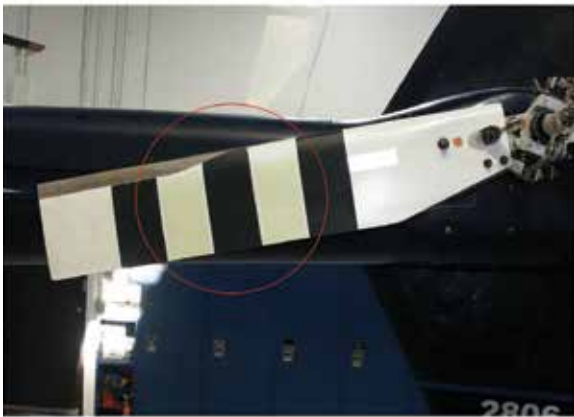
And he should know. Growing up in an aviation family, Coleman related how his father told a story that in the 1970s one of his employees was severely injured by a rotating propeller while on the job. Coleman was repeatedly instructed by

his father to be alert on the flightline — and to this day is cautious around propellers. Coleman became exposed to the AfterGlo safety coating (a Photoluminescent Paint System) when working on his own plane, a restored 1982 Piper Turbo Seminole. Utilizing the capacity at Duncan, he was able get his aircraft's exterior painted between other Duncan projects.

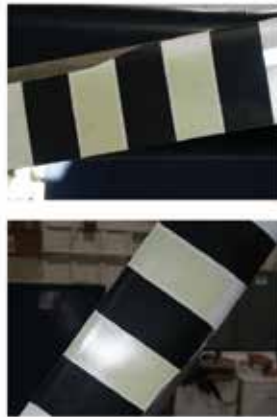
He was trying out a new SKYscapes Next Gen basecoat/clearcoat system from Sherwin-Williams Aerospace, when he was reviewing one of the brand's catalogues in the 'Defense Coatings' sections. There he saw the availability of the safety coating AfterGlo system, originally commissioned by the U.S.



Sailors direct an E-2D Advanced Hawkeye assigned to the Black Eagles of Carrier Airborne Early Warning Squadron (VAW) 113 on the flight deck aboard Nimitz-class aircraft carrier USS Carl Vinson (CVN 70), Sept. 11, 2021 in the South China Sea. Seen on the propellers above is Sherwin-Williams AfterGlo photoluminescent paint. U.S. Navy photo by Mass Communication Specialist 3rd Class Jeff D. Kempton.



The Sherwin-Williams photoluminescent paint AfterGlo has been applied to helicopter main and tail rotors to increase their visibility, especially in low-light situations. DHi Images.



Navy through Defense Holdings, Inc. (DHi). DHi partnered with Sherwin-Williams to develop the paint that could be applied to propeller tips. The Navy wanted it for use on aircraft carriers, where it would illuminate prop tips and give the visibility needed to prevent personnel from inadvertently walking into a moving prop.

The Navy converted all its E-2/C-2 aircraft to this propeller paint scheme in 2008 following near-ly five years of successful research, development, and testing. The aerospace-grade photoluminescent (PL) paint is applied to the blades and blade tips

of helicopter main and tail rotors and aircraft propeller blades to aid personnel in avoiding injury or death, particularly in low-light situations.

The initial application of this paint was on the Navy's E-2C/D carrier-based aircraft to help save the lives of men and women who must work at night in the vicinity of rapidly spinning propeller blades on aircraft carrier flight decks. The PL paint is required for use on U.S. Navy aircraft as well as the aircraft in numerous foreign militaries. In addition to the work with the U.S. Navy and Hartzell Propeller (the latter which in 2010 signed the first agreement with DHi approving the PL paint on its propellers), the paint has been applied to helicopter main and tail rotors and DHi is in discussions with several OEMs, fixed-wing aircraft builders, propeller manufacturers and MRO's regarding adoption of the paint for their aircraft and propellers.

