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GROUND SUPPORT EQUIPMENT

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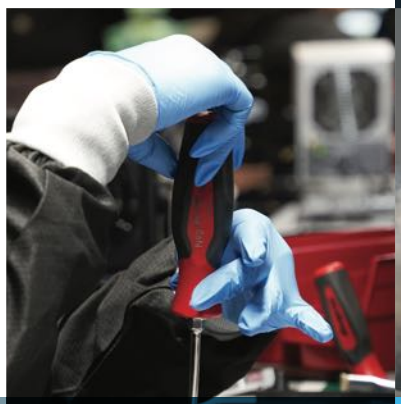

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CONTENTS

Q1 2025

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DEPARTMENTS

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

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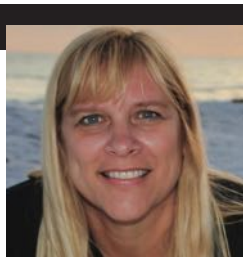

Exciting Times

BY JOY FINNEGAN
EDITOR-IN-CHIEF

Every year I think to myself, what a time to be alive and working in aviation. We are, in fact, living through amazing times in aviation. There is rarely a dull moment, whether it be the ups and downs of Covid, the recent threat of tariffs from the current administration, or going from giddy-up to whoa in pilot hiring or the reverse of that in the aviation maintenance industry.

There is continued growth in the commercial aviation realm. Every time we think it can't possibly get any bigger, we are proved wrong. Even when there is a global event like Covid, we come back stronger than ever. Pent-up demand for travel creates an environment for growth. Humans love to travel and have a need to travel, whether it be for work, pleasure, to see family or any combination thereof.

Quick figures from A4A reveal commercial aviation drives 5% of U.S. GDP — the equivalent of $1.45 trillion in 2024. Every day, U.S. airlines operate more than 27,000 flights carrying 2.7 million passengers to/from nearly 80 countries and 61,000 tons of cargo to/from more than 220 countries. A4E (Airlines for Europe) also reports big numbers: about 1.9 million passengers a day, eight million flights and more than 12 million jobs. And these aren't even the growth markets. The Asia-Pacific region is the relative newbie, predicted to grow by leaps and bounds in the next 20 years.

Globally, the numbers are staggering. According to the International Air Transportation Association (IATA), aviation holds 86.5 million jobs, contributes $4.1 trillion to the global economy and is 3.9% of the total global GPD. All of the numbers here were published in 2024 and reflect the previous year when we were still seeing impacts of and recovering from the Covid crisis.

With the huge numbers mentioned, we need to ensure aircraft are safe and properly maintained more than ever. There was a rash of aircraft accidents early this year which caused concern among the flying public about the safety of the industry. I saw numerous comments on social media asking if it was safe to fly. We know it is but it's always concerning when the flying public starts to worry.

As always, this issue of **Aviation Maintenance** includes timely topics that will help increase understanding, give insight into what successful companies are doing, share ideas on what is working in the industry and provide info about products and services that can assist in our shared goal of keeping aircraft safely flying as we meet the challenge of those numbers.

Our cover story takes a look at non-destructive testing (NDT). We spoke to NDT service providers like SEAL Aviation and FL Technics, who sponsored the story, and makers of specialized products like Evident and Waygate, who are leading the way in providing services and technology to help ensure, in the most efficient way, the aircraft engines and structures we fly in every day are sound. Check out that story on page 38.

Next, we have an interview with the leader of the Lithuanian-based powerhouse MRO, FL Technics. This company has literally taken off in the MRO market. With incredible focus, CEO Zilvinas Lapinskas has guided the company from a small, one-hangar operation in Vilnius with a few Russian and ex-Soviet Union countries' airline operators for clients, to a global force to be reckoned with. In our wide-ranging talk, we spoke about the early days, their growth and their new project in Punta Cana, Dominican Republic. We've covered the growth of this company for years and it has been amazing to watch. Check out my chat with Zilvinas Lapinskas starting on page 24.

We also delve into robotic process automation — RPA for short. Although that has a nice futuristic ring to it, this isn't your father's robotics. It's a new take on how to automate tedious, time-consuming, labor intensive processes. With the shortage of maintenance personnel, automating anything possible is going to be key to gaining the competitive edge. Learn how software providers like Ultramain Systems and Ramco utilize RPA and the benefits of implementing them, especially as MROs become more digital. That story begins on page 30.

From the moment an aircraft pulls onto the ramp or into a hangar, until it rolls out the door, we need ground support equipment (GSE) to assist in taking care of that aircraft. Of course, it's also used for refueling, boarding and other essential phases. We take a look at the crucial role these pieces of equipment play in supporting the operations of aircraft while on the ground, maintaining safety and ensuring that flights can depart and arrive on schedule. That story beings on page 46.

