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The Technician Shortage Is Here

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ELECTRONIC LOGBOOKS

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APU REPAIR

NOT AUXILIARY

Q&A

WITH JEAN-MARC LENZ
CEO OF SR TECHNICS

ON GUARD

SHIFT CHANGE TRAGEDY

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COVER STORY

HELP WANTED

There is a significant shortfall of workers across the entirety of the aviation industry, including in MRO. How bad is it? What is being done to alleviate it? We take a deep dive into the mechanic shortage. Cover image shows a student training in the turbine engine lab at Embry-Riddle Aeronautical University. Embry-Riddle Aeronautical University image.



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The goal of electronic tech logs is to improve the quality of aircraft monitoring, maintenance and repair management. They aim to improve MRO with more proactive decisions based on real-time information. Are they as revolutionary as they are hyped up to be?
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No Surprises

BY JOY FINNEGAN
EDITOR-IN-CHIEF

Hardly anything surprises me about aviation anymore. But I have to say, I have been pleasantly encouraged by how quickly the airline sector has bounced back from the brink of the worst days of Covid-19. Each time I traveled in the last year, I was amazed to see how strong the load factors are and how eager everyone is to get somewhere.

The decrease in air travel that resulted in a reduction in demand for maintenance services and aircraft repairs, and led to layoffs and furloughs for many in aviation is over and we are now experiencing a shortage of people, especially aircraft mechanics. Some of those that were laid off won't be returning for various reasons.

For example, some took a package deal and fully retired. Others looked for, and found, better opportunities in other sectors. Some have said they needed more stability and would never come back to aviation due to the disruption to their finances and families. We'll see.

But this, coupled with the already-in-progress wave of retirements of both maintenance professionals, pilots and others, has left a deficit of people. According to the Aviation Technician Education Council, more than a quarter of maintenance professionals are 64 years old or older.

Airlines are stepping up hiring again across the board. In our cover story this issue, we take a look at the aviation maintenance skilled workforce shortage and what is being done to improve the situation. It isn't going to be easy. The pipeline takes a long time to fill, but it must be done. See our story, "Help Really, Really Wanted" starting on page 16.

One of the biggest challenges facing the aviation maintenance industry is the need for digitization. It should be a no-brainer. The use of digital technologies can improve efficiency, reduce costs and enhance safety in aircraft maintenance. The adoption of technologies like artificial intelligence, machine learning and predictive maintenance can help identify potential problems in aircraft before they occur, minimizing the risk of safety incidents and increasing operational efficiency.

But where to start? For one idea, take a look at our story on electronic logbooks. As our writer, James Careless, puts it, the "volume of advantages associated with migrating from paper-to digitally-based maintenance tracking may well astound you." Integrating these tech logs with airline maintenance and flight operations will provide the most up-to-date, accurate picture of what is happening with the aircraft and gives maintenance the best chance to service it properly. A win-win. That story begins on page 24.

In another feature, I had the opportunity to speak with Jean-Marc Lenz, CEO of SR Technics, recently. Lenz became CEO in September of 2019, just before the pandemic struck. I had a wide-ranging talk with him in Atlanta, Georgia, recently to learn how the company navigated the past several years and about

their big plans for the future. See my interview with this quietly confident MRO leader starting on page 38.

I also want to call your attention to our regular On Guard feature. This issue, former NTSB and FAA investigator, Jeff Guzzetti, examines what many believe is the most striking example of an airline accident caused by systemic deficiencies in maintenance and safety culture. The piece looks at Continental Express Flight 2574, an Embraer 120 Brasilia turboprop that broke up near Eagle Lake, Texas, killing the two flight crewmembers, one flight attendant, and 11 passengers. This accident helped introduce the topic of safety culture as an essential tenet in aviation safety because although there were clear missteps by certain individuals, the entirety of the events leading up to the accident were complex and multifaceted.


Failure to follow procedures, shift changes, a lack of quality control inspections, lack of equipment and poor communications were all factors in this tragic and preventable event. It is a fascinating case study and the stuff of maintenance nightmares. There is so much to learn in Guzzetti's recap of this classic case. Please read it starting on page 40, share it with your team and make it discussion starter at your next safety meeting.

For those of you who joined us in March at our Aerospace Tech Week event in Munich, thank you so much for coming and making it our best event ever. We hope you will consider coming to our next event, Aerospace Tech Week Americas, which will be held in Atlanta, Georgia, on November 14-15. Please mark your calendars and make plans now to attend.

Finally, I want to take a moment to remind everyone still here in the aviation maintenance business how critically important your work is. Even though I know you know it, it is important to hear or see it periodically and to appreciate the importance of what you do to keep the aviation industry thriving.

First and foremost, you provide an essential layer of safety. Without proper, regular maintenance checks potential issues can quickly escalate and lead to serious safety incidents. Next, in our highly regulated industry, compliance is crucial. Though rare, failure to comply with FAA regulations can result in severe penalties, including fines and the revocation of operating licenses. The work you do makes reliability possible.

Operators rely on their aircraft to meet their schedules and maintain their reputations. Regular maintenance helps to ensure that aircraft are in good working order and reduces the risk of unexpected breakdowns and delays. And one more thing: proper maintenance can actually save operators money in the long run by reducing the risk of expensive repairs due later. Identifying issues early on when they are easier to repair and less complicated saves money (not to mention lives).

Thank you for all you do. 



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AFI KLM E&M and SkyThread Lay the Foundations for Partnership in the Digital Aviation Ecosystem

AFI KLM E&M and SkyThread, a provider of a neutral industry data network applied to aviation, announce the signing of a memorandum of understanding (MoU) to perpetuate their industrial and commercial partnership around the solution for SkyThread for Parts, to be implemented on AFI KLM E&M component services pool. The result of more than a year of collaboration based on SkyThread's blockchain and aviation data expertise combined with AFI KLM E&M's leading-edge component support know-how, this innovation aims to facilitate, accelerate and secure the tracking of components from manufacturing to decommissioning.

Blockchain becomes increasingly relevant to facilitate the recording of transactions and tracking assets across an ecosystem. As it is immutable, decentralized and scalable, a private blockchain overcomes the trust barrier which is the main obstacle to a seamless and controlled exchange of data belonging to heterogeneous organizations.

SkyThread for Parts is based on a private and secure blockchain technology, where users and their stakeholders can record all events related to the life of the component: certificate of origin, shipping notes, maintenance certificates, repairs, transfer to an aircraft, ownership transfer, etc. By digitizing the tracking process and eliminating human interfaces — often a source of errors — this approach allows users to benefit from reliable data, without additional costs or validation time: they can trace the history of a part, for example, or retrieve its configuration information at any time across multiple IT silos. Developed and successfully tested in its initial version for 787 component support, for which AFI KLM E&M is one of the world's major players, SkyThread for Parts is designed to adapt to the needs of component market players.

The blockchain solution developed for SkyThread for Parts is particularly well adapted to the complexity of the aviation sector and the multiplicity of its stakeholders: airlines, OAM/OEMs, MROs, lessors, brokers, etc. This solution enables the verification of user rights at each stage. It guarantees each stakeholder the



respect of the ownership of its data, with the possibility to decide at any time when, how and with whom to share it.

This project is part of the broader approach advocated by the Independent Data Consortium for Aviation, which aims to create a collaborative ecosystem to define and rule the exchange of data between industry participants. A private blockchain allows to manage permissioned members and implement such strict and specific rules for transaction validation. According to SkyThread co-founder and CEO Mark Roboff, "our solution does not replace the legacy IT systems used by airlines, MROs, and OEMs, but rather runs in cooperation with them. SkyThread for Parts resolves the inefficiencies, waste and delays that plague commercial aviation due in large part to the challenges of manually sharing part history data between siloed systems. We are very proud to have developed this product with the unique industry expertise of AFI KLM E&M, and we look forward to deepening this collaboration."

"This partnership reflects AFI KLM E&M's long-standing commitment to innovation, especially digital innovation, for the benefit of its customers and the advancement of aviation maintenance," said Anne Brachet, executive vice president AFI KLM Engineering & Maintenance. "I am convinced that this type of collaboration is essential to deliver the efficiency and safety gains promised by data technologies to the entire aviation industry, and we are very pleased to be able to continue to explore this pioneering path with SkyThread over the coming years."

Boeing, EPCOR Sign Parts Agreement



Pictured from left to right: Franzis Schiavo, Boeing; Rob van de Graaf, EPCOR; Travis Sullivan, Boeing; Rinse van Beusekom, EPCOR; Nick van Meteren, EPCOR; Garry Snow, Boeing.

Boeing and EPCOR are extending their long-term relationship by signing a three-year parts agreement recently.

Boeing Distribution Services has been working with EPCOR since 2008, after signing a long-term license agreement on Honeywell Proprietary Parts (HPP). Boeing then used its parts and services optimization model to determine other supply chain solutions it could offer, including fasteners, standard hardware and a majority of EPCOR's chemical requirements.

The recently signed agreement means Boeing will continue delivering HPP, standard hardware and chemicals to EPCOR.

EPCOR is a wholly owned subsidiary of Air France Industries KLM Engineering & Maintenance, part of the Air France-KLM Group, holding EASA, CAAC, CAAV and FAR 145 certifications. Within the AFI KLM E&M Group, EPCOR provides MRO support for the APUs and pneumatic systems of a wide range of commercial aircraft. EPCOR is a licensed and OEM warranty approved Honeywell and Pratt & Whitney Canada (former HSPS) Auxiliary Power Unit (APU) repair center. Besides the APU capability EPCOR also maintains and overhauls air

cycle machines on several fleet, environmental control systems, starters, leading-edge flap drive units and many other pneumatic and nitrogen components installed on large commercial aircraft.

Boeing Parts & Distribution Services says they provide a simplified supply chain with platform-agnostic, integrated solutions; a comprehensive portfolio of parts, chemical, services and managed programs; and a global network with localized support.

GE Digital Partners With Aeroxchange to Digitize Commercial Parts Receiving Process

A new partnership between GE Digital and Aeroxchange seeks to transform the commercial parts receiving process. Under this agreement, GE Digital's Asset Records software will integrate with Aeroxchange's core product offerings, AeroBuy and AeroRepair. The goal of this integration is to digitize the commercial supply chain parts receiving process.

This integration enables the management of electronic material documents, and new and repaired part shipping documents. By leveraging the capabilities of both product portfolios, the integration seeks to streamline the flow and management of these critical documents, improving both efficiency and transparency.

"We're thrilled to partner with Aeroxchange to bring our leading Asset Records software to the aviation industry," said Nate Hicks, vice president of product management for GE Digital's Aviation Software business. "Our goal with this integration is to digitize the supply chain management process to help our mutual customers save time, reduce costs and improve operational efficiency."

The integration will be made possible by GE Digital's Asset Records software, which enables aerospace companies to digitize



paper records, store digital documents, package records for review, and transact digital records and asset data across the enterprise. This helps companies to optimize asset maintenance tracking, reduce downtime, and increase operational efficiency.

Albert Koszarek, president and CEO of Aeroxchange, said, "We are delighted to partner with GE Digital to provide AeroBuy and AeroRepair users the ability to automate data flow from Aeroxchange directly into their Records Management System (RMS) solution. With this new capability, GE Digital's RMS users will have access to critical part documents in advance of the part arriving, enabling pre-receiving teams to validate and stage data in their enterprise resource planning systems to help reduce receiving processing time, errors and delay-related costs."



MSN11192, an A320neo, is the 200th aircraft delivered directly from Airbus to the airline. It was produced in Airbus' Mobile, Alabama, manufacturing facility. Pictured here: Team members from Airbus and Spirit Airlines celebrate the milestone delivery in Mobile. Airbus image.

Spirit Airlines Accepts 200th Aircraft from Airbus

Spirit Airlines has commemorated the delivery of its 200th Airbus aircraft directly delivered from Airbus to the airline. The aircraft is an A320neo assembled in Mobile, Alabama.

Spirit began to transition to an all-Airbus fleet in 2004 and completed the transition in 2006. Today, the airline's fleet stands at nearly 200 A319, A320 and A321 ceo and neo aircraft obtained directly from Airbus or via lessors.

"The 200th aircraft delivery from Airbus to Spirit Airlines is not only a major milestone, but also reflects the trust they have in our products that provide the best passenger experience their customers demand combined with the cost and environmentally efficient operations the airline needs," said C. Jeffrey Knittel, president and CEO of Airbus Americas, Inc. "Spirit has one of the youngest and most fuel-efficient fleets in the U.S. thanks to the benefits offered by our A320 Family of aircraft."

The A320neo Family incorporates the latest technologies including new generation engines and Sharklets, which together deliver at least 20% fuel saving and CO2 emissions.

Whitty Elected Chairman of The Aviation Club UK



Tony Whitty, senior vice president of aircraft and engine procurement for AJW Group, has been elected as the chairman of The Aviation Club UK. Whitty will be taking over the esteemed role from Karl Brünjes, who has served as chairman for the past five years, successfully steering the club through the challenges posed by the Covid pandemic.

"I am deeply honored and privileged to have been elected as the Chairman of The Aviation Club UK," Whitty said, expressing

his delight on his appointment. "I am grateful for the opportunity to lead this prestigious organization and build on its legacy of excellence in the aviation industry."

With a wealth of experience and expertise in the aviation industry, Whitty is well-equipped to take on the role of chairman and is committed to further advancing the club's mission of fostering collaboration, knowledge sharing, and networking among aviation professionals.

The Aviation Club UK is a renowned organization that brings together aviation industry leaders, experts and enthusiasts from various sectors, including airlines, airports, manufacturers, regulators, and service providers. The Club organizes regular events, seminars and networking opportunities for its members, featuring distinguished speakers who provide insights and perspectives on the latest trends, challenges and innovations in the aviation industry.

For more information about The Aviation Club UK, including how to join, upcoming events and featured speakers, visit their website at <https://aviationclub.org.uk>.

Boeing Signs Exclusive Distribution Agreement With Ontic



Boeing signs exclusive distributor agreement with Ontic at MRO Americas in Atlanta, Georgia. Pictured from left to right: Scott Sloane, Boeing; Sheena Mitchell, Boeing; Chris Muklevicz, Ontic; and Jack Karapetyan, Ontic.

Boeing announced a distributor agreement with Ontic to support the Staverton product line. The agreement identifies Boeing Distribution (formerly Aviall) as the exclusive distributor of approximately 600 actuation and control products on a range of civil and military aircraft platforms.

"We are excited to reach an agreement with Ontic to once again offer

these products to our customers," said Travis Sullivan, vice president and general manager, distribution services. "We are in a unique position to lead in this dynamic market by leveraging Boeing's global network and platform-agnostic aftermarket capability to support various markets and platforms, along with our previous experience supporting the Staverton product line."

Boeing's distribution portfolio for Ontic also includes fuel controls, memory wheel device, interior electronic and wipers product lines, and business and general aviation (BA/GA) displays. The new, three-year agreement expands Boeing's relationship with Ontic.

"Every day, our customers across the world depend on Ontic parts to execute their operations effectively. By expanding our long-term agreement with Boeing, we are ensuring that our valued customers continue to have access to the parts they need, when they need them," said Matthew Pritchard, director of customer engagement, Ontic.

Pritchard continued, "At Ontic, we recognize the importance of quality, part availability and reduced lead times. We are confident that our partnership with Boeing will help us improve the customer experience, while we continue to focus on investing in ongoing sustainment and the seamless integration of our recent Triumph acquisition in Staverton, where these product lines are expertly managed."