The AfterGlo solution combines a revolutionary, long-lasting, ultra-bright, non-radioactive PL material with a high-quality aerospace coating to dramatically improve propeller blade visibility under all lighting conditions. The application maximizes visibility, material adhesion, durability, wear

resistance and ease of installation without compromising propeller/rotor aerodynamic performance or aircraft detection. It is also compatible with Night Vision Devices.

"The phosphors in the paint absorb a broad spectrum of UV energy (200nm to 450 nm) from natural and artificial sources of light, which charges the electrons in the orbital structure; causing them to emit photons," explained Richard Martin, DHI's president and CEO. "The material will then recharge itself and will do so for years. 'Pursue the minimization of propeller strikes'; that's the actual statement of work from the Navy when looking to have this paint system developed," added Martin. "My understanding is that the long-term effectiveness of it is such that in the dozen or so years we've provided this to the Navy, there hasn't been one fatality, or even serious injury that we've heard of, recorded on a flight deck."

AfterGlo is not a difficult process to apply — in fact it comes complete in kit form and oftentimes Naval personnel simply apply it to the propeller tips of aircraft when they are hangered or on the flight deck.

"We're honored to work with DHI on such a significant aviation safety initiative," said Julie Voisin, global product manager at Sherwin-Williams Aerospace Coatings. "The coating system was originally designed for improved visual acuity of stationary and rotating objects in night and low-light operations. In addition to propeller blades, it can also be used for plane dock doors, tie-down chains (so people don't trip), winglets and even wheel chocks. We developed the paint process and manufactured the system which includes a white polyurethane basecoat, followed by the photoluminescent (PL) layer topped with a clearcoat. The three-part system also provides excellent hardness and impact resistance. It is typically applied using a high-volume, low-pressure HVLP gravity feed gun," added Voisin.

"The product is a true win-win. This is an opportunity for the MRO to serve the customer, demonstrate that they care, while also adding to the bottom-line," concluded Coleman. "It's not at an overly time-consuming or highly technical process. It also differentiates your facility from the others during the estimating process — because you can't put a price on safety." **AM**



AfterGlo combines long-lasting, ultra-bright, non-radioactive photoluminescent material with a high-quality aerospace coating to improve propeller blade visibility under all lighting conditions. Sherwin-Williams image.

AIRCRAFT COATINGS THAT PROTECT AND REFLECT

You expect your aircraft's finish to be durable and great looking. Nothing less will do.

You expect it to be protected against punishing weather, extreme temperatures, corrosion exposure and aggressive chemical and cleaning materials.

Your plane also needs to reflect and promote your brand – crisp colors, sharp Distinctness of Image – whether it's an airline livery, a corporate jet or your own personal aircraft. You can trust Sherwin-Williams Aerospace Coatings for an impression that lasts. Year after year.



SHERWIN-WILLIAMS
Aerospace Coatings

swaerospace.com/reflect



Implementing Emergency Management: The Necessity for Airline Preparedness

Addressing threats to flight is a constant challenge for airlines. In January 2022, Verizon and AT&T's 5G c-band spectrum rollouts halted flights as fears rose over 5G's interference with altimeters, the instrument used to measure a plane's height above the earth. In a statement penned by CEOs of multiple major airlines, the cell providers were warned of an impending catastrophic aviation crisis if the rollouts continued.

Threats to flight are generally clear-cut — natural disasters, mechanical malfunctions, or hijackers — but the A4A's request to stop rollouts is a reminder that new threats emerge in aerospace, as they do in any other industry. And as threats emerge, we need adequate systems and mechanisms to help prepare for and respond to them.

Aviation disasters can cost airlines millions of dollars and create irreversible reputational damage while also threatening the life of every single passenger. An airline's direct cost of a crash averages around \$9.1 million, with indirect compensation costs rising even higher if the airline is found at fault for a crash. Thus, airlines must be fully prepared to deal with any emergency and mitigate further calamities when disaster strikes. Additional costs and damages will be significantly reduced when airlines invest in comprehensive emergency management.