Next, we had to talk about tariffs. The use of tariffs seems inevitable. But as we have already seen, the current administration has caused some confusion as it begins to impose them, but almost as quickly pauses them. How are tariffs going to impact our business? We asked experts Jason Dickstein, general counsel with the Aviation Suppliers Association (ASA) and Christian Klein, executive vice president of the Aeronautical Repair Station Association (ARSA) to give us their take on the tricky talk of tariffs. Read more on page 52.

As the industry continues to struggle to get new people trained and ready to work, let me also highlight this workforce initiative taking place in Canada. It is getting people trained and up to speed quickly and safely, without spending a fortune. Learn how the Work-Based Learning Consortium is succeeding starting on page 60.

We also have a slate of columns from amazing experts. First, anytime we have questions about the challenging supply chain situation, we reach out to Chris Brumitt, managing director at supply chain consultancy Maine Pointe. He says moving to a predictive supplier quality process is the way to go — see his column on page 64. We have our trusty column, Legal Spin, in which Jason Dickstein also suggests ways to break supply chain bottlenecks on page 68. And finally, Billy Webb, senior director at Mass Virtual, explains how extended reality (XR) could help fill the growing skills gap among maintenance technicians on page 70.

Hope you enjoy this issue and the **Aviation Maintenance** team will see you in Atlanta for the MRO Americas show!

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FCAH Announces Amy Merkley as COO of MRO Services and Mike Abram as President of Cobalt Aero Services

FCAH Aerospace has appointed Amy Merkley as chief operating officer of MRO services and Mike Abram as president of Cobalt Aero Services.

Merkley is a seasoned industry leader with an impressive history of driving operational excellence, building high-performance teams and spearheading strategic growth initiatives. In addition, she has a proven track record in managing global operations, driving market expansion and aligning organizations. Previously, she served as COO at Precision Aviation Group (PAG) and as a senior vice president at Meggitt. In her role, Merkley will oversee all maintenance, repair and overhaul (MRO) operations for FCAH Aerospace, ensuring the company continues to exceed customer expectations while enhancing operational efficiency.

Mike Abram joins Cobalt Aero Services with extensive leadership experience and an unwavering focus on customer satisfaction. Previously, Abram spent 15 years at Triumph Group where he was responsible for spearheading organic growth and operational initiatives.

"These appointments mark a pivotal moment for FCAH Aerospace as we continue to elevate our leadership and capabilities," Isac Roths, CEO of FCAH Aerospace, commented. "Amy and Mike are dynamic leaders whose expertise and passion align perfectly with our mission to deliver outstanding value to our customers. Their contributions will drive innovation, strengthen our market position, and take FCAH Aerospace to new heights. Together, Amy and Mike bring a wealth of knowledge, experience, and leadership that will undoubtedly enhance our organization's success and reinforce our commitment to excellence in the aviation industry."

AFI KLM E&M and Air Canada Sign Major 10-Year Contract for Component Support of Boeing 787 Aircraft

Air France Industries KLM Engineering & Maintenance (AFI KLM E&M) and Air Canada signed a landmark 10-year contract for the component support of 58 Boeing 787 Dreamliner aircraft. This agreement marks the first major component support contract between the two airlines and includes the establishment of a new pool stock positioned in Toronto, Canada, to support Air Canada's expanding operations. Starting with a fleet of 39 aircraft on May 1, 2024, Air Canada plans to grow its fleet to 58 Boeing 787 Dreamliners by 2029. The contract also encompasses an option for 12 additional 787 aircraft, further underscoring Air Canada's commitment to fleet modernization and expansion.

With this Component Support contract, the Canadian airline has deepened a long-standing partnership with AFI KLM E&M of more than 15 years. This collaboration has included programs such as the GE90, CFM56, APS5000, and airframe events, demonstrating a robust history of mutual trust and cooperation.

"This groundbreaking agreement with Air Canada is a testament to our shared vision of innovation and excellence in aviation", stated Mathieu Essenberg, executive vice president of KLM Engineering & Maintenance. "We are honored to provide robust component support for Air Canada's expanding 787 fleet. This collaboration leverages the strengths of both airlines and sets a new standard for industry partnerships. We look forward to a decade of mutual growth and success."

"We are excited to embark on this new chapter with Air France Industries KLM Engineering & Maintenance, a partnership that signifies our shared, unwavering commitment to operational excellence and customer satisfaction," said Josh Vanderveen, vice president of Air Canada Maintenance. "The support for our growing 787 fleet will not only enhance our service reliability but also fortify our position as a leader in the aviation industry. This agreement is a strategic milestone in the ongoing modernization of our fleet so we can keep delivering a world-class travel experience to our passengers."