True Blue Power Introduces Smallest, Lightest Lithium Main Ship Batteries for GA

True Blue Power, the first company in the world to engineer and certify lithium-ion batteries for aviation, has introduced two new, main ship batteries. The certified TB14 (13 amp-hour) and TB28-12V (26 amp-hour) lithium-ion batteries are specifically designed for smaller, fixed-wing, Part 23 aircraft. Weighing just 10 pounds, they are the company's smallest and lightest aircraft batteries.

Company officials say the introduction of the TB14 and TB28-12V has expanded the True Blue Power main ship battery product line to serve all aircraft markets. The company now has lithium-ion batteries ranging from 13

amp-hours to 60 amp-hours. The certification plan for the new TB14 and TB28-12V includes STC approval for an extensive list of aircraft models.

"True Blue Power is known as the world's market leader for lithium batteries, recognized for top quality and reliability," said Todd Winter, president and CEO of True Blue Power.

The TB14 and the TB28-12V are certified to FAA TSO C179b (Class A-4B), RTCA DO-311A, RTCA DO-160G, and RTCA DO-178C DAL A.





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FlightSafety to Supply Paramount Aviation Services B737 MAX and A320 Simulators



FlightSafety International has been selected by Paramount Aviation Services to supply commercial airline training equipment and support, including a Boeing 737 MAX and an Airbus A320 full-flight simulator (FFS).

The agreement with Paramount, a flight training provider for airline pilots, strengthens FlightSafety's commitment to provide simulators and support to the commercial aviation market.

Backed by over 70 years of industry-leading training support and experience, FlightSafety has increased its equipment presence to enhance safety for commercial operators and to help address the growing demand for new airline pilots. Paramount is FlightSafety's inaugural 737 MAX FFS partner.

"We are proud to partner with Paramount," said Nathan Speiser, FlightSafety executive vice president of sales and marketing. "This

agreement demonstrates FlightSafety's dedication to address the needs of airlines and commercial training providers. It expands our offerings within commercial aviation training, helping ensure airline pilots are not only proficient, but the best possibly prepared."

"We are helping the airlines answer the challenge of bringing highly trained pilots into the cockpit, and especially to meet the rapidly growing needs for these two aircraft models," said Stephen Vella, Paramount vice chairman. "These state-of-the-art FlightSafety simulators will further enhance Paramount's ability to accommodate our customers' strong demand for our flight training products."

The 737 MAX Level D FFS is expected to be available for training later this quarter, and will be equipped with Heads-up Displays (HUD); Aircraft Communications, Reporting and Addressing System (ACARS) and Enhanced Vision System (EVS).

The A320 Level D FFS will be delivered to Paramount's Miami International Airport location and will be ready for training in Q3 of this year. It will be equipped with New Engine Option (NEO) engines, Pratt & Whitney PW1100G, and CFM International LEAP-1A; and both Current Engine Option (CEO) engines, CFM56 and International Aero Engine V2500. It will also provide training for both the Honeywell and Thales Flight Management Systems.

Both FFS will be equipped with FlightSafety's VITAL visual systems, and backed by the company's 24/7 service and support.

"FlightSafety has dedicated itself to developing the technology, and delivering simulators and training devices that enhance aviation safety, setting up the airline industry for long-term success," Speiser added.

PIA and SkyWest Launch New National Program Offering Financial Aid and Direct Hiring Opportunity for Aspiring Aircraft Mechanics

To help fill the growing number of job openings in the field of aviation maintenance, Pittsburgh Institute of Aeronautics (PIA) and SkyWest have announced a new, elite partnership. The SkyWest AMT Pathway Program offers PIA students training in Aviation Maintenance Technology (AMT) the chance to jumpstart their career while they're still in school.

SkyWest is partnering with PIA in Pittsburgh, Youngstown, Myrtle Beach and Hagerstown. Through the SkyWest AMT Pathway Program, students can receive mentorship, hands-on experience, and a direct pathway to a career in commercial aviation. They are also eligible for up to \$7,600 in financial aid, including:

- Up to \$4,500 in education assistance.
- Up to \$1,600 in A&P test fee reimbursements.
- Up to \$1,500 in moving expense reimbursements, plus mileage.
- Guaranteed final interview to become an A&P mechanic at SkyWest.
- Enhanced SkyWest seniority for benefits like health insurance, profit-sharing programs, and travel.

To be eligible for the program, candidates must be attending PIA and be in good standing. Unlike an internship, the program allows students to remain at PIA to complete their training until they are able to gain their A&P license.

"Due to high demand for new AMTs, forward-thinking employers like SkyWest are no longer waiting for candidates to come to them. Instead, they are creating high-value educator-employer partnerships like the AMT Pathway Program to actively invest in and support talented students with



a direct route to entry-level employment," said Suzanne Markle, president and CEO of PIA.

"We are excited to be partnering with PIA and to provide more opportunities for their AMT students to get started with their aviation careers," said Joe Sigg, SkyWest VP of maintenance. "Plus, the benefits of the SkyWest AMT Pathway Program, including the financial support, make it easier for students to enter this important career field."

According to Boeing's 2022-2041 Pilot and Technician Outlook, 134,000 new mechanics and avionics professionals will need to join the field over the next 20 years to meet the growing needs of the aviation industry. Many of these openings are due to upcoming retirements, as ATEC estimates 38% of current aviation mechanics are at least 60 years of age.

To learn more about PIA's AMT program, visit <https://pia.edu/>. For related content, see feature story starting on Page 16 called "Help Really, Really Wanted" about the shortage of aviation maintenance workers.

WestJet Cargo and GTA Group Inaugurate Three 737-800 Boeing Converted Freighters



WestJet Cargo together with the GTA Group inaugurated the launch of three 737-800 Boeing converted freighters yesterday in Toronto. More celebrations are planned today in Halifax and on April 25 in Vancouver. The event marked the start of a dedicated cargo service designed to fulfill the large-scale needs of businesses, freight forwarders, shippers and individual customers across an expanding network.

WestJet Cargo and GTA's dedicated freighters will now begin operating between six stations in Halifax, Calgary, Los Angeles, Miami, Toronto and Vancouver. Integrating into WestJet Group's existing network, WestJet Cargo and GTA's dedicated freighters will work in tandem with the cargo-carrying bellies of WestJet's existing fleet of a hundred 737 aircraft and use the group's highly skilled 737 pilots. With a payload of 23 tons, the three freighters will have a weekly capacity of over 1,500 tons. Their operation will create global connectivity and open trade lanes between Canada and the Caribbean, Europe, Japan and the United States.

In addition to the broad range of commodities already carried by WestJet Cargo such as perishables, e-commerce and live animals, the dedicated freighters have enabled a broad expansion of the carrier's service offerings, including the capacity to carry oversized items and unitized e-commerce containers.

"Our incredibly talented and creative team at WestJet Cargo is eager to satisfy the demand of Canada's underserved air cargo market, by bringing competitive cost advantages, increased choice, reliable on-time performance and exemplary customer service. This launch signifies a green light to do just that, as we strive to meet the needs of Canada's expanding cargo market," said Kirsten de Bruijn, WestJet executive vice-president, cargo.



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Black Widow Helicopters Orders 12 Foresight MX HUMS



Black Widow Helicopters has announced an order for 12 shipsets of GPMS International's Foresight MX, the industry's most advanced health and usage monitoring system (HUMS). In addition, every UH-60 Black Hawk aircraft delivered through Black Widow's leading digital modernization program will be standard equipped with Foresight MX. With the agreement, Black Widow Helicopters also becomes a GPMS Certified Installer, providing a premier installation option for the growing number of Black Hawk operators around the world.

"We selected Foresight MX to provide operators the best HUMS experience possible to monitor their Black Hawks," said Alex Freidin, vice president of commercial and flight operations of Black Widow Helicopters. "Foresight reduces operating costs by monitoring aircraft and engine vibrations, and identifies trending components with an easy-to-understand user interface.

"With Foresight's advanced analytics and predictive Remaining Useful

Life capability for trending components, operators are able to mitigate unscheduled and AOG events, resulting in lower operating costs and increased aircraft availability."

According to Todd Powers, vice president of sales for GPMS, Foresight MX goes beyond HUMS. "In addition to the predictive HUMS, Black Widow UH-60 clients benefit from Foresight's touchless cellular data uploads, flight data monitoring (FDM), exceedance monitoring, automated power assurance checks, and 'one move' rotor track and balance capability.

"At just over 17 pounds installed, operators benefit from our award-winning, lightweight, integrated and future-proof technology versus typical federated and heavy legacy systems from multiple solutions and vendors. We're proud and honored to be on Black Widow Helicopters UH-60A and soon on their UH-60L Black Hawks."

Freidin added, "HUMS is a key part of the United States Forest Service roadmap and it's included in their MATOC requirement for a 'modern helicopter.' We're focused on delivering state-of-the-art Black Hawks to our clients with full-width, touch-screen glass cockpits for a superior pilot experience, and with Foresight MX HUMS as standard equipment, an exceptional experience for the maintenance and operations teams. It gives our clients the competitive advantage in an ever-increasing UH-60 Black Hawk market and more importantly, aside from the commercial and economic benefit, a massive safety enhancement."

Storm Aviation Appoints New Director at Chevron Technical Services



International line maintenance, base maintenance and training provider Storm Aviation has appointed Jacco Klerk as general manager and director to lead the integration and transformation of its recently acquired subsidiary, Chevron Technical Services & Aircraft Maintenance, into the UK group business.

Klerk said, "I am delighted to join Storm Aviation to run the Chevron operation, focusing on integrating the business and leading the base maintenance, component workshop and parts manufacturing facility. Everything we do is designed towards delivering operational excellence and exceptional service to our clients. We will deliver the necessary transformational change and continue to enhance the services we offer, including our renowned Tank Seals, AOG and MRT

support. I am already enjoying the challenge and can see significant potential and opportunities for the future."

Klerk started his aviation career at KLM as an aircraft technician and transitioned into planning with various international secondments in production engineering positions before becoming hangar production maintenance manager for the minor base maintenance and global AOG teams.

He joined Qualitair Aviation Group UK as group business development manager for interim management and strategic programs for MROs. Subsequently, he was promoted to become vice president for technology and engineering at Randstad, where he was responsible for all global aerospace OEM's workforce solutions. He also worked at Joramco as a business transformation leader in a senior MRO role in the Middle East. In recent years, he was managing director of direct maintenance, a European/African line maintenance organization.

"This is an exciting time for the Storm Group, and I'm delighted to strengthen our team with a new director with such a great track record and industry experience to manage our base maintenance, workshop and manufacturing facility," said Thomas Buckley, CEO of Storm Aviation, commented. "Jacco has worked in a range of engineering roles within the aviation industry and his appointment is integral to integrating Chevron Technical Services & Aircraft Maintenance into the wider group."

Klerk is a licensed engineer, holding a BSc Eng. Degree in industrial engineering and management and is a lean six sigma black belt and agile practitioner.



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ST Engineering, Spirit AeroSystems Sign Agreement to Target Middle East Nacelle MRO



Spirit AeroSystems president & CEO Tom Gentile, left, and ST Engineering CEO Jeffrey Lam.

Spirit AeroSystems signed an exclusive cooperation agreement with ST

Engineering's Commercial Aerospace business to support customers in select Middle Eastern countries including Qatar, UAE, Jordan, Saudi Arabia, Kuwait and Oman with aircraft engine nacelle MRO solutions.

The two companies plan to bring together their expertise and experience across various aircraft platforms to jointly market and offer competitive value propositions. The companies intend to support a significant portion of commercial aircraft variants to operators in the Middle East.

Spirit AeroSystems' expertise includes the design, build and repair of select components on the nacelles of the Boeing 737 NG/MAX, 747, 757, 777, as well as the Airbus A320ceo and A330, while ST Engineering has expertise in design, build and repair of select components on the nacelles of the Boeing 747, 767 and Airbus A330,

A320neo. ST Engineering also has MRO licenses for the Boeing 787 and Airbus A320neo LEAP engine nacelles, and MRO expertise in the A320ceo and Boeing 737 NG/MAX.

"The cooperation will allow two strong MRO players to offer one-stop, comprehensive MRO solutions for our Middle Eastern customers. We will be able to pool our resources, offer our joint MRO capacity, and coordinate with our recently announced regional partners JORAMCO and GMR to deliver best-value MRO solutions. We are excited about the potential of this long-term exclusive cooperation in the region," said Kailash Krishnaswamy, senior vice president of Spirit aftermarket services.

"By bringing together the expertise and solution suites of both companies, ST Engineering and Spirit AeroSystems can cater to much of the nacelle MRO needs of operators in the Middle East," Goh Poh Loh, executive vice president and head of component services at ST Engineering, said. Under such an arrangement, customers can have the convenience of one-stop shop services and yet enjoy a wide scope of services, which we believe is a huge value add that allows airlines to focus better on their flight operations."

Spirit says their aftermarket business continues to grow since the acquisition of select Bombardier maintenance, repair and overhaul operations in Belfast, Northern Ireland and Dallas, Texas; the acquisition of assets from Applied Aerodynamics in Dallas, Texas, USA; and the signing of a joint venture agreement with Evergreen Aviation Technologies Corporation in Taiwan.

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Safran and Lufthansa Technik Sign a License Agreement for MRO for the A320neo/LEAP-1A Nacelles



Safran Nacelles and Lufthansa Technik have today signed a license agreement for the maintenance, repair and overhaul (MRO) of Airbus A320neo's LEAP-1A nacelles. Over 2,500 nacelles produced by Safran Nacelles are currently in service on Airbus A320neo aircraft that are powered by CFM International's LEAP-1A engines.

Lufthansa Technik is becoming a member of Safran Nacelles' licensed MRO network. The company will be able to carry out warranty tasks, repairs and modifications guaranteed by Safran Nacelles, the OEM. Thus, in combination with its existing rotatable asset pool of LEAP-1A spares, Lufthansa Technik can offer its customers spare availability from OEM stock locations and MRO services. A320neo operators will benefit from Safran Nacelles and Lufthansa Technik's extensive repair experience and are assured to find a station nearby so that repair time can be shortened and the cost of logistics reduced. With this partnership, both companies will jointly ensure the highest standards in nacelle MRO for the growing fleet of Airbus A320neo.

Alain Berger, Safran Nacelles' executive vice president - customer support and services, stated: "I look forward to sharing with Lufthansa Technik our best OEM quality standards. Operators of the A320neo nacelles can therefore rest assured that they will benefit from the best repairs in an extensive network of global stations."

"We are delighted to extend our long-standing partnership with Safran Nacelles through this MRO license," said Andreas Drosdowski, vice president Aircraft Component Services at Lufthansa Technik.

"The LEAP-1A engine type represents a major part of the future of Lufthansa Technik's nacelle portfolio and the long-term commitment to providing top level spare availability and MRO services to our valued customers."



Christopher Whiteside, AJW Group and Maria Sanchez, Honeywell Aerospace shake hands after signing distribution agreement. Honeywell image.

AJW Group and Honeywell Aerospace, are expanding their worldwide sole distributor agreement for the global sales of 29 Honeywell standard-fit new avionic products for the Boeing 787 platform, to include an additional five products. AJW Group is now the sole aftermarket distributor for all Honeywell B787 mechanical and avionic line replacement units (LRUs) fitted to current/future Boeing 787 aircraft. The agreement covers initial provisioning and on-going purchasing requirements for operators and integrated service providers. The expanded distribution list covers parts ranging from inertial reference units to flight control modules, global navigation satellite systems antenna to active clearance control valves.