Aviation Disaster Family Assistance Act

In an aviation accident, an airline must evaluate a crisis and determine the cause and impact while at the same time communicating with the passengers' families. This is a complex series of workflows. Emergency response and disaster relief plans incorporating automation, connection, and management create a more efficient communication network. Under the Aviation Disaster Family Assistance Act of 1996, airlines are required to:

- Provide a toll-free telephone line for victims' families.
- Inform families of the death of family members.
- Help families travel to the accident location and provide them room and board
- List all passengers on the flight and tell families before publicizing the list.

This is an incredibly fractured process if the right communication, data management, tracking system, and response plan are not in place.

Elements of Emergency Management

One of the most crucial elements of emergency management is the need for effective internal and external communication networks. Airlines and their employees should be able to access critical data without undue delay or administrative friction. A significant issue facing airlines' emergency preparedness is a lack of coordination between airlines, airports, and personnel. Airlines must be able to disseminate information efficiently in any situation. Far too often, the airlines and their crews face barriers to effective communication, with information or correspondence failing to reach key stakeholders in a timely fashion. With so many lines of communication that appear in response to a crisis, antiquated systems can lead to errors and wasted time. Airlines need to respond to a disaster without taking time to bridge data boundaries and communication gaps while simultaneously reacting to an emergency. With the proper

emergency management, these detrimental communication gaps will no longer hinder operations.

The foundation of excellent emergency preparedness is situational awareness. Airlines can easily keep pace with current activities while automating event management 24/7 when deploying emergency management plans. There is often a lack of critical information provided to key players when disaster strikes. If safety managers do not understand precisely what to do, they will inevitably have difficulty managing the crisis. No airline member should be left out of the loop, and the entirety of an organization must receive the appropriate level of information in a timely fashion.

Airlines also need to adequately train their employees in crisis management to have a comprehensive emergency management system. An airline must be able to act swiftly and effectively from the ground up. All employees must be trained in emergency response, from operations to passenger service agents. This will ensure that response efforts holistically reflect the airline's commitment to safety while also empowering every team member to serve a purpose effectively.

Emergency preparedness mechanisms will provide tracking for passengers and crews that will significantly help abide by the Aviation Disaster Family Assistance Act. With the proper data management and visibility in place, airlines can quickly organize while informing the necessary parties. Tracking elements will provide all the information on passengers and crew involved in a crisis, denoting any specific aid required during an incident.

Inevitably, having adequate emergency preparedness will also reduce business costs. Emergency preparedness plans can help cut costs by reducing duplication of efforts and consolidating work. By implementing collaborative operations systems, havoc can be captured, reshaped, and redirected to make work more productive.

Fly High with Situational Awareness

While emergency preparedness and response platforms require investment, they provide an incredible level of security and value for both airlines and their passengers. An airline's reputation will hinge on its preparedness and response in an industry where a crisis lurks in the shadows. An emergency management system is the difference between being credited for handling a bad situation well or being blamed for an avoidable disaster. **AM**

Brad Pond serves as vice president of the transportation vertical at Juvare. He is a 21-year veteran of the WebEOC adventure. A former U. S. Navy submariner, Pond earned his BS in computer science from Limestone College and his MBA from The Citadel. Juvare is a worldwide leader in emergency preparedness and critical incident management and response technology. Juvare solutions empower corporations, academic institutions, government agencies, healthcare facilities, and volunteer organizations to leverage real-time data to manage incidents faster and more efficiently, protecting people, property, and brands.