AJW Group Appoints Donal Boylan as President - Asia Pacific

AJW Group recently announced the appointment of Donal Boylan as president – Asia Pacific.

With 35 years in aerospace and defense, Boylan has held senior engineering and commercial roles, including founding partner at BCAP, board vice chairman at Vietjet Air JSC and CEO at Bohai Leasing (Hong Kong) owner of Avolon. He has successfully led aircraft leasing companies through major expansions and public listings and co-founded RBS Aviation Capital (now SMBC Aviation Capital).

In this current role, AJW says Boylan will drive strategic initiatives to bolster the AJW Group brand, strengthen customer relationships, and accelerate growth throughout the Asia Pacific market.

"We are delighted to welcome Donal to our Singapore office as president – Asia Pacific," said Christopher Whiteside, chairman of AJW Group. "His deep industry expertise and proven leadership will be key to driving our regional growth and maintaining our commitment to excellence in aviation asset management."

GE Aerospace to Invest Nearly $1B in U.S. Manufacturing in 2025

GE Aerospace says it plans to invest nearly $1 billion in its U.S. factories and supply chain to strengthen manufacturing and increase the use of innovative new parts and materials needed for the future of flight. This new investment is nearly double last year's commitment and will help increase engine safety, quality, and delivery, benefitting more than two dozen communities across 16 states, it says. The company also announced it will hire around 5,000 U.S. workers this year, including both manufacturing and engineering roles.

"Investing in manufacturing and innovation is more critical than ever for the future of our industry and the communities where we operate," said H. Lawrence Culp, Jr., chairman and CEO of GE Aerospace. "We are committed to helping our customers modernize and expand their fleets while scaling technologies that will truly define the future of flight. Together, this will keep the United States at the forefront of aerospace leadership."

GE Aerospace is growing its capacity and expanding several key sites, especially those that support the production and assembly of the narrowbody CFM LEAP engine, where deliveries are expected to increase by 15-20% this year. The company says these investments, combined with GE Aerospace's proprietary lean operating model, FLIGHT DECK, are improving safety, quality, delivery and cycle times. Some of these investments include:

- $113 million in Greater Cincinnati: Facility upgrades and additional equipment for several sites in the area that produce, test, and assemble many of the company's commercial and military engines.
- $70 million in Muskegon, Michigan: Breaking ground on an expansion to produce parts for the hot section of the engine.
- $16 million in Durham, North Carolina, and $5 million in Lafayette, Indiana: Additional equipment to support the assembly of commercial engines, including LEAP.
- $13 million in West Jefferson, North Carolina: Expanding the building to increase production of key parts of the engine.
- $200 million investment in military engine production: The company is investing in sites, including Lynn, Massachusetts, and Madisonville, Kentucky, to get ready for the new T901 Black Hawk and Apache helicopter engine and continue producing other military engines.

The company's investments are also scaling the production of parts made from new materials and advanced manufacturing processes that provide engines with more range, power and efficiency. This includes additive manufacturing, or 3D printing, which reduces part count, increasing fuel efficiency and durability while providing greater design freedom as well as ceramic matrix composites (CMCs). CMCs are one-third the weight of traditional materials but can operate at up to 500 degrees hotter, meaning greater power and durability for engines. Among the investments to further scale these technologies include:

- $51 million in Auburn, Alabama: Additional 3D printers, upgrades to existing equipment and tooling to increase capacity and ensure quality.
- $14 million in West Chester, Ohio: Additional 3D printer, industrial furnace, and upgrades to facility to increase capacity.
- $22 million in Huntsville, Alabama: Additional machines to produce materials that are the building blocks for ceramic matrix composite engine parts.
- $20 million in Asheville, North Carolina: Additional equipment to produce ceramic matrix composite engine parts, new inspection equipment, and advanced machines that can shape metal parts to precise specifications.
- $11 million in Batesville, Mississippi: Industrial oven, precision measuring tools, high-precision machines, and inspection technology to maintain quality.

The almost $1 billion investment includes $100+ million dedicated to the company's external supplier base, providing investments to ensure suppliers are using the newest tools to produce parts, further reducing defects and supply chain constraints.

Last year GE Aerospace says it hired more than 900 engineers and 1,000 new manufacturing workers, which will increase to 5,000 this year. GE Aerospace and its Foundation will also donate $2.3 million to more than a dozen communities to support workforce development skills training.