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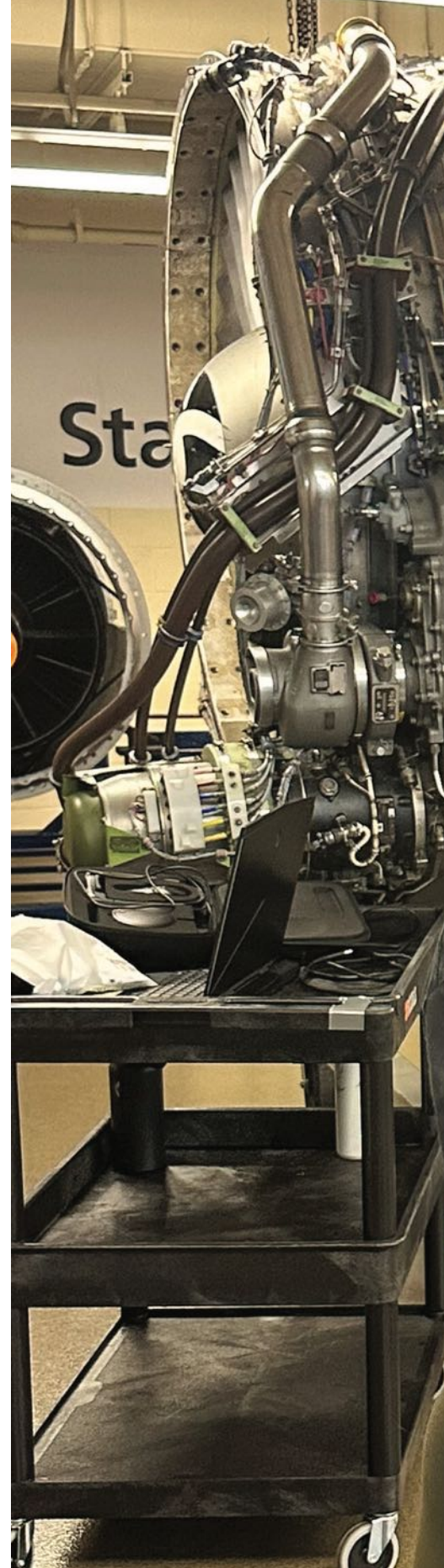
HELP REALLY, REALLY WANTED

SHORTAGE OF SKILLED TRADES DOGS AIRLINES, MROS — IS THERE A WAY OUT?

Just how serious is the shortage of skilled aviation technicians for the airline and MRO industries? According to labor experts, it's very serious, and due to get worse.

Take North America: In its January 2023 report entitled, 'Not Enough Aviation Mechanics', the management consulting firm Oliver Wyman said that, "While there were just enough to handle the maintenance, repair and overhaul (MRO) workload on the North American fleet in 2022, our latest forecast suggests that a shortfall of somewhere between 12,000 and 18,000 is likely to be the case in 2023. By 2027 — projected to be the worst year for the shortage — the bleakest scenario has the supply deficit at more than 48,000 aircraft maintenance workers, or a shortfall of about 27%."

These bleak predictions didn't come as a surprise to Oliver Wyman aviation practice partner and report co-author Derek Costanza. "We've been talking about a shortage for some time now," he told Aviation Maintenance magazine. "We predicted this shortage back in 2017 or 2018 for the middle of this decade or sooner, and now here we are." Oliver Wyman isn't alone in reporting this trend. "In a recent survey, it was cited that 77%



Oliver Wyman says diversifying the aviation maintenance workforce and valuing diversity are key steps toward solving the shortage of workers, given that Gen Z workers look for and expect diversified workforces. ERAU image.



*Dr. Larry Nulton
Nulton Aviation*





Charles Horning
ERAU



Crystal Maguire
ATEC



Armel Jezequel
Vallair



Sajedah Rustom
AJW Technique

of aviation maintenance technician schools reported a shortage of aviation mechanics and 50% of employers reported difficulty in finding qualified mechanics," said Dr. Larry Nulton, owner of Nulton Aviation, a flight training school and fixed-base operator (FBO) at the John Murtha Johnstown-Cambria County Airport in Pennsylvania. "This national trend can be observed throughout Pennsylvania as well."

"All indications are that there is a significant shortfall of technicians across the entire industry," agreed Charles Horning, director of Regulatory Compliance and Outreach at Embry-Riddle Aeronautical University in Daytona Beach, Florida. In order to attract talent to their shops, "some companies have recently increased wages as well as providing incentives for new technicians to come work for them," he said. "The competition for technicians has obviously significantly increased in the last couple of years."

There are many factors contributing to the shortage of technicians in the aviation industry. There are also many solutions available to address this shortage, according to the experts who spoke to Aviation Maintenance for this article. Here is what they told us.

Boomers Retiring, Encouraged by COVID

One major reason why the aviation industry is short of technicians is because the Baby Boomers are retiring. They are leaving the profession at a time when demand for their services is going up, thanks to the recovery of airline travel following COVID-19. Unfortunately, the remaining supply of skilled technicians is not sufficient to keep up with demand.

This retirement-based shortage has been predicted for some time by consultants such as those at Oliver Wyman. But the severity of the shortage has exceeded these predictions, due to the impact of COVID-19 on the labor market. "When the COVID-19 lockdowns happened, many mechanics and technicians left the industry," said Armel Jezequel, director general/COO at Vallair, an MRO/aircraft recycler with facilities in France and Luxembourg. "They have not returned."

According to the Aviation Technician Education Council (ATEC), about 30 percent of aircraft technicians in North America are at

or close to retirement age and they're retiring faster than they're being replaced. "The average age of an aviation mechanic is 51," said Crystal Maguire, ATEC executive director. "More than a quarter of them are older than 64 years."

Demand for Technicians is Increasing as Air Travel Grows

As Baby Boomer technicians retire, the airline industry they serviced continues to grow. Based on data from Boeing's Pilot and Technician Outlook 2022-2041 report, 610,000 new maintenance technicians will be needed to maintain the global commercial fleet over the next 20 years, to keep up with current market demand plus projected growth in global aviation travel.

"In the North American region alone, fleet growth is anticipated to be at a rate of 1.8% annually over the next decade," said Sajedah Rustom, CEO and board director at AJW Technique, an MRO based in Montreal, Canada. "This is because airline flight schedules are increasing as travelers take to the skies." At the same time, regions such as China have now opened for travel again and flights to this country are in demand, she observed. Many airlines are also expanding their fleets and mission profiles, and actioning previously neglected interior refurbishments and delayed maintenance scheduling due to COVID.

"Boeing's Pilot and Technician Outlook 2022-2041 report noted that there will be a demand for over 610,000 new maintenance technicians over the next 20 years," said Dr. Nulton. "Well, we are seeing this growing demand already occurring in Pennsylvania with an annual projected growth rate of well over 3% annually, and an estimated 455 job openings due to replacement needs and industry expansion."

ATEC's 2022 Pipeline Report paints a similarly dramatic picture. "The mechanic pipeline will need to increase production by at least 20% to meet projected workforce demand," it said. "In comparison, AMTS (aviation maintenance technical school) enrollment is growing only about 2% a year."

"The Boeing Pilot and Technician Outlook is a little narrow; it only looks at commercial fleets," ATEC's Maguire said. "As new mechanics, our students support all sectors of aviation, not just commercial."

A stylized illustration of a woman with black hair in a ponytail, wearing dark sunglasses, a purple suit, and red lips. She is standing next to a red and white striped suitcase and a red and purple bag. The background is a bright blue gradient with a faint gear pattern.

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Not Enough New Blood

The two percent/year increase in AMTS enrollments is the third factor driving the aviation technician shortage. Simply put, there's not enough new blood coming into the industry to replace the old blood going out. And, of course, the pandemic only made matters worse.

"At the height of COVID, there was a reduction in the number of aerospace technicians being trained and this shortage put pressure on the aviation supply chain," said Rustom. "This has led to longer lead times for maintenance and repairs, which in turn is affecting flight schedules."

Today, "the trend of not enough people training to be aircraft mechanics to start with is having a big impact," Jezequel added. "In addition, there are not enough training programs available globally to meet the demand for aircraft mechanics. This can be due to a lack of funding or resources, or lack of interest from potential students."

One factor depressing enrollment in AMTS programs is a widespread and long-standing public bias against "blue collar" jobs. In countries like the United States, decades of societal pressure to "send your kids to college so they can get high-paying positions" has prejudiced some parents and students against skilled careers in the trades — even though such jobs can be equally lucrative and long-lived.

"One of the greatest challenges is getting the story out that a career in aviation maintenance can be great," Horning said. "There may be some stigma to taking a blue collar/trade track, but I think a larger reason is that there is not a good understanding within the general public of what it means to be an aircraft technician and what that career path can look like."

His opinion is endorsed by Brian Prentice, another of the

Oliver Wyman report co-authors and one of its transportation practice partners. "I do think that we as an industry need to do a better job of communicating and marketing, and letting people know what a great career in aviation maintenance can be," said Prentice. "But I also think society as a whole should be focussing on what are the right paths for young workers entering the workforce. And that isn't always a four-year college degree. Sometimes that is a technical degree, and a very attractive and rewarding career in aviation maintenance."

For society to make this change, people will have to re-set some of their social status beliefs. They will also have to base more of their attitudes on facts rather than snap judgements. For instance, "we are seeing inaccurate environmental perceptions of the aviation industry is having a large impact on people not training to be aircraft mechanics," Jezequel said. "The industry is perceived as not having a 'green future' by those not already working in it, despite aviation companies working towards achieving net zero pollution levels in the next 20 years."

Tackling the Shortage Head-On

Changing the public's negative perception of aviation technician careers will require efforts by the industry and AMTS schools like. The reason? "The industry is best at showing what a technician does," said Horner. "The schools can most effectively explain how to make that happen by becoming an FAA-certified mechanic."

As far as ATEC's Maguire is concerned, an effective way to tackle the labor shortage head-on is to promote aviation technician careers to students in school. "People who just don't know about the trades in general tend to focus on getting four-year college

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The Mid-Atlantic Opportunity Park is a planned 138-acre aviation-centered development that will partner with Nulton Aviation Services to train new aviation mechanics.

degrees," she explained. "So you have to reach them in middle school to spur their interest, because most people these days are choosing their career paths before they get to high school."

This is why most of ATEC's efforts into workforce development are going into creating awareness among prospects in middle school. "We are also working to build high school programs that can partner and build pipelines into our network of FAA-certificated schools to help increase their enrollment," said Macquire. "In the United States, many AMTS have empty seats in their programs, so there is room to handle this expanded influx of students."

On the industry side, Vallair is doing its part to boost the supply of new aviation technicians. To this end, "we are partnering with aircraft academies to offer easy-to-access qualifications to employees," Jezequel said. "In line with this, we offer competitive salaries based on the specialist skill set of candidates. We also work alongside local schools and colleges to highlight the benefits of a career with Vallair in the aviation industry, showing the next generation the positives of working as an aircraft mechanic and dispelling negative perceptions of the industry."

In Pennsylvania, the planned 138-acre aviation-centered Mid-Atlantic Opportunity Park will partner with Nulton Aviation Services to train new aviation mechanics. "With nearly 304,500

total jobs linked to Pennsylvania's airport system, there is a high demand for skilled aviation mechanics, and the Laurel Highlands region also offers abundant opportunities for high-paying careers in this industry," said Dr. Nulton.

To further address the technician shortage, Saint Francis University recently expanded its existing relationship with Nulton Aviation Flight Academy, to give access to SkyWest's Elite Pilot Pathway and Aviation Maintenance Training Pathway programs. "In addition, Nulton Aviation Services is spearheading an effort to approach and get approval from the Pennsylvania Department of Education to launch six aviation CIP (Classification of Instructional Programs) codes — with one being airframe and powerframe mechanic training," he said. "Using these newly approved codes, we will be integrating the aviation curriculum into the high school curriculum, providing a strong foundation for future aviation mechanics. Collectively, these initiatives demonstrate a proactive approach to address the aviation mechanics shortage and create more opportunities for high-paying careers in aviation."

Oliver Wyman's Not Enough Aviation Mechanics report has further ideas to attract more students to AMTS and, from there, into the aviation industry. One way to do this is by re-engineering the working environments of aviation technicians to align with the



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values of Generation Z (Gen Z; people born between 1997 and 2013) job candidates.

For instance, "Diversifying the workforce and valuing diversity are steps in the right direction, given that Gen Z workers look for and expect diversified workforces," said the Oliver Wyman report. "Gen Z workers are also apt to leave a work situation where they encounter unfair pay or uneven treatment based on race or gender. The atmosphere at work is also important to these younger employees who work to live rather than live to work as their baby boomer elders did. ... The MRO industry offers few of the amenities common at companies popular with Gen Z workers, such as free snacks, comfortable break rooms, and attractive work environments. Gen Z employees expect these extras when they come to work — especially since hybrid work situations are not available in MRO."

In the same vein, the training process associated with becoming an aviation technician has to be updated to meet Gen Z demands, or they will simply avoid aviation in favor of those industries that do. To this end, "The FAA could help the industry by making some rule changes that would modernize the sector," the Oliver Wyman report said. "Revising 14 CFR Part 147, effective September 21, 2022, was a step in the right direction by removing archaic requirements from training. This was a much-needed overhaul to align curriculums with current industry standards. But the change shouldn't stop there. The FAA and the industry could also consider ways to reduce the time mechanics spend in the academic environment through the expansion of on-the-job work study where candidates can work with A&P license holders."

That's not all. To boost AMTS enrollment and graduation levels, the Oliver Wyman report calls for increased "government subsidies and free tuition programs for AMT schools with requirements that students then owe a certain amount of time on the job in the United States or North America, like the military requirements for Reserve Officers' Training Corps candidates." It also recommends allowing aviation technician candidates to apply credits earned in other trades towards their certificates where appropriate: "Amend the rules that require 18 full months of 40-hour weeks to allow candidates that put in the same hours over a shorter period to qualify to take the A&P exam", and, "Make it easier for military-trained and foreign aircraft mechanics to get certificated as A&P-licensed mechanics in the U.S. and make work visas available to them."