ALBERTH AVIATION

Tools and Equipment Designed by Mechanics for Mechanics

TIRE INFLATION CAGE

now available for 42" tires



- **Safety Equipment**
- Protect Employees from injuries
- Prevent costly hangar damage
- Exceeds OSHA & military standards
- Triple safety redundant features

Online test videos

HYDRAULIC WHEEL DOLLY




optional brake dolly attachment

- Helps prevent back injuries and aircraft damage
- Low profile design eliminates clearance issues
- For wheel diameters 25-40", up to 350 lbs
- Converts to brake dolly with optional attachment

GSE | Tooling | Aircraft Parts

☆ Celebrating Our 25th Anniversary ☆

www.AlberthAviation.com
832-934-0055

FARSOUND

SOLUTIONS FUELLED BY BRAINPOWER



YOUR PROBLEM | OUR SOLUTION

We care about your problems and don't believe in one size fits all solutions.

www.farsound.com

NEW USA1000J PLUS

4MM PORTABLE JOYSTICK ARTICULATING VIDEOSCOPE



USA BORESCOPES

USA 1000J PLUS INCLUDES:

- HD 7 INCH SCREEN
- 4MM DIAMETER PROBE
- INTERCHANGEABLE 90 DEGREE TIP
- 1500MM OF WORKING LENGTH
- JOYSTICK ARTICULATION
- HEAVY DUTY STORAGE CASE



360 DEGREE ARTICULATION



SIDE VIEW TIP

TOUCH SCREEN OPERATION

4MM KIT STARTING AT **\$8995!**

931-362-3304

sales@usaborescopes.com
www.USABorescopes.com

USA BORESCOPES

Integrity Aero Service

ADVANCED AIRCRAFT COMPONENT REPAIR
Above & Beneath the Surface



Bombardier/Learjet | King Air/Beechcraft/Hawker | Dassault Falcon
Gulfstream | Cessna/Citation | Seab | Embraer



Challenger 300 / 350 Inlet Engine Mounting Ring Replacement



Technical Expertise and Quality Repairs



Aircraft Structural Repair/Custom Painting

For A.O.G. Service - Your Schedule Is Our Schedule

CONTINENTAL TESTING

Trusted Calibration Services

YOUR AVIATION CALIBRATION SPECIALISTS



- Two laboratories in Dayton, OH and Denver, CO
- Two mobile calibration labs covering much of the contiguous 48 states
- Offering superior service and repair of your equipment

CONTINENTAL TESTING
104 S. Main St. | 975 Platte River Blvd Unit M
Union, OH 45322-3358 | Brighton, CO 80601-4349
937-832-3322 | 720-841-4557

www.continentaltesting.com

MICROCRANES

THE ORIGINAL

Battery Power, Portable Hoist



22 ft. tip height.
Pick & Carry

Compacts to 30 inches

www.smartrigcranes.com

SCHWEISS DOORS

THE DOOR LEADER

HYDRAULIC - or - BIFOLD
ONE-PIECE DOORS STRAP LIFT DOORS

SCHWEISSDOORS.COM 507-426-8273

+44 2045343915
PCALDERON@AEROSPACE-MEDIA.COM

AVIATION MAINTENANCE

magazine.com



Exporting Aircraft Parts: ITARs or EARs – Choosing the Right Set of Export Regulations

Do you know the difference between the ITARs and the EARs? If you are exporting aircraft parts out of the United States, then you need to understand the difference between these two acronyms (they represent two different U.S. export legal systems).

In the last issue of Aviation Maintenance Magazine, we provided a general overview of U.S. export laws, particularly as they apply to aircraft parts. We examined the regulations coming from the Commerce, State and Treasury Departments.

This month, we examine how to distinguish Commerce Department jurisdiction from State Department jurisdiction. Many people are familiar with the ITARs (International Traffic in Arms Regulations) that are administered by the State Department's Directorate of Defense Trade Controls, and the EARs (Export Administration Regulations) that are administered by the Commerce Department's Bureau of Industry and Security; but exporters can get confused about which set of regulations applies to a specific export. Properly identifying the Department with export jurisdiction is important because the different Departments have different regulations that apply to exports.