As well, Gen Z is a truly digital generation, so their AMTS

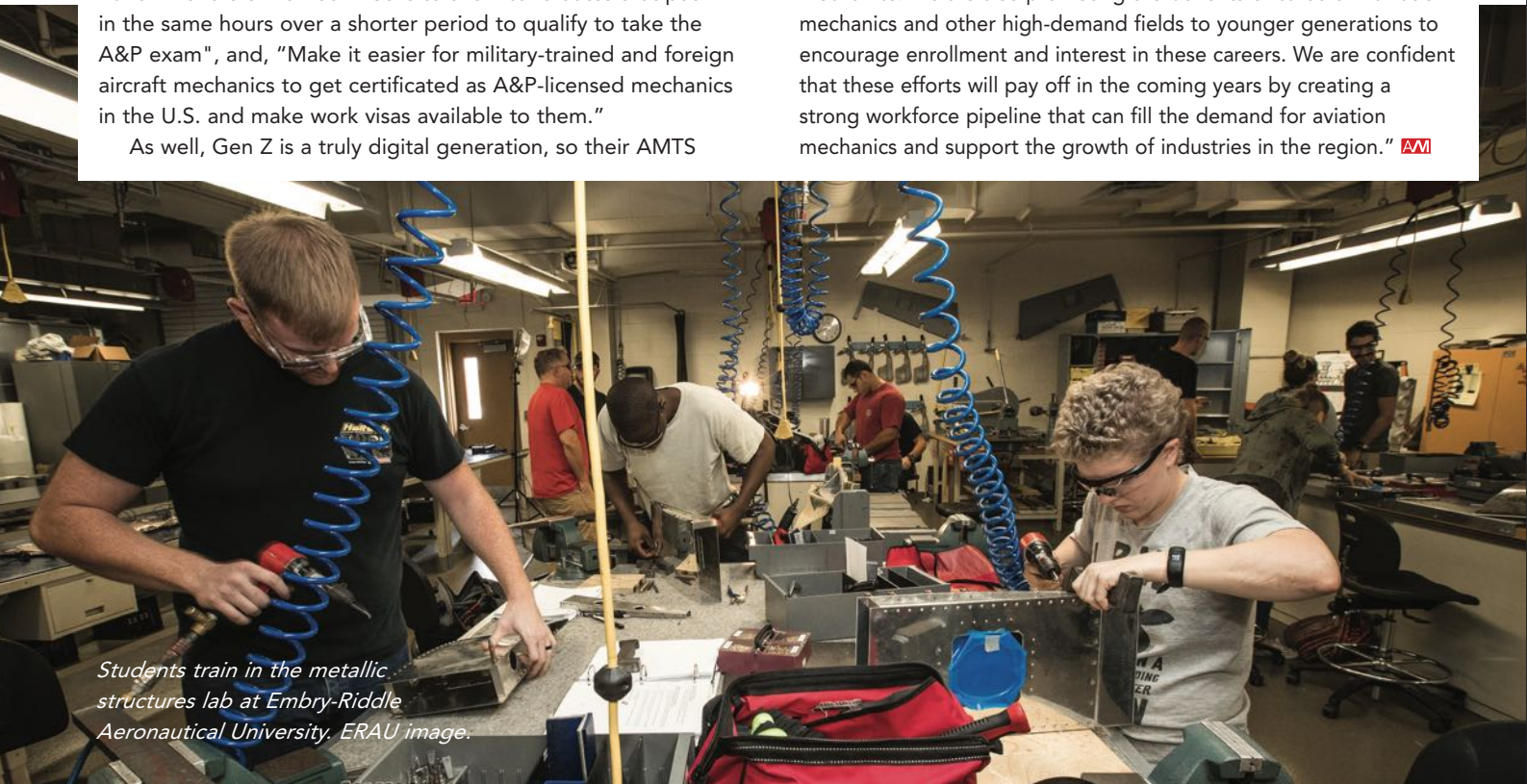
training process needs to offer "a blended environment of in-class, online, and hands-on training," said the report. "Today's younger generation also grew up around technology, and they expect — and want — to utilize technology in their workplace, even for jobs that are hands-on. MRO training and operations must incorporate more modern technologies and experiences, not as experimental pilots but as business as usual. For instance, to ensure a unified industry focus on safety and reliability, training on the use of electronic logbooks, portable devices for work instructions, and hyperlinked content management systems should become standardized."

Finally, while doing all it can to increase the number of new technicians going forward, the aviation industry has to do whatever it can to retain those it already has. After all, a Boomer who hasn't retired yet is one who doesn't have to be immediately replaced. This means "offering flexible working solutions to seniors verging on retirement in the form of part-time consulting, training, and teaching opportunities to ensure the technical foundation of the business is strong," said Rustom, while at the same time "raising up emerging talent with a strong employer value proposition, diverse training programs, captivating culture, and digital enablement is at the core of sustainable success."

One thing is certain: The growing shortage of skilled aviation technicians is not a problem that can be cured with a quick fix. Addressing it successfully for the long-term as air travel grows and the Baby Boomers retire requires "a longterm process in which we have to consider the short, medium and long-term objectives of the company as well as its growth ambitions," Jezequel observed. "In doing so, the aviation industry has to maintain high standards to meet customer demand on a day-to-day basis."

Is this doable? In Pennsylvania, according to Dr. Nulton, the answer is yes.

"Our efforts are having a positive impact in addressing the shortage of aviation mechanics," he told Aviation Maintenance. "By providing education and training programs, high school education opportunities, apprenticeships and on-the-job training, we are attracting and preparing new workers to enter the field of aviation mechanics. We are also promoting the benefits of careers in aviation mechanics and other high-demand fields to younger generations to encourage enrollment and interest in these careers. We are confident that these efforts will pay off in the coming years by creating a strong workforce pipeline that can fill the demand for aviation mechanics and support the growth of industries in the region." **AM**



Students train in the metallic structures lab at Embry-Riddle Aeronautical University. ERAU image.



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By James Careless

TrustFlight's ETL is linked to the company's operational management system, which gives access to a complete history for an individual aircraft or across the fleet. This allows trend analysis, including a Reliability Analysis Model that can show aircraft that are outliers, even to seasonal variations in air conditioning. As it is a web-based system, it is possible to have remote sign off. TrustFlight image.



ELECTRONIC TECH LOGS

Whether you call them Electronic Tech Logs (ETLs) or Electronic Log Books (ELBs), the use of digital devices/media for tracking the mechanical/electrical health of aircraft is revolutionizing the aviation maintenance business.

This is because “an ETL functions as a fully integrated technical, journey and cabin solution that is carried on each aircraft,” said Jack Clancy, UX/UI designer and sales manager with REDiFly, makers of the REDiFly ETL mobile app. “It holds the most recent status of the aircraft in terms of its current maintenance, as well as hours, cycles, fuel, approved signatures and more.”

To get a sense of how big a revolution this is, Aviation Maintenance spoke with ETL/ELB developers/vendors. Our takeaway: The sheer volume of advantages associated with migrating from paper to digitally-based maintenance tracking may well astound you.

Better Aircraft Maintenance Management

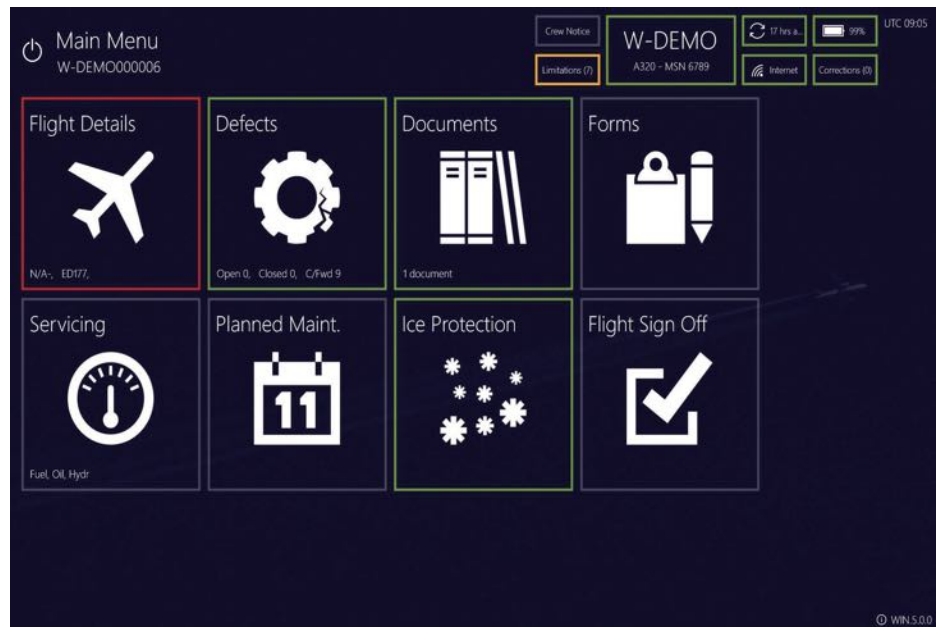
The fundamental purpose of ETLs/ELBs — let’s call them ETLs for convenience’s sake — is to improve the quality of aircraft monitoring, maintenance, and repair management. On all of these points, ETLs definitely hit the mark.

“There are numerous benefits for both airlines and MROs to incorporate an electronic tech log for maintenance” Clancy told Aviation Maintenance. For one thing, ETLs support the recording of real-time data such as the entry of flight hours, cycles, defects/MEL items, and service log data. For another, this maintenance data can be accessed quickly and easily by authorized personnel, even while the aircraft is in flight.

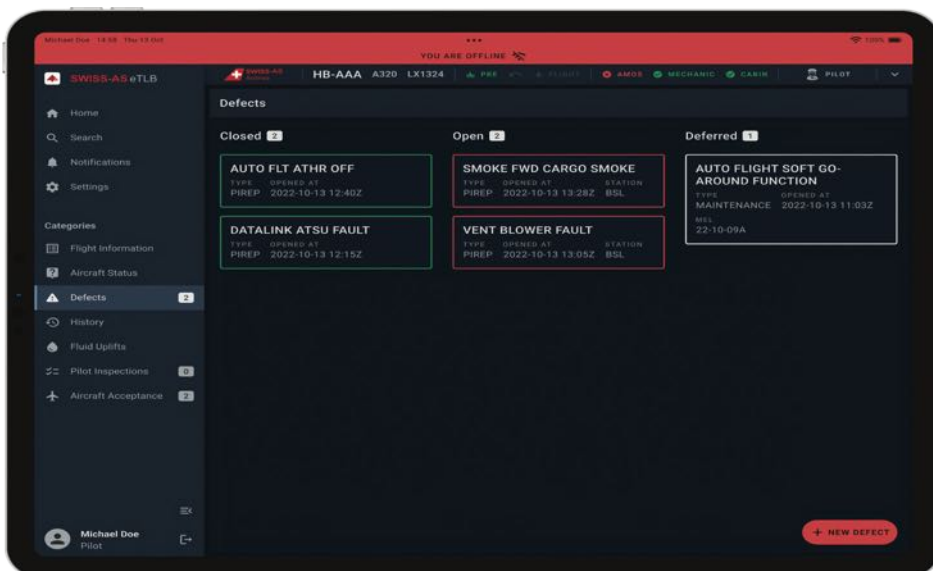
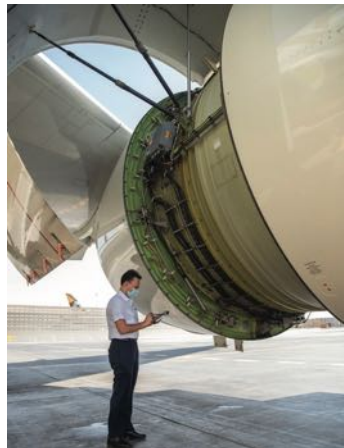
Taken together, this real-time data can be used by MROs to accurately schedule maintenance, optimize the coordinated availability of technicians, and provide complete transparency regarding tools, parts and warranties. In the repair shop, this improved planning process allows for simplified control of line items, decreases the risk of wrongly replaced parts, and enables faster turnaround times. As well, "the CAMO (Continuing Airworthiness Management Organization) department is informed of the ideal times to perform tasks," said Clancy. Meanwhile, "it is always possible to see if an aircraft is serviceable but not released."



Paul Boyd Conduce



Eliminating paper and exponentially improving data quality are two benefits of Conduce's eTechLog8 solution. The company says there has been a huge increase in interest recently, as operators began investing in the engineering side during the pandemic. Conduce images.



Swiss AS says users of their electronic tech log will benefit from a better user experience with their AMOSeTL because a community of users gave input to the company while the product was in development. Swiss AS image.

Proactive Response to Maintenance

When airlines and MROs have regular access to the ETL-captured data outlined above, “it allows them to take a proactive approach to their work and prepare future ground maintenance tasks even during the flight,” said Mathis Even, product marketer with Swiss Aviation Software, makers of the tablet-based AMOSeTL ETL. “Additionally, aircraft mechanics do not need to go back and forth to the flight deck to report their actions into the paper-based Tech Log, because AMOSeTL can capture this data for them. We have also seen that the aircraft acceptance process is much smoother and safer when all data is dash-boarded and summarized for the pilot. He can immediately check if the aircraft is ready to be accepted.”

Over the long term, “obtaining aircraft performance data more efficiently allows the operator to make more proactive decisions based on real information,” said Paul Boyd. He is managing director of the Conduce Group, maker of the eTechLog8 ETL platform. “Software such as eTechLog8 guides users toward selecting the correct data entries as well as ensuring that all mandatory data is complete before data transmission into the airlines’ MCC/OCC departments. The increased consistency of data recording is also significant when you look at the use of this data in predictive maintenance models. In order for potential component failure predictions to be accurate, consistent and reliable data is required at the outset.”

Integration with Maintenance Software Systems

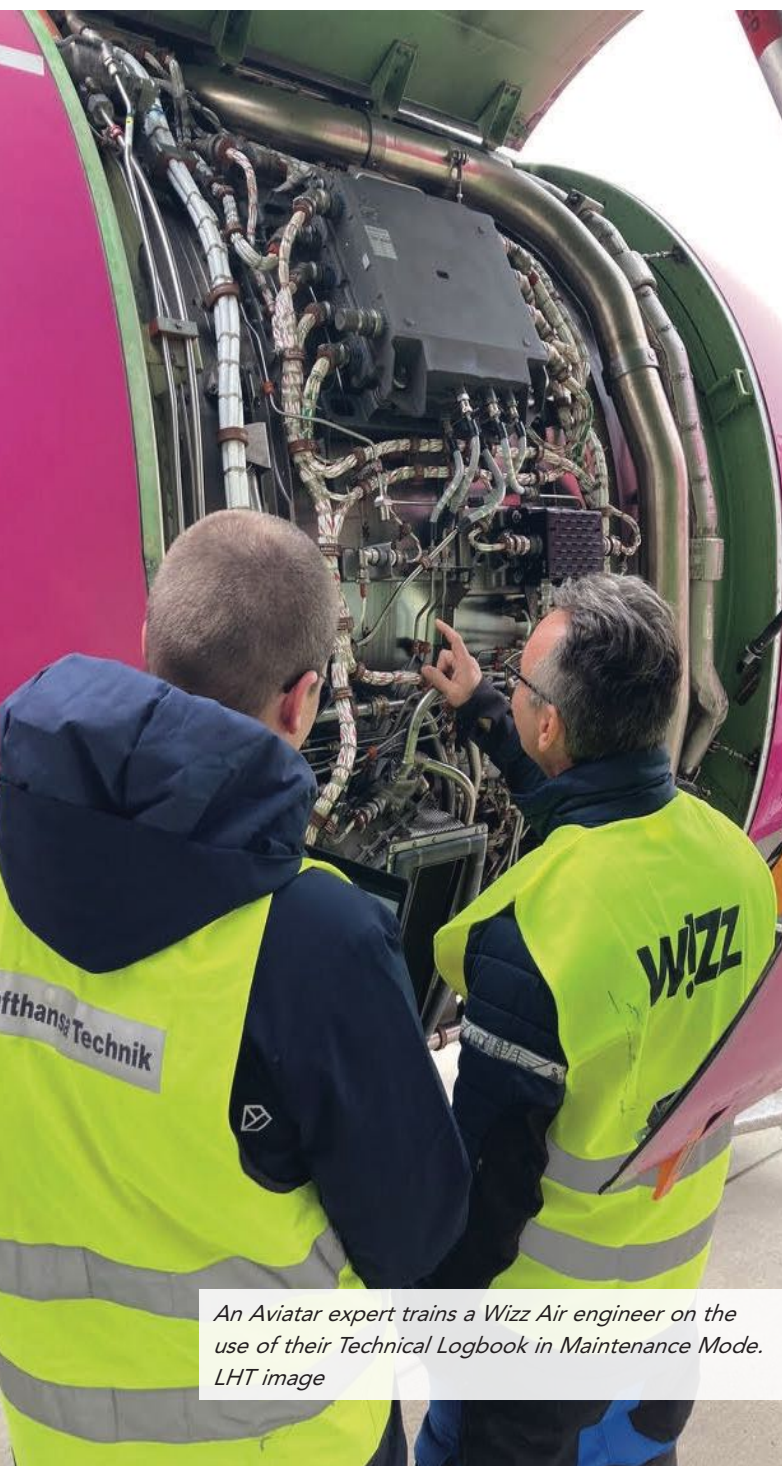
ETLs can be integrated with airline maintenance and flight operations in several ways, and be ported to these airlines’ MROs as well. This ensures that everyone involved in aircraft maintenance has the most up-to-date, accurate picture of what is happening with the aircraft in question, and thus the best chance to service it properly.

In addition, ETLs can be configured to send automatic alerts and notifications to relevant stakeholders when specific maintenance events or operational conditions occur. “For example, if an aircraft component reaches a predetermined threshold that indicates it requires inspection or replacement, the system can automatically notify maintenance crews, flight crews, and other relevant parties,” Clancy said. “Maintenance crews can also use the system to communicate with flight crews about the status of maintenance activities, while flight crews can use the system to provide feedback about any issues they encounter during flight.”

A case in point: “eTechLog8 was designed from the very first line of software code to be totally interoperable across the airlines’ systems,” said Boyd. “Conduce believes that the principle of collecting data once and using it multiple times is paramount. This essential maintenance data can be supported with additional metadata such as component change information, man-hour details, photos of defects and standardization using digitally interactive LOPA charts for cabin defects.

Simpler, More Accurate Process

There is no doubt that technical data recorded using an electronic keyboard will be more accurate than data written down by hand on paper. “Unreadable writing on paper and carbon copies often causes extra effort for maintenance personnel,” said Dajana Kunz, product lead of AVIATAR Technical Logbook, Lufthansa Technik’s ETL product. “A digital solution mitigates that extra work completely and frees capacities which can be utilized elsewhere. Even more so, the ETL’s direct connection to a maintenance and engineering software system saves the effort and time with additional manual entries. Best yet, the whole process of paper



An Aviatar expert trains a Wizz Air engineer on the use of their Technical Logbook in Maintenance Mode. LHT image

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Dajana Kunz
Lufthansa Technik

transport, scanning and archiving becomes obsolete, which is not only a financial but also an ecological advantage for the airlines using our electronic solution."

That's not all: An ETL can simplify non-maintenance tasks such as the mandatory recording of an aircraft's technical status prior to each flight. "A basic ETL solution will eliminate errors associated with handwriting legibility and calculation errors (e.g., for fuel uplifts)," Cameron Hood said. He is CEO of NVable Europe Limited, maker of the CONVERGE Electronic Techlog ETL. "Generally, they will also manage the time limitations associated

with deferred defects and checks, making those limitations visible to both line engineers and maintenance control. Various other advantages can arise with the addition of damage charts, document management, and integration with operational data."

In contrast, "paper logs are a time-consuming process to fill out as, for example, crew have to manually calculate the flight time," said Karl Steeves, director of TrustFlight, an iPad-based ETL solution. "Once they are created on carbonized paper, they must be shipped to a records team to then be transcribed into multiple maintenance and operations systems. All of this takes a lot of administration time in an operation."

More Control

An ETL makes it possible for an airline to exert more control over various aspects of its business.

For example, when its data is ported to a web portal, the ETL provides near real-time visibility of an airline's fleet status. "In turn, this allows for better planning and fewer unexpected issues, thereby increasing reliability," Hood said. "These benefits accrue primarily to the airlines, but are ultimately beneficial to their passengers as well." For instance, "airline passengers will benefit indirectly if technical problems can be solved faster/sooner



Gerben Bondt, line captain, Wizz Air Group, demonstrates how the ultra-low cost carrier is using the AVIATAR Technical Logbook. Wizz Air image.

e.g., through an advanced dispatch process, reducing technical delays," said Kunz.

"An ETL provides instant visibility of faults on an aircraft, allowing quicker and better troubleshooting, ultimately reducing delay time," agreed Steeves. "As faults are recorded as a digital record, they tend to be of better quality than those written down manually. This can lead to benefits when looking at reliability trending with respect to specific parts and/or aircraft."

ETLs also provide enhanced control of access to aircraft technical logs, giving their operators a justifiable sense of confidence in their historical accuracy. This is because "an ETL provides more control around who is allowed to authorize sections of the technical log," said Hood. "This ensures that pilots do not authorize a section that only a qualified engineer should be allowed to authorize, and vice versa. It also provides better control over third-party authorizations."

Better Compliance

The airline industry has to deal with intense levels of scrutiny. Not only do they have to comply with a wide range of regulations in flying aircraft around the globe, they have to be able to prove this compliance before, during and after the fact.

There is no doubt that a digitally-based technical logging system is the best suited to show such compliance on a reliable and accessible basis. "Because these ETL processes are digital, there can be validations, checks and balances to ensure that all data recording processes are completed correctly and in compliance," Steeves said. "For airlines, this provides a significant safety benefit as you avoid the risk of dispatching an unserviceable



Cameron Hood
NVable

aircraft, for example. Of course, cost is also a big factor in all of the above benefits, in addition to reducing the amount of carbonized pads that have to be procured by the airline!"

Easy to Use

Beyond the advantages noted above, one standout fact about ETLs is that they are easier for pilots and technicians to use than paper-based systems. This is because ETL interfaces are designed to be intuitive and simple to work with. Being digital, they can also have their Help menus right at hand for users, avoiding the frantic 'looking through the index' associated with paper-based technical logs.

"Key ETL/ELB features such as predefined workflows, embedded MEL/CDL (Minimum Equipment List/Configuration Deviation List), predefined report trees and fault menus, graphical

The all-in-one software for airlines, MROs, CAMOs, fixed-wing and rotary operators

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.

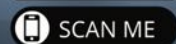
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ULTRAMAIN's ELB comes with an electronic journey log, integrated technical and cabin logs, a dent and buckle chart, eDocs and a refuel log among its ETL features. All of these things are designed to simplify the life of the user, the company says. ULTRAMAIN image.



Rob Saunders
ULTRAMAIN



reporting and an intuitive UI all contribute to extremely high data integrity and ease of use," observed Rob Saunders, director of business development with Ultramain Systems. (This company's ULTRAMAIN ELB comes with an electronic journey log, integrated technical and cabin logs, a dent-and-buckle chart, eDocs and a Refuel Log among its ETL features.) "All of these things we talk about are designed to simplify the life of the user and make the hard stuff easier."

Solid Savings

When it comes to the cost and operational efficiencies associated with ETLs versus paper-based logging systems, "it is easy to see the savings on printing, distribution, collection, data entry, and records storage," Saunders said. "However, the savings in paper replacement are minor compared to what can be achieved with an ETL that is designed to rationalize the line maintenance operations process. As well, with real-time accurate updates to the user's management information system, no matter what system is in place, existing back-office processes immediately become more efficient."

Adoption of ETLs is Slow

With all the benefits that we have enumerated with respect to ETLs in this article, one would expect this technology to be enjoying widespread adoption among airlines and MROs alike. But this isn't the case. According to Karl Steeves, "adoption is still relatively low, with around 5-10% of operators using ETLs. We generally see the more forward-thinking and process-focused operators adopting these systems first. Often these are low cost carriers and 'simpler' single-fleet type operators."

So why is the aviation industry reluctant to adopt ETLs across the board? "In the early days some vendors had several failed projects," replied Boyd. "This is often the case with new technology that is being used to solve different issues."

In recent years, ETLs have been adopted by several airlines including flag carriers, scheduled operators and ACMI capacity providers, he noted. "Conduces customers include the likes of Etihad Airways, Royal Brunei Airlines, Jazeera Airways, Titan Airways, SmartLynx Airlines, Avion Express, Texel Air and other international cargo operators," said Boyd. Still, "The truth is that, across all ETL vendors, I suspect that the adoption rate is such that still only around 10% of the 30,000 or so commercial airliners operating have an ETL on board today."

The laptop/embedded ETL options available at the turn of the millennium were limited and had their problems, Saunders added. "Laptops were slow to connect (if at all), while installed EFBs from the OEMs cost tens of thousands of dollars per aircraft, and each change would require Service Bulletin-type recertification," he said.

Despite the challenges associated with those early ETL days, "leading innovators such as Cathay Pacific achieved groundbreaking achievements in e-enabled operations," said Saunders. "In 2009 the first Cathay Pacific B777 was operated with STC-installed EFBs in the flight deck and cabin. The cabin device being used was the ULTRAMAIN eCabin log while the ULTRAMAIN eTech log was available on the three flight-deck EFBs." The introduction of the iPad a year later made it possible to load flight-related software on lightweight portable devices. These were quickly adopted by flight crews to serve as Electronic Flight Bags



ULTRAMAIN's ELB allows flight crews to record and transmit write-ups in real time as defects occur. ULTRAMAIN image.



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(EFBs), replacing the heavy bags of paper manuals they had to carry in the cockpit.

"E-tech logs were expected to follow," Saunders said.

"However, an aircraft maintenance log is not a flight ops document and has never been in a pilot's leather flight bag. The user demographics are flight crew, cabin crew, and engineering. This fact, along with the slow acceptance of ETLs by regulators and a general underestimation of the complications of online/off-line application capabilities led to few successes over the last 10 years." Meanwhile, over 1.5m electronically signed sectors later, ULTRAMAIN's full suite ELB remains available with its aircraft systems integration capabilities.

Change is Coming

In recent years, the aviation industry's cautious attitude towards ETLs has started to change, albeit slowly. "There are a few well-known maintenance companies that are now emerging with an electronic tech log solution, which is a telling sign that there is a growing demand in the market," said Clancy. "However, progress takes time, and the aviation industry has been slow to respond to digitalization in the past. Compared with the advent of the EFB a few years ago, we are only now seeing an increased rate of global adoption for the electronic tech log, particularly among the larger scheduled carriers."

The good news: "Currently we are seeing a major growth of interest of our customers to digitize their flight and maintenance operations," Even said. "We even see that aviation customers who are purchasing and moving to AMOS today want to go live directly with fully paperless processes; including eSignature. We have ten funding customers who are supporting the final stages of development of our product (released in June 2023). They include low-cost and major airlines, flag carriers, and helicopter operators."

Ultramain is seeing similar growth in ETL market acceptance. "ULTRAMAIN ELB is deployed and in paperless production use at ten airlines throughout the world with over 100,000 direct users using many different fleet types, both Boeing and Airbus," said Saunders. "It is being used throughout their network of line stations worldwide by airlines and their third party maintenance providers. Our customers include Cathay Pacific Airways, Japan Airlines, British Airways, Air New Zealand, Airwork, Starlux, Air Hong Kong, Vistara and Scandinavian Airlines.

As these ETL vendors will tell you, the main obstacle blocking widespread deployment of their products is not their capabilities, but the reticence of airlines to take this step.

"There are no doubts about the benefits of an ETL," said Hood. "The main obstacle is the airline making a strategic decision to implement it. The introduction of an ETL requires effort from the airline and some relatively intense engagement with the local aviation authority. It also inevitably leads to a reassessment of various procedures and realigning those to fit."

"Conduce believes that there are no real obstacles to the adoption of an ETL," Boyd agreed. "There are now enough successful implementations that should encourage other operators to look seriously at an ETL project. Obviously, you still need to evaluate the software solution options available and ensure the project is kept simple so that deliverables can be quickly identified and be successful. But Conduce has regularly seen project paybacks for many of its clients being achieved in only one year of operation."

What's to Come

Looking forward, airlines and maintenance operators can expect

even more capabilities from the ETLs of tomorrow.

"We expect that, in the future, the tech log solutions will offer even more automation, connecting data from various sources and automatically giving recommendations or drawing conclusions based on them," said Kunz. "The connection of different data points within the logbook will further enable entities to gain business intelligence, make users' lives easier and enable them to take on new tasks using the logbook."

"There will be more and deeper system integrations with increasing interchangeable access across multiple platforms such as Windows, iOS, and Android," Hood predicted. "This will drive additional functionality that will be helpful on the line. Analysis of the stream of data collected will become more automated and intelligent, potentially integrating aspects of machine learning or artificial intelligence. And the onboarding process will become smoother, because our ultimate aim is to allow airlines to 'self-serve' the entire ETL process."

"There are many developments in Aviation IT such as Blockchain, AI (Artificial Intelligence) and Predictive Analytics, all of which we are interested in," concludes Clancy. "However, for small to medium operators, these concepts may still be a while down the road. So, I believe the future of ETL technology lies in the flexibility of the software and for digital aviation vendors like ourselves to provide a more informative and accessible landscape for the operators we cater for." **AM**

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Leandro Rodrigues Oliveira, Engine Module Technician

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Mario Pierobon

APU REPAIR AND OVERHAUL

The auxiliary power unit (APU) is a very strategic aircraft system requiring dedicated maintenance considerations. In this feature, we have reached out to industry experts to assess the requirements of aircraft operators with regard to APU repair and overhaul, the peculiarities of this type of maintenance, and the application of preventive and predictive maintenance principles.