People tend to think of the State Department as having jurisdiction over defense article exports and of the Commerce Department as having jurisdiction over all other exports. This simplistic approach might be a good place to start, but it lacks the precision that we need to accurately determine our compliance path when we export aircraft parts. An accurate determination of export jurisdiction is an important step in your export analysis, because aircraft parts will be subject to the jurisdiction of one Department or the other, but not both.

Export Jurisdiction History

The law has clarified that aircraft parts exports are subject to the jurisdiction of either Commerce Department or State Department regulations; but clearly identifying the Department with jurisdiction has been tough, in the past. It used to be the case that an exporter would need to know information that was not readily available to the public in order to ascertain export jurisdiction. This made export compliance especially difficult.

The process of simplifying the compliance path began over 15 years ago. The Bush Administration had identified exports as a priority, and the Commerce Department reached out to me as a trade association representative to ask how it could promote aircraft parts exports? I identified regulatory simplification as an important step, because many companies refused to export because the process was complicated, and they could not be certain of their compliance. I also suggested that vague and subjective language should be eliminated in the regulations. Put simply, if the U.S. Government wanted to regulate an article for export purposes, then the U.S. government should say so,

plainly. And if the U.S. Government did not know whether it wanted to regulate that good for export purposes then the U.S. Government had no business making us guess at whether the good was regulated. I even went so far as to say that there should be a positive list of ITAR-controlled articles, and that the assumption should be that if an article is not on the list, then it is not ITAR-controlled. This was a major departure from the then-current language which made exporters guess at features like original design-intent for aircraft parts in order to identify the Department with jurisdiction.

I was not sure if my suggestions would be taken seriously. They were! The Commerce Department adopted the suggestions, negotiated them with the State Department, and found ways to implement them. The aerospace staff at the Commerce Department did a tremendous job in making it easier for exporters to understand how to export aircraft parts. They knew that simplification made it much more likely that exporters would be able to successfully comply with the regulations.

The process toward simplification came to its conclusion about a decade ago, when the United States government overhauled its export laws to make it easier to identify the Department with jurisdiction. In 2013 this overhaul focused on the export regulations that affected aircraft parts. And an important element was the "positive list" that we'd requested.

Identifying the Department with Jurisdiction

First, when identifying the Department with jurisdiction you need to identify what your part is. Where it goes is of secondary importance (except for rare cases, like the special rules that apply to L-100 parts versus C-130 parts). The identity of the part (and its operating characteristics) is usually going to be the primary driver in determining the Department with export jurisdiction.

Under today's regulations the State Department has jurisdiction over a narrow set of aircraft parts exports, which can be summarized as this:

- Specially designed parts for developmental aircraft funded by the Department of Defense via contract or other funding authorization;
- Parts for the following aircraft: B-1B, B-2, B-21, F-15SE, F/A-18 E/F, EA-18G, F-22, F-35, and future variants thereof; or the F-117 or U.S. Government technology demonstrators;
- Certain rotorcraft gearboxes;
- Certain folding systems, like those for tail-booms, stabilators, rotorblades, and wings;
- Arresting gear, like tail hooks and drag chutes;
- Weapons storage and delivery systems;
- Certain flight control systems that are damage-adaptive, failure-adaptive, or threat-adaptive;
- Certain non-surface-based flight control systems, like

Want your business to take off in 2022/23?



Then we've got you covered with our leading events and publications.



8-9 November '22 | Atlanta, USA



29-30 March '23 | Munich, Germany

PUBLISHERS OF



thrust-vectoring gas ports;

- Certain radar altimeters with LPI (low probability of intercept) capabilities;
- Air-to-air refueling systems;
- Certain unmanned aerial vehicles;
- Lift fans, clutches, and roll posts for STOVL aircraft;
- Certain helmets incorporating optical sights or slewing devices;
- Certain computers designed for defense aircraft, including those that control weapons;
- Hardened systems that have been designed to withstand impact from ammunition;
- Thrust reversers for defense aircraft;
- "Classified" equipment

Each of these categories typically includes the subsidiary parts. You will note in looking at this list that the aviation equipment that remains subject to the ITARs is mostly equipment that has unique defense capabilities. Other aircraft parts are typically controlled under the Commerce Department's regulations (the EARs). There is an entire series of export commodity classification numbers (the "600 series") that is dedicated to defense parts that are regulated under the Commerce Department's regulations for

export purposes.