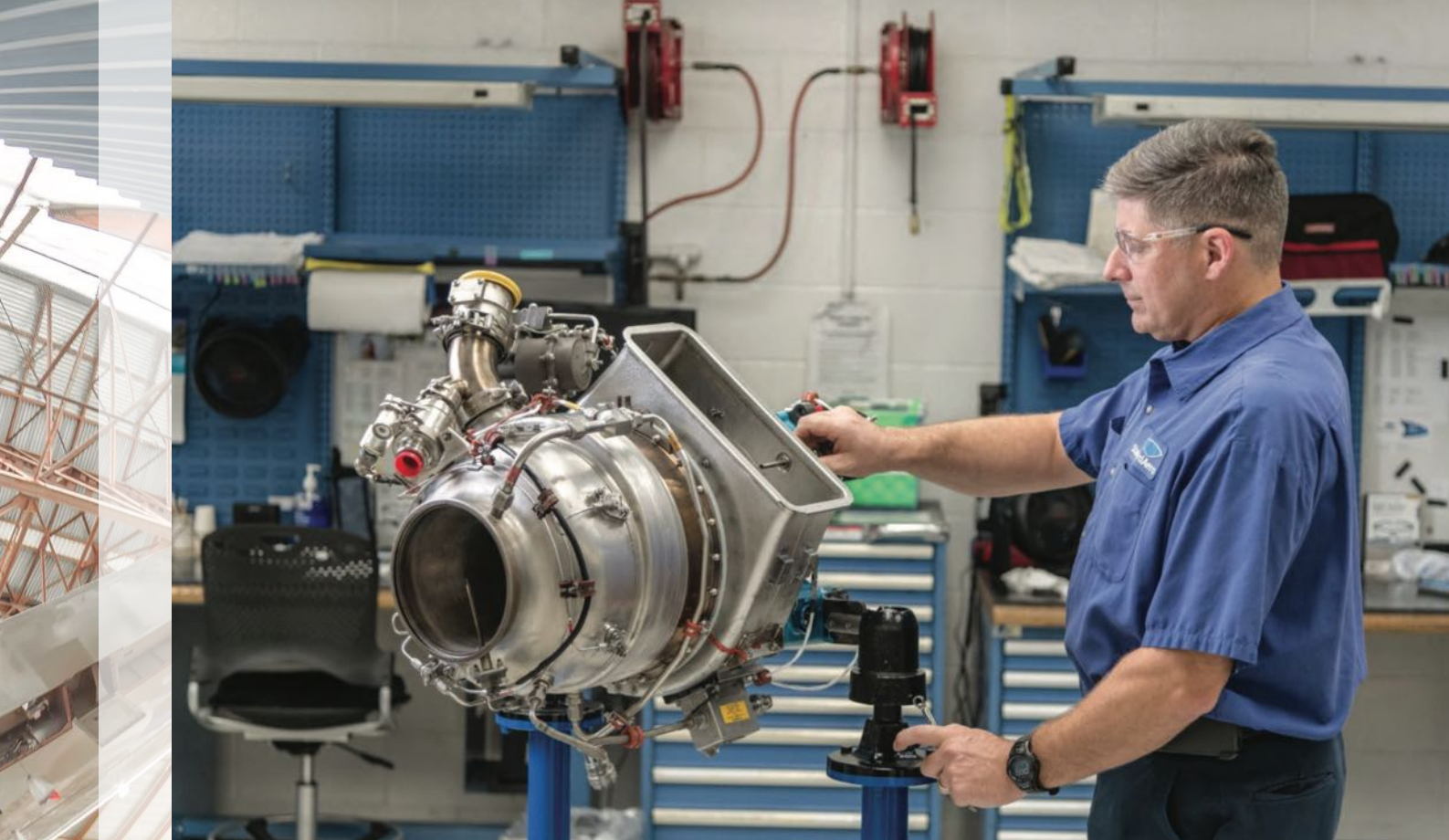
Operators' requirements

The airline operators are required to have an approved APU maintenance program that is generally consistent with the original equipment manufacturer's (OEM) recommendations, and they have to perform all required line maintenance, preventive maintenance, routine periodic inspections, and replacement of life-limited components, affirms Bob Dorran, director of APU programs at StandardAero's Maryville, Tenn., MRO facility. "They typically ask for APU repairs for unscheduled failures or performance deterioration, or scheduled events for replacement of life-limited components. They also typically ask for repair of APU line replacement units (LRU) that have failed and require repair separate from the APU," he says.

With very few exceptions, APUs are operated on condition instead of following a maintenance schedule, observes Rodrigo Nardelli, vice president of global sales at TurbineAero Engines Technics. "This means operators will run the APU until it presents some level of failure. The value from the maintenance organization is to accurately review APU incoming condition and get the

customer a quote that minimizes the maintenance cost, this is why we do what we call SMaRT (Strategic Maintenance and Repair Techniques) work scoping," he explains. "Before we disassemble an APU, we put it on the test cell and try to identify the root cause of the failure, instead of getting APUs in production and immediately disassembling all sections of the APU."

The majority of APUs manufactured and serviced by Pratt & Whitney Canada (P&WC) are for commercial aircraft, such as the APS3200 for the Airbus A320 aircraft family, the all-electric APS5000 for the Boeing 787 Dreamliner, the PW980A for the Airbus A380, or the APS2600E for the Embraer E170/190/195 regional jets, affirms Mathieu Asselin, director of APU global sales at P&WC. "For these customers, obviously, the dispatch availability of their aircraft is critical, and that availability is tied directly to the reliability and to the proper maintenance of the APU. So, when customers turn to us for the maintenance of their APUs they do so with a mindset of 'keep my business running smoothly'," he says.



StandardAero image



P&WC is committed to ensure the maintenance of an aircraft's APUs is as much as possible done when the aircraft is scheduled for regular airframe maintenance. "We focus on two goals: ensuring that replacement parts (either new or refurbished) are routinely installed to ensure the APUs continue to perform and operate on demand, and making every effort to keep costs down for our customers," Asselin points out. "We work to provide our customers with a fully planned maintenance environment for their APUs, and we strive to minimize or eliminate maintenance issues that could affect their operations."

Peculiarities of APU repair and overhaul

APUs are generally a minimum equipment list (MEL) item so the aircraft can continue to operate for a period of time with the APU inoperative where generally other systems cannot, observes Dorrán. "To continue operating the aircraft after the MEL expiration period, the APU has to be repaired or be replaced

with a serviceable one that many times can be accomplished by replacing a failed LRU without having to remove the APU. This generally requires the operator to stock suitable spares or have a reliable source," he says.

The big difference between an APU and a propulsion engine is measuring the electrical performance as well as bleed air from the load compressor. Other than that, the APU is a gas turbine engine and has similar maintenance, according to Nardelli. "One thing to consider is that the main engine maintenance is scheduled, so there is a lot of planning that goes into it, which allows for preparation and scheduling maintenance for other systems at the same time," he says. "With the APU coming off the aircraft at unpredictable intervals, the MRO needs to be more flexible in terms of scheduling, inventory levels to support unexpected demand. Also, since this is unscheduled for the majority of the operators, sometimes the airline does not have a spare unit available to put on the aeroplane while the APU is on the shop. In that case, we can provide a lease unit for the airline to install while we perform the overhaul on their equipment."

P&WC offers various pay-per-hour maintenance plans for their APUs. "The programs provide stable, simplified APU management and financial planning tools that can guarantee operating costs and can be tailored to suit individual requirements. For example, the customer tracks the number of hours and the number of cycles the APU has operated every month, so they then pay a set hourly fee for the maintenance of the APU, and we assume the maintenance costs," says Asselin.

P&WC also offers specialized maintenance programs under its P&WC SMART maintenance solutions. "These are high value solutions and cost guarantees that eliminate price variables and uncertainty, for some of our more popular APU models. These programs help customers extend the life of an aircraft by replacing APU fleets on a cost-effective basis or extending the life of the APU itself through replacement of key parts, again on a cost-effective basis," affirms Asselin.

Preventive and predictive maintenance

With regard to APU repair and overhaul, preventive maintenance is applied by following the OEM's recommendations concerning periodic inspections, checks and performance monitoring, according to Dorran. "Conversely, predictive maintenance is applied by following OEM soft time recommended replacement of components before failure to prevent the failure from causing additional damage which can greatly increase the repair cost of the APU. This is predicted by historically known failure modes and known operating times of how long the components can generally operate until failure," he says.

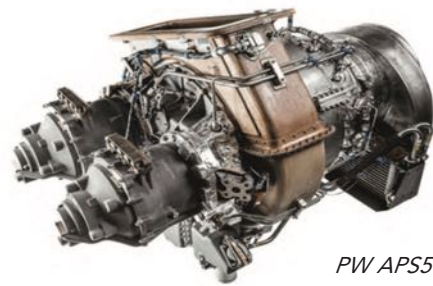
The application of preventive maintenance by continuously monitoring and trending APU parameters is typical on newer generation aircraft, as some older aircraft do not record and report many APU performance metrics, observes Nardelli. "The on-wing trend monitoring provides an opportunity for early detection of potential trouble. These can be addressed right away by simpler maintenance or with a removal prior to failure, which leads to faster and cheaper maintenance for operators," he says. "The benefits would also carry over into scheduled maintenance. In addition, executed preventive maintenance should keep the cost down on scheduled shop visits."

According to Asselin, there are two aspects of predictive maintenance to point out. "One is predicting how the engine will perform throughout its lifecycle and the maintenance work scope that must be undertaken to promote reliable performance. The second is predicting how much the maintenance of the APU will cost over its lifetime and thus providing the ability to effectively

budget for it," he says.

Both elements of 'predictability' are extremely important to commercial airline customers, affirms Asselin. "To serve the first, we have a DP&HM (diagnostic, prognostic, and health management) product for some of our newer models of APUs. In particular, the program allows the customers to track the performance of their APU throughout its lifecycle; they can use the DP&HM data to plan their shop visits and thus avoid undesirable operational impacts such as downtimes or flight delays/cancellations," he says.

The second element, dealing with lifecycle costs, is provided by P&WC's pay-per-hour program, with which the customer's maintenance costs are guaranteed, affirms Asselin. "In a 'no-surprises' APU maintenance environment, the airline has the peace of mind knowing that its cash flow will not be diminished by unexpected maintenance costs and that assurance is of considerable value in a commercial setting," he concludes. **AM**




PW APS5000
Pratt & Whitney image

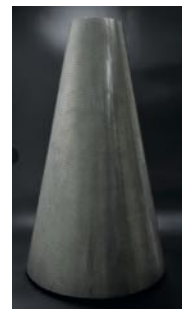


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D0.4 (0.016)	▲	▲	▲	▲						
D0.8 (0.031)	▲	▲	▲	▲						
D1.6 (0.062)	▲	▲	▲	▲	▲					
D2.5 (0.098)			▲	▲	▲	▲				
D3.2 (0.125)			▲	▲	▲	▲	▲	▲		Recommended ▲
D4.8 (0.188)				▲	▲	▲	▲	▲	▲	Able ▲
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JEAN-MARC Lenz

With more than 30 years of experience in the aviation industry, Jean-Marc Lenz became CEO of SR Technics in September of 2019 just before the pandemic struck. Aviation Maintenance Editor-in-Chief, Joy Finnegan, had the opportunity to sit down with him in Atlanta, Georgia, recently to learn how the company navigated the past several years and their big plans for the future.

AVM: Give our readers some highlights of what SR Technics did to make it through the pandemic years and what you are working on right now?

JML: The company is coming out of the pandemic on the right spot. We designed our strategy by focusing mainly on the engine business. During the pandemic, we made sure that all the non-engine-related businesses, especially those that were loss-making, were completely removed or sold. Now, we have an 80% engine-focused business. This engine business basically has two pockets. The main business where we do a lot of activities on the PW 4000 and on the CFM 56, where we still have a really nice growth story for the next 10 years or so. That's the cash cow for the company. And we continue to be focused on that business, especially on the repair side of the house. That's exactly the core of the business.

AVM: What are you focusing on for the future?

JML: The new business in the future is the PW1100G-JM (also known as the GTF - geared turbofan) and the LEAP-1B. [We have] a big contract for the PW1100G-JM engines for the A320neo with full disassembly, assembly and test; more than 1,000 shop visits for the next 10 years. We start next year, 2024, with the first engine induction. We are in a hiring phase, in a preparation phase, in the full industrialization process to prepare. Recently we announced the start of the construction work for reactivation of a second test cell to expand test capabilities and capacities at Zurich Airport, Switzerland. It will be redesigned for this new engine. That will be a rapid ramp up, basically going rapidly to up to 100 visits a year. The test cell 2 will be enlarged to a seven-by-eight-meter cross-section and will receive state-of-the-art data acquisition and instrumentation systems. SR Technics and Safran Test Cells have designed test cell with environmental compatibility and sustainability in

mind, introducing fit-for-purpose equipment for the lowest energy consumption and technology, such as thermal waste heat recovery.

AVM: So far, how is the project of reactivation of the test cell going?

JML: Every big investment like that will have its challenges that's for sure. But for now, basically the project is well set up, all the preparations are made. We had the groundbreaking event in April that indicates that the full planning and design phase is behind us. And we have good partners.

AVM: Talk about your goals for the company?

JML: Our goal is to double our business in the next five years. We are building infrastructure in Zurich, opening new production facilities and increasing our workforce with around 500 people within the next few years to extend our capabilities for the GTF and LEAP engines.

AVM: That is an ambitious goal to double your business in the next five years. How will you get there?

JML: Yes. The GTF and LEAP, of course, will be a large portion of it as they are the actual engine types which will be in a growth phase. Today, we are doing around 200 shop visits a year, and in five years from now we will do 350 - 400. That's the goal.

AVM: What about your work on the LEAP-1B?

JML: The strategy for the LEAP-1B, it's different from the GTF. Obviously, we cannot do two new engine types at the same time, at the same speed. So, on the LEAP, we start up on a different pace. We have already started on the hospital lines. We do smaller repairs on the quick turn lines. On LEAP-1A we are about to launch a couple of work scopes together with the OEM basically to also ramp up a little

bit more rapidly on this quick turn line with dedicated work scopes.

AVM: What about ongoing work for other engines?

JML: Last year we introduced more than 50 new repairs on the CFM 56. So that's something which is ongoing as we speak. It's important and for me, that's one of the most important points for the future. Those engines need to be repaired. And by having new repair capabilities, it also means we have availability on USM (used serviceable materials). The USM market is important also for the repair on that engine. That simply increases the service offerings we have for customers.

AVM: Talk a little bit about the USM market. How are you incorporating that into your business plan?

JML: We are working with a lot of partners on finding engines to be torn down now and we are supporting basically quicker turnaround times. We are making sure that the problems in the supply chains are overcome, especially with us. We were always doing that. But with that big increase in demand, it's now very important.

AVM: How do you see the supply chain issues resolving in the near future?

JML: I'm optimistic. The supply chain issue will be resolved in the next six to 12 months. Even in a more pessimistic view it takes a little bit longer, but it will be resolved. It's a matter of having raw material back and having the people back. Just needs a little bit of time.

AVM: With that growth comes the need for skilled labor. Everyone's talking about how difficult it is to find skilled labor right now. Are you experiencing this as deeply as we are here in the U.S.?

JML: We also have issues with finding the right skilled labor. But I have to admit Switzerland is in a better position. First of all, we have a very nice apprenticeship program. That was ongoing and we didn't stop it during the pandemic. It's a self-feeding, in-house system. Secondly, we are hiring, obviously from all over the place (outside of aviation) in Switzerland and retraining those technicians, basically for the aviation business. And thirdly, we are hiring across all of Europe, so people are joining Switzerland because it is good place to live. So, in other terms, we are still finding the necessary people. We will have to hire 400 to 500 in the next three to four years. It's over 100 a year.

AVM: Let's talk about the digitization of business. SR Technics has done some serious work in that area. Tell us about what you've done and who you've partnered with?

JML: Yes, absolutely. Digitalization in our industry is very important for various reasons. The first is efficiency. The second is traceability. And also to make sure that interconnectivities in the processes are 100% understood. So, in the word digitalization, there is much more behind that than just a new IT system. It's about making sure that all the processes in our industry are, as I said, interconnected reflected by bringing in a new agile cloud-based ERP platform. We redesigned all our operating processes to fit with that system. We are working with HCLTech to digitally transform SR Technics' operations. HCLTech will implement a new greenfield SAP S/4HANA environment hosted on Microsoft Azure using RISE with SAP. We will implement iMRO, HCLTech's MRO industry add-on for SAP. This new system will be implemented starting 2024.

AVM: Talk about the implementation process — how do you prepare?

JML: The implementation is much more complicated than just transferring data. You only do a digitalization project like this one every 20 years. The first thing you have to do is to clean up your processes. The second thing you have to do is to make sure that the processes are completely lean and ready to be digitalized. And then you need to ensure that your processes are fitting with the standard of the chosen systems. Then you have to make decisions about the needed add-ons and only then can you implement the system. So, it's quite a major move for the company. And it's a huge investment not only financially but in people, in processes.

AVM: How do you clean up these processes and make them completely lean, as you said? How do you determine where you need work?

JML: In the beginning to figure out which system would fit we worked with a consultant. But for this, that's where we have a special team in place, a project team. That [internal] project team started those activities, I would say two years ago already.

AVM: It's been about a year since opening the new six-bay hangar and back-shop facilities in Malta. How is that updated facility doing?

JML: We've been in Malta for more than 10 years. Why there? Because at that time we were choosing in different location in Europe where we would have a lower cost location. We started with a rented hangar. About a year ago we moved into the new hangar. Cost for us was a factor, but also location for our customer base and where do we find the necessary skills? Malta was, and still is, the right place because the availability of skilled labor was very good. It fit and was feeding very well to our customer base. After a while we realized that the two-bay operation was too small. We increased to three bays with temporary hangers. At that point in time, we decided to build a new hangar with the government's help in supporting that kind of development. The new hangar was finalized last year and we moved into the new six-bay hangar. Now we are operating a five-day operation there.

AVM: You recently launched a new Sustainable Engine Alliance. Please tell our readers about this project.

JML: It's something new, very important and is a strategic topic. We have a role to play in that. We decided to start an engine alliance about sustainability. The target is to reduce the footprint or avoid the CO2 emissions for the full cycle of a shop visit, starting from the removal of the engine at the airline and continuing in each stop of the process including transferring the engine to the shop, disassembling the engines, all the activities connected to logistics, on repairs, and also to reassemble and test the engine and to transport the engine again. So, the full repair cycle is managed and analyzed on the search. We're going to be able to show the reduction of the CO2 footprint with this project. I think that will be much more important in the future and I'm quite sure that airline customers will be looking more and more at those kinds of activities when selecting their providers.





By Jeff Guzzetti

SHIFT CHANGE TRAGEDY

Former NTSB and FAA investigator Jeff Guzzetti discusses what many believe to be the most striking example of an airline accident caused by systemic deficiencies in maintenance and safety culture.

As a newly hired NTSB field investigator in the early 1990s, I was assigned to a field office that was co-located at NTSB headquarters in Washington, D.C. This location allowed me to attend final NTSB board meetings in which the causes and factors of major airline accidents were presented and discussed in public. One such meeting occurred in July 1992 to adopt the final report of an accident that occurred nine months earlier on September 11, 1991.

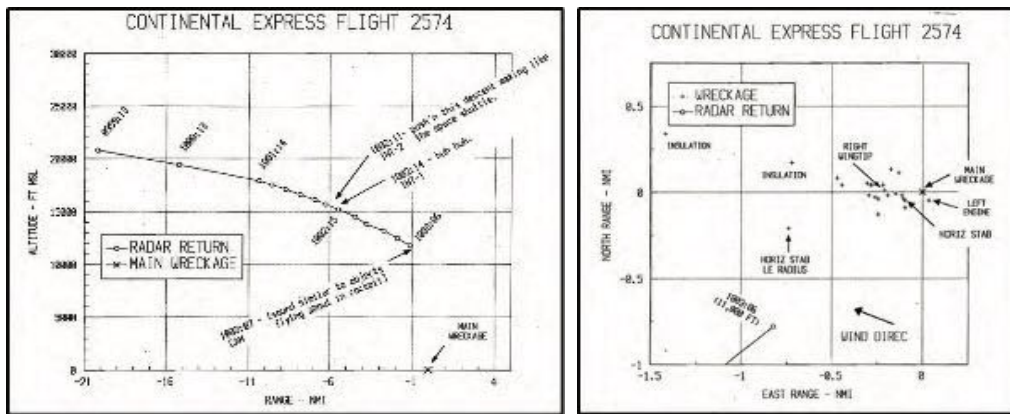
The accident involved Continental Express Flight 2574, an Embraer 120 Brasilia turboprop airplane (see graphic above) that broke apart over a cornfield near Eagle Lake, Texas, killing the two flight crewmembers, one flight attendant, and 11 passengers. This commuter airline accident continues to serve as a striking example of a tragedy caused by systemic deficiencies in maintenance, and it introduced the topic of safety culture as an essential tenet in aviation safety.



Graphic 2 – Final resting site of the main wreckage of the EMB-120. Pieces of the horizontal stabilizer were missing in this area.



Graphic 3 – The horizontal stabilizer was the first piece of wreckage along the wreckage distribution path, indicating that it had separated first from the airplane in flight.



Graphic 4 - shows the radar-derived descent profile. The last radar contact occurred as flight 2574 was descending through 11,800 feet.

Graphic 5 - radar-derived ground track and wreckage diagram.

Flight 2574 departed Laredo, Texas, at 9:09 a.m. and was destined for Houston Intercontinental Airport. About an hour into the flight, as it was descending through 12,000 feet on approach to Houston, the airplane suddenly exploded in flames. Several eyewitnesses described the Embraer 120 as “flying normally ... wings level, slightly nose down” when it was suddenly “consumed by a fireball with wingtips and part of a tail protruding.” They watched as the airplane entered into a flat spin until impacting the ground, shedding parts during its descent (see graphic 2).

Many of the separated parts of the airplane were located within a two-mile radius of the main wreckage. The horizontal stabilizer, located on top of the T-tail, was lying about 650 feet southwest of the main wreckage (see graphic 3). Some of the structure from the upper third of the vertical stabilizer was still attached to the horizontal stabilizer. The lower two-thirds of the vertical stabilizer remained attached to the tail cone in the main wreckage. The leading edge/deice boot assembly for the left side was missing from the horizontal stabilizer, but was later found in a small coral about one mile west of the main impact site. This part was the first chunk of wreckage found along the wreckage path, indicating that it was the first to separate from the airplane in flight.

Black Box Data and Recorded Radar

One of the first actions that NTSB performs in an airline accident investigation is to recover the cockpit voice recorder (CVR) and flight data recorder (FDR). In this case, their quick recovery yielded valuable data. A readout of the FDR showed the airplane was descending through 11,500 feet at 260 knots when it abruptly pitched down and entered a steep dive. A negative load factor of at least 3.3 g was reached about one second after the upset, with a corresponding decrease in airplane pitch attitude.

The CVR picked up sounds of objects being upset in the cockpit followed immediately by a human “grunt” at the time of the accident. The remaining sounds heard were produced by the airplane’s aural warning systems along with mechanical sounds that were consistent with an inflight structural failure.

The NTSB also collected and analyzed recorded radar data that traced the breadcrumb trail of Flight 2574 during the accident flight. Graphic 4 shows the radar-derived ground track of flight 2574, selected sounds from the CVR, and the wreckage distribution. Graphic 5 provides a close-up view of part of the ground track and wreckage distribution. It was clear to investigators that the horizontal stabilizer had separated from the fuselage before

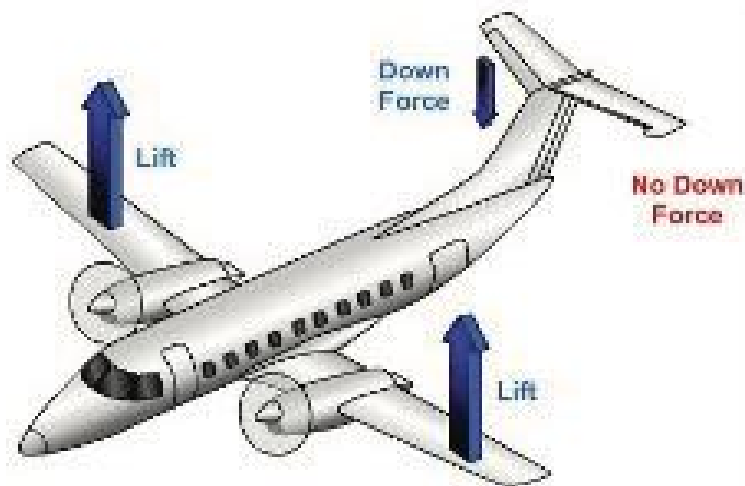
ground impact. Investigators surmised that the loss of the leading edge/deice boot assembly exposed the front spar of the left horizontal stabilizer to the airstream, prompting an aerodynamic stall that greatly reduced the downforce produced by the horizontal stabilizer, as shown in graphic 6, next page.

But why did the horizontal stabilizer come apart in flight? Investigators quickly realized that the 47 screw fasteners that would have attached the upper surface of the leading edge assembly to the left horizontal stabilizer were missing. Additionally, there was no evidence of distress in the upper attachment holes or any other indication that the screws were installed when the assembly separated from the horizontal stabilizer.

Systemic Maintenance Deficiencies

The NTSB review of the maintenance records revealed that two weeks prior to the accident, during a fleet-wide campaign to examine aircraft deice boots for winter operation, a quality control inspector had noted both leading edge boots on the accident airplane had dry-rotted pin holes along the entire length of the boots. So, on the night before the accident, the airline’s maintenance control office scheduled both deice boots to be replaced. NTSB interviews with maintenance personnel revealed that this maintenance action occurred during a shift change.

The Continental Express General Maintenance Manual (GMM) had FAA-approved procedures for shift turnovers that required briefings by mechanics to supervisors, briefings by outgoing supervisors to incoming supervisors, completion of maintenance and inspection shift turnover forms (so that oncoming



Graphic 6 – The T-tail was designed to produce a down force (shown by blue arrow pointing down) to balance the wing lift forces. However, in this accident, the left half of the tail force was eliminated by the failure of the leading edge (shown in red lettering).

personnel would be aware of incomplete work), and the documentation of incomplete work that would be noted by the mechanic on the reverse sides of work cards. The Safety Board concluded that the GMM contained clear procedures, which, if followed, could have prevented the accident.

Investigators interviewed a dozen mechanics who had worked on the airplane. They discovered that the events during the maintenance and inspection of the aircraft on the night before the accident were directly causal to the accident. Several errors were made by specific individuals responsible for the airworthiness of the airplane.

For example, the second shift supervisor responsible for the accident airplane failed to solicit an end-of-shift verbal report (shift turnover) from the two mechanics he assigned to remove the deice boots. Moreover, he failed to give a turnover to the oncoming third shift supervisor. To add insult to injury, the second shift supervisor had demonstrated recent substandard performance that was not addressed by management. For example, one month before the accident, he “missed a crack in the inspection of an engine exhaust stack” on one occasion, and he “missed 15 task cards” while performing maintenance on another occasion.

The Safety Board concluded that the upper row of screws that had been removed from the leading edge of the

left horizontal stabilizer was undetected because the approved procedures in the GMM were not followed by the maintenance personnel directly charged with evaluating the airworthiness of the airplane before it was returned to service.

However, in the end, they determined that the reasons for the errors and the overall failure of the maintenance program were complex and not simply related to a single failure by any single individual. The NTSB also found no evidence that the two pilots were informed of the work that had been performed on the tail. The top of the horizontal stabilizer on the airplane’s T-tail rests about 20 feet above the ground; therefore, the flight crew could not have seen the area of the missing screws on top of the leading edge/deice boot during their normal preflight inspection. However, if they had been informed of the maintenance, they might have discussed the work and conducted a visual inspection of the stabilizer’s upper surface.

Another factor discussed in the final NTSB board meeting was the failure of Continental Express maintenance and quality assurance personnel to treat the deicing boot replacement — which requires removal of the leading edge of the horizontal stabilizer — as a Required Inspection Item (RII). By doing so, a separate inspection by quality control inspectors would have been required of the work performed that night. Even though regulations clearly establish that the horizontal stabilizer is an RII, Continental

Express maintained that the deice boot/leading edge assembly was a “non-structural” item, and therefore not subject to the more rigorous inspection requirements.

Inadequate Safety Orientation

The NTSB report identified “substandard practices and procedures and oversight” by numerous individuals, each of whom could have prevented the accident. Included were mechanics, quality assurance inspectors, and supervisors, all of whom demonstrated a “general lack of compliance with the approved procedures.” Departures from approved procedures included failures to solicit and give proper shift-change turnover reports, failures to use maintenance work cards as approved, failures to complete required maintenance/inspection shift turnover forms, and a breach in the integrity of the quality control function by virtue of an inspector serving as a mechanic’s assistant during the early stages of the repair work performed on the accident aircraft.

Furthermore, investigators discovered two previous maintenance actions taken on the accident aircraft, each of which departed from the approved procedures, and each of which involved employees different from those engaged in the deice boot replacement. The first event was the replacement of an elevator without use of the required manufacturer-specified balancing tools, and the second was a



failure to follow specified procedures and logging requirements in response to an engine overtorque.

Finding no. 18 in the report sums up the issue of Safety Culture: "The deficiencies noted in the maintenance department at Continental Express indicate that the airline's management did not instill an adequate safety orientation in its maintenance personnel by emphasizing the importance of adhering to procedure." During the months and years after this investigation, the words "safety orientation" were replaced by the term "safety culture" in the lexicon of aviation safety. The seeds of Safety Management Systems (SMS) for aviation were planted.

The NTSB determined that the probable cause of the accident was "the failure of Continental Express maintenance and inspection personnel to adhere to proper maintenance and quality assurance procedures for the airplane's horizontal stabilizer deice boots that led to the sudden in-flight loss of the partially secured left horizontal stabilizer leading edge and the immediate severe nose-down pitch-over and breakup of the airplane." Contributing to the cause was "the failure of the Continental Express management to ensure compliance with the approved maintenance procedures, and the failure of FAA surveillance to detect and verify compliance with approved procedures."

A Rare Dissenting Opinion

But the story doesn't stop there. Following the adoption of the probable cause, a rare "dissenting opinion" was issued by one of the NTSB board members — Dr. John K. Lauber, considered a giant in the field of human factors. Lauber wrote: "I am perplexed by the majority decision that the actions of Continental Express senior



management were not [determined to be] causal in this accident. It is clear ... that the series of failures which led directly to the accident were not the result of an aberration, but rather resulted from the normal, accepted way of doing business at Continental Express. ... By permitting deviations to occur on a continuing basis, senior management created a work environment in which a string of failures, such as occurred the night before the accident, became probable. Accordingly, their role must be considered causal in this accident."

Lauber also expressed his concern that senior personnel responsible for maintenance did not understand that the leading edge of any airfoil is a critical component for which improper repair work could seriously compromise the safety of the aircraft.

As a result of this investigation the Safety Board issued four safety recommendations to the FAA to review the rules and practices regarding RII, advise pilots of critical maintenance actions, enhance surveillance of Continental Express, and emphasize inspection of equipment, procedures and quality assurance to evaluate the effectiveness of air carrier maintenance programs. **AM**



NEW THINKING ON A&P CERTIFICATE REQUIREMENTS, PART TWO

By Carl Ziegler, A&P, IA

“If everybody is thinking alike, then somebody isn't thinking.” This quote is attributed to the late General George S. Patton — patriot, warrior and a general in the U.S. Army — who commanded the troops in World War II in France and Germany after the Allied invasion of Normandy in June 1944. A brilliant tactician and as indicative of the quote, was open to new ideas if something wasn't working or a process could be done with greater efficiency. Unfortunately, it seems this is not the world we work in, especially when it applies to the government.