What this means is that the mere fact that an aircraft part is destined for a defense aircraft does not mean that it is subject to the State Department's jurisdiction! Look carefully to see whether your export is in one of the above categories, because if it is not then it may be controlled under the Commerce Department's regulations (the EARs). For example, you could be selling aircraft parts to the Indian Ministry of Defence, but those parts might be subject to the EARs and not the ITARs if they fall outside of the scope of the jurisdiction that has been retained by the State Department. So the fact that we are selling to the Indian Ministry of Defence means that we should double-check whether ITARs may apply; but there is still a good chance that the aircraft parts might fall outside of the ITARs.

Note also that there are non-aircraft parts that can be installed on aircraft, and that can be State-Department controlled under non-aircraft categories. For example, certain guidance and navigation systems can be controlled under ITAR category XII (which typically applies to "Fire Control, Laser, Imaging, and Guidance Equipment"). Thus, it important

to have a working knowledge of the entire Munitions List (the list of things to which the ITARs apply) when deciding whether your export is potentially covered under the ITARs.

Also remember that we are talking about export of aircraft parts – not complete aircraft. While many defense aircraft parts might have been removed from the ITARs, the defense aircraft on which they are installed are often still controlled under the ITARs.

Conclusion

Today, most aircraft parts are subject to the Commerce Department export regulations (the EARs). Only a fairly narrow range of aircraft parts with specific defense functions remain subject to the State Department's export regulations (the ITARs). In each case, though, it is important to follow the process for determining the compliance path, as both of these export regulatory systems include licensing provisions. Remember: if an aircraft part comes into a U. S.-based MRO from abroad, then the return to the non-U. S. customer is likely to be treated as an export that is subject to one of these regulatory systems! 



2022 MARPA CONFERENCE

NOVEMBER 2-3, 2022 IN SAN DIEGO, CALIFORNIA



Featuring Keynote Speaker

JOHN HOLMES

PRESIDENT AND CHIEF EXECUTIVE OFFICER
AAR CORP

WHY SHOULD YOU BE INTERESTED IN PMA PARTS?

MARPA Member airlines worldwide already take advantage of PMA parts on their fleets in order to achieve benefits like safety, reliability, reduced lead times, and savings in order to remain competitive. Other operators could be enjoying these same benefits. The global leasing community should look to PMA as a way to protect the value of their assets.

WHY SHOULD YOU BE INTERESTED IN THE MARPA CONFERENCE?

Take advantage of networking opportunities with regulators, manufacturers, air carriers, MROs, and more. Sign up for MARPA-facilitated member-to-member meetings and show your management your scheduled good use of time before you've even left the office. Choose concurrent workshops and educational sessions to stay current with the latest industry changes and trends, taught by FAA regulators, specialists, and industry leaders offering knowledge to help your business thrive.

- **Operators:** PMA parts are part of a solution-oriented approach, reflecting opportunities to achieve benefits like safety, reliability, availability, and savings
- **Maintenance facilities:** PMA parts can be a competitive advantage when bidding maintenance jobs
- **Manufacturers:** Your customers are there, as are opportunities for PMA parts manufacturing partnerships

WWW.PMAPARTS.ORG/ANNUALCONFERENCE

 **AEROSPACE SERVICES**
A Textron Company

















TPAerospace

SIMPLICITY **FOR THE** **WIN**



WHEELS AND BRAKES
IT'S THAT SIMPLE

TPAEROSPACE.COM



When you need us most

Your goal is to be in the air safely transporting passengers and cargo. At BAE Systems, we are doing our part to ensure that you are always ready for takeoff!

baesystems.com

BAE SYSTEMS