I put forth a possible NPRM earlier this year proposing to break the A&P license into an “unlimited rating” and a “limited rating”. The unlimited rating would be afforded those that have gone to an approved part 147 School. General aviation (GA) maintenance skills are continually deteriorating due to the loss of skilled technicians and the influx of new technicians that have only acquired the rating based on tactile time with no formal classroom training. The intent of the proposal was to provide ongoing and future safety margins for the general aviation fleet, in particular, because those individuals that are licensed on a “tactile hours”-based process are not necessarily qualified to work on light aircraft. Conversely, airline maintenance programs are structured and have oversight protection not available in GA part 91 operations. This disparity in the skills gap has grown substantially, specifically in the last five to ten years. I feel it is time for an evolutionary change to help maintain the thin safety margins that we now have.

In response to the NPRM proposal I put forth back in January (see Aviation Maintenance Winter 22/23 issue, page 38), a proposal to help enhance declining skill sets we are experiencing in aviation maintenance fields, the FAA has decided they have other, more pressing issues to deal with. These are the three reasons they cited:

1. The immediacy of the safety or security concerns you raise;
2. The priority of other issues the FAA must deal with; and
3. The resources the FAA has available to address these issues.

But all is not lost, I am so lucky to know that my comments and arguments for the proposed rule changes in my petition will be placed in a database. I am so lucky.

My proposal stressed that safety AND security could be greatly enhanced with absolutely NO cost to the consumer. All this with the

stroke of a pen. Of course, the FAA is pretty busy trying to cover all the ATC errors causing close calls. May I point out that it was the skill set of at least one party in each of the recent events that prevented collisions. That party was not the FAA. They are also busy trying to get everyone on board with SMS. The Dynamic Regulatory upgrades have to be eating lots of time from various departments. And thank goodness the FAA has established the “Office of Investigations and Professional Responsibility.” Warm fuzziness all over. I can see why important issues like safety going forward isn't on the plate.

I was just on the U.S. Bureau of Labor Statistics website. You have it bookmarked, right? Check out the breakdown of aircraft mechanic and service technicians. I could not find any references to skill and pay for anything OTHER than air transport related employments. Seriously? Who maintains the 200,000 General Aviation aircraft? The new part 147 rewrite is solidly aimed to benefit the transport sectors. No dope and fabric and welding. ATEC, which should be looking out for our interests in all aspects of our industry, is amazingly silent on anything outside of high end aviation. On the ATEC site, the Oliver Wyman link states that by 2027 demand for maintenance technicians will outstrip supply by 9%. That was the MRO 2017 survey and again, was only talking air transport. Extrapolate where we are now. In every magazine and website I read, all personnel and skill shortages are referenced to the air transport sectors. If you are an FBO and not affiliated with a major jet center, you tell me what you are seeing for skill sets.

I recently renewed my Inspection Authorization and I found out that due to processing backlogs I was number 400 on the list (last name starts with a Z). Really? There are more than 400 IAs in the state of Minnesota. Major jet centers are expanding across the country but lament the lack of talent that may not materialize with new ventures. COVID killed many smaller FBOs. How are we in aviation going to secure and train qualified warriors to guarantee the safety of our aging fleets? The NPRM I submitted put mentoring in the forefront to support that end. Technically, in Minnesota, we could have 400 IAs available for mentoring newly minted and aspiring technicians. A training force the FAA could never envision, but then again, everybody is thinking alike.

Carl Ziegler is an A&P and IA mechanic and can be reached at planemech@yahoo.com. [AWI](#)

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5 POWERFUL PRINCIPLES FOR MAKING THE RIGHT DECISIONS

A FRAMEWORK
FOR MAKING
THE RIGHT
DECISIONS
BOTH AT WORK
AND AT HOME

BY BRUCE WEINSTEIN, PH.D.,
THE ETHICS GUY

H

ere are five powerful principles that will help you make the right decisions in your aviation maintenance business and in your personal

life too. They're a framework, not a formula, for leading with ethical intelligence.

I'll show how several aviation companies and the Mechanic's Creed acknowledge the importance of these principles. I'll also include questions to reflect upon so that you can enhance the good work you're already doing.

Principle #1: Do No Harm

The most fundamental principle of ethical leadership is Do No Harm. What group of people immediately comes to mind when you see the phrase, "Do No Harm"? Probably healthcare workers. After all, physicians, nurses, pharmacists, dentists and clinical social workers are taught in school, "First, do no harm."

But this principle applies to the aviation maintenance industry too. The best thing about Do No Harm is that all it takes to apply it is — nothing! It is a principle of restraint.

The least we can expect from one another is that we don't make matters worse. Leading aviation companies refer to this explicitly in their codes of conduct.

For example, in its document "The Way We Fly," Delta Airlines states: "We believe no level of harm is acceptable to anyone as a cost of doing business. Take time to understand the safety policies and procedures for your job."

For reflection: What is one simple thing you can do today to avoid causing harm to the people you serve, the people who work with you and yourself?

A Crucial Corollary: Prevent Harm

Do No Harm is a principle of restraint, but sometimes it is necessary to do something so that harm doesn't occur. A crucial corollary of Do No Harm, then, is Prevent Harm. You apply this principle in your business by double- or triple-checking your work to ensure that others won't be unintentionally harmed by your products or services.

In its Standards of Business Conduct, American Airlines notes the central role that Prevent Harm plays in the aviation maintenance industry: "It may seem easier to keep silent or look the other way, but taking no action can result in serious consequences. Remember, we cannot honor our company's bedrock commitment to integrity if we ignore concerns about suspected illegal or unethical actions."

Doing nothing is easier than doing something, but aviation maintenance is one industry that cannot abide by anyone at any level of any organization failing to prevent harm to others.

For reflection: What can you do this week to prevent harm to your team members, clients or future passengers?

Principle #2: Make Things Better

It's not enough to Do No Harm or Prevent Harm. Ethical leaders are also committed to the principle Make Things Better.

The core of your company's mission is to enrich the lives of others. That enrichment can be partly a financial one, but that is not and cannot be your company's primary focus. The goal is to make flying a safe and effective means of transportation for the public and for private clients.

The good news is that making money and serving others are not mutually exclusive. The surest way to increase revenue for stakeholders is to focus like a laser on your mission of service.

For reflection: What is one more thing you could do to serve others to a greater degree than you're already doing?

Principle #3: Respect Others

From an ethical perspective, we show respect for people by keeping our promises, telling the truth, and protecting confidentiality.

Let's look at each in turn.

Keep Your Promises. We think of contracts between companies and employees as legal documents. They are. Above all, however, they are promises. Employees promise to do what their job descriptions or statements of work require of them. In return, employers promise to pay their employees and perhaps offer benefits like health insurance and sick leave.

For reflection: What can you do to ensure that you are keeping your promises to the people you serve—and who serve your business?

Tell the Truth. Jerome Lederer's Mechanic's Creed speaks of the importance of truth telling: "I pledge myself never to undertake work or approve work which I feel to be beyond the limits of my knowledge..." Otherwise, you would be presenting yourself as someone you are not. You would be deceiving the people you are sworn to serve. In so doing, you would be disrespecting them.

For reflection: What can you do to ensure that both you and everyone who works for you will refrain from misrepresentation? Even if you lose business in the short run, how might your company benefit in the long run by doing so?

Protect Confidentiality. AAR's code of conduct, "Doing it Right," emphasizes the importance of keeping confidential information confidential. "Doing It Right in the workplace. ...means protecting personal data we may have access to about our fellow employees."

It's amazing how frequently one hears confidential information discussed in public. I was once in a hospital elevator and overheard two physicians discussing the surgery they had just performed. They mentioned the patient's full name and what the procedure was.

I wasn't eavesdropping. It's hard not to overhear conversations in an elevator. I knew the physicians in question. They were good people. In discussing confidential information publicly, however, they did not evince the greatest respect for their patient.

For reflection: What is one simple thing you can do to protect your business and your clients from having sensitive information divulged?

Principle #4: Be Fair

The fourth principle of ethical intelligence, Be Fair, requires us to give to others their due. One necessary way that aviation maintenance professionals do this is by ensuring their workforce is a diverse one.

For example, as a subsidiary of the Lufthansa Group, Lufthansa

Technik abides by the following commitment: [D]iversity and equal opportunities are important and necessary. It makes the company more open-minded and creative — essential qualities for remaining innovative and flexible. This also leads to a more varied understanding of customer needs and contributes to the customer-oriented development of products and services. At the same time, the Lufthansa Group's diversity approach underscores the appreciation of, and equal opportunities for, all employees.

For reflection: What is your company doing to promote diversity and other aspects of fairness? How might the business benefit by making this a priority?

Principle #5: Care

At the beginning of a flight, the flight attendant tells us, "In the event of the loss of cabin pressure, oxygen masks will drop down. Put the mask on yourself before attempting to help others." Why? Because if you're not in good shape, you're in no position to help anyone else.

Leaders in the aviation maintenance industry care about the people who work for them and the clients they serve. They also care about themselves. They strive to eat healthfully, exercise, and get enough sleep. It's not always easy to do this, but that's part of what ethical leadership is about.

For reflection: Are you caring for yourself as well as you care for others? What is one thing you could do to treat yourself in a more caring fashion?

Summary

As a leader in the aviation maintenance industry, it is smart to base your decisions on the following principles:

1. *Do No Harm (and its corollary, Prevent Harm)*
2. *Make Things Better*
3. *Respect Others, which you do when you:*
 - *Keep Promises*
 - *Tell the Truth*
 - *Maintain Confidentiality*
4. *Be Fair*
5. *Care*

It is difficult to live by these principles every day, which is why you are to be commended for having read this far. It means you take this matter seriously and are willing to take a few moments from your day to commit to being at your best. Thank you.

Acknowledgment

I adapted these principles from Tom L. Beauchamp and James F. Childress's masterwork, *Principles of Biomedical Ethics* (Oxford University Press). I simplified the language (e.g., their Principle of Nonmaleficence becomes Do No Harm here). I also broadened the scope of the principles to include the aviation maintenance industry. You've also learned them from your parents, teachers, mentors, and spiritual leaders. In no way do I claim I came up with these principles. Consider this article a brief refresher course. I hope it has been useful.

About the Author

Dr. Bruce Weinstein helps companies ensure ethical conduct at every level of their organizations. Continuing education credits in ethics are available. To invite him to speak to your staff or at your next conference or to create a customized ethics video they can watch when they want, contact him at TheEthicsGuy.com or at (424) 394-0804.



China is Looking for Global Partnerships

The aviation industry of China is open for business. This is not a mere slogan — China is taking specific steps to open their aviation industry to non-Chinese participation.

I was looking at some back issues of *Aviation Maintenance* and I came across an article I wrote thirteen years ago entitled "China: More Open to Business Ideas Than You Might Think." This is still true. China has a large fleet of aircraft that is expected to grow. While the first delivery of the Comac C919 means that China is now the proud manufacturer of a transport category passenger aircraft, there is still a significant investment in Airbus and Boeing aircraft that ties Chinese airlines to Western support for the foreseeable future.

I just returned from a trip to China and I find that the rhetoric in the media is very different from the discussions being had about aviation safety. I met with the Chinese government to discuss aviation safety programs and two things were very evident. First, the Civil Aviation Authority of China remains steadfastly committed to aviation safety. But second, in the wake of Covid, China is now "open for business."

China really is trying to be open for business. The Chinese government is taking affirmative steps to open their aviation markets. This is not just about China opening its markets to the United States. China is trying to open its markets to the world.

The first way that they are doing this is by endorsing modern distribution quality assurance programs. The Chinese government has issued guidance explaining that Chinese airlines who intend to obtain parts from distributors must make sure that the distributors are accredited to an acceptable standard (CAAC Advisory Circular AC-120-FS-058 R3). The companion document, Information Bulletin IB-FS-MAT-001 R1, explains that there are two acceptable accreditations for distributors seeking to sell into China. The first is CAMAC ASP-R5. This standard is administered by the Civil Aviation Maintenance Association of China and is largely intended for domestic (Chinese) distributors. The second acceptable accreditation is the Aviation Suppliers Association's ASA-100. This standard was developed as an international standard that has been formally endorsed by the FAA and EASA, and the Chinese government intends to rely on it mostly for foreign (non-Chinese) distributors.

This reliance on ASA-100 provides a mechanism for companies to demonstrate that they have adopted a quality system that is acceptable to the Chinese government, and that provides an acceptable level of safety.

A second way that China is embracing international business is by embracing the latest iterations of safety management systems (SMS). China has added SMS to the latest revision of its CCAR-145 repair station rules. This means that Chinese repair stations will meet the SMS requirements that other countries are imposing on the repair station community (EASA is requiring European repair stations to adopt SMS programs; the FAA chose not to include U.S. repair stations in the latest SMS notice of proposed rulemaking). This helps to ensure that Chinese repair stations will have safety systems comparable to those required by much of the rest of the world.

I was impressed by the Chinese decision to integrate SMS into the CCAR-145 rule. This sort of integration takes more government effort, but it makes it easier for repair stations to build a single system that complies with the regulations (easier than when the government issues a set of SMS regulations that are separate and potentially duplicative of the existing rules).

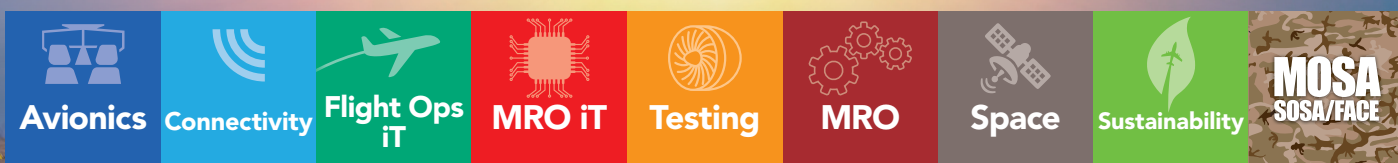
The third important change is a collaboration being developed by the Aircraft Fleet Recycling Association (AFRA) and the Chinese government that will permit China to use parts that are removed from aircraft — everywhere around the world.

Under current law, a Chinese repair station may not maintain a component that is removed from an aircraft by a third party ("used serviceable material") and a Chinese operator may not permit installation of that used serviceable material following maintenance, unless the component has met three important conditions:

1. It was removed from the aircraft by a CCAR-145 (Chinese) repair station;
2. At the time of removal, the CCAR-145 repair station identified the component with a removal tag meeting CAAC standards; and
3. The CCAR-145 repair station listed the removed component in a centralized database of acceptably-removed parts.

CAAC has identified that it wants to extend this program to

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permit qualified disassembly facilities outside of China to be able to sell used serviceable material into the Chinese market. To do this, they have been working with AFRA to develop a Limited-Disassembly-Program that will allow non-Chinese disassemblers to obtain CAAC approval. This very limited approval would permit the companies to remove parts from aircraft of any registry, tag them according to Chinese standards, and list them in an English language database that can be used to verify the provenance of the components.

This program will meet a number of Chinese priorities including ensuring that parts are removed under acceptable practices that are intended to prevent damage to the parts. This meets a Chinese desire to protect their system from parts that may have been damaged during disassembly or during subsequent handling. The program will ensure a level of parts handling that is consistent with the AFRA Best Management Practice (BMP). The plan includes an English language database for verifying parts. This meets a Chinese desire to protect their system from parts of unknown provenance.

The AFRA-CAAC program is an ongoing project, but it shows CAAC's commitment to safety and their commitment to opening the Chinese market to aircraft parts that can be demonstrated to be safe.



I am told that China is flying at about 75% of the number of flights available in 2019, and they hope to get back to 100% by the end of the year. This market is rapidly returning to prominence in the aviation marketplace, and they have made it clear that they want to be a partner in the global aviation community. 



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