Lufthansa Technik Malta to Build New Hangar for 787 Dreamliner Cabin Modifications

Lufthansa Technik Malta is expanding its location and capacities. From autumn 2026, a new 6,400-square-meter hangar will be used to carry out base maintenance services, particularly cabin modifications on 787 Dreamliner aircraft. As a Boeing-licensed service center, Lufthansa Technik is the only MRO (maintenance, repair and overhaul) provider worldwide authorized to perform the combination of 787 cabin modification engineering services and their implementation. The new building will provide space for one widebody aircraft. Additionally, three parking spots for narrowbody aircraft will be established. All this will create around 70 new jobs. Lufthansa Technik recently acknowledged the signing of the expansion agreement with representatives in Malta.

"With the expansion of our base maintenance service center in Malta, we are strengthening the global network of Lufthansa Technik and, in addition to the previously announced construction of two new facilities in Portugal and Canada, we have achieved another major milestone in our corporate strategy within a few months," said Harald Gloy, chief operating officer at Lufthansa Technik. "Lufthansa Technik Malta will be the first location worldwide where Lufthansa Technik will carry out work on the 787 Dreamliner as a Boeing-licensed service center for cabin modifications. This will not only create new options for our customers, but also highly qualified jobs in Malta."

With the addition of a new hangar, which will be attached to the existing buildings, Lufthansa Technik Malta will have a total of four hangars capable of carrying out MRO on nearly all commercial Airbus aircraft — except the A380 — as well as on the Boeing 787 Dreamliner. The new hangar is expected to be operational by autumn of 2026, following a construction period of 18 months.

"The context of this investment is the positive economic performance of our country as since 2013 the economy has grown by 86 percent to well exceed the average growth in the Euro Zone which stands at 14 percent," said Robert Abela, the Maltese Prime Minister. "This new project is not only a testament to the resilience of our economy but also a reflection of the commitment to excellence that characterizes our workforce and our nation. Thank you, Lufthansa Technik for your trust in Malta as a strategic partner for your future growth — you will find us as resolute supporter and partner — let us embrace this moment with optimism and resolve."

Maria Cilia, chief executive officer of Lufthansa Technik Malta, said, "Today marks a historic moment for Lufthansa Technik Malta as we embark on a transformative journey that will shape the future of our company. This significant project is more than just an investment — it is a testament to our commitment to growth, innovation, and excellence in aviation maintenance. Together with my 570 colleagues here in Malta, I take immense pride in seeing our site expand into new frontiers. The launch of our 787 Dreamliner cabin modification projects represents an exciting evolution for our operations, building on our proven expertise in base maintenance for this aircraft type. As CEO, an engineer, and a proud Maltese, I see this expansion as an opportunity that extends beyond our company. It strengthens Lufthansa Technik Malta, creates opportunities for our employees, enhances the experience for our customers, and reinforces Malta's position as a thriving aviation hub. This is not just about today — it is about shaping the future of aviation in Malta."

The company will hire an additional 70 employees by the time the new hangar becomes operational, increasing the total number of staff to nearly 650.

Last year, Lufthansa Technik received Boeing's license to carry out cabin modifications on 787 Dreamliner aircraft. Since then, preparations have been underway. The first cabin modification is scheduled to start this year in one of the existing hangars in Malta. As a Boeing-licensed service center for 787 cabin modifications, Lufthansa Technik is authorized to design new cabin interiors, provide the corresponding engineering, and carry out the integration according to customer requirements. With the license granted by Boeing, Lufthansa Technik will also manage the certification process.

Turkish Technic and Air India Express Expand Partnership

Turkish Technic has signed an agreement with Air India Express, subsidiary of Air India group, covering their Boeing 737-8 and 737-10 fleet. The agreement includes the component support and solution needs of 190 Boeing 737-8 and 737-10 aircraft, enabling Air India Express to benefit from extensive component services such as component pooling, repair, overhaul, modification, and logistics services of Turkish Technic. Leveraging its extensive global supply chain and technical expertise, Turkish Technic continues to enhance the operational efficiency and fleet reliability of Air India Express's fleet.

"We are happy to further strengthen our partnership with Air India Express through a new agreement. The continuation of our cooperation is a testament to our reliability in component support, supply, and solution services. We are confident in our capabilities and global supply chain network to continue enhancing their operational efficiency. We thank Air India Express for choosing us as their trusted solution partner. We are excited to contribute to the elevation of Indian aviation," said Mikail Akbulut, CEO and board member of Turkish Technic.

Aloke Singh, managing director, Air India Express, added, "We are happy to have Turkish Technic as our partner for the component support and solution service for the B737-8 and B737-10 aircraft. The collaboration will further bolster our repairs and maintenance competencies for the airline's rapidly growing B737 family of aircraft and enhance our reliability and availability of components for aircraft operations."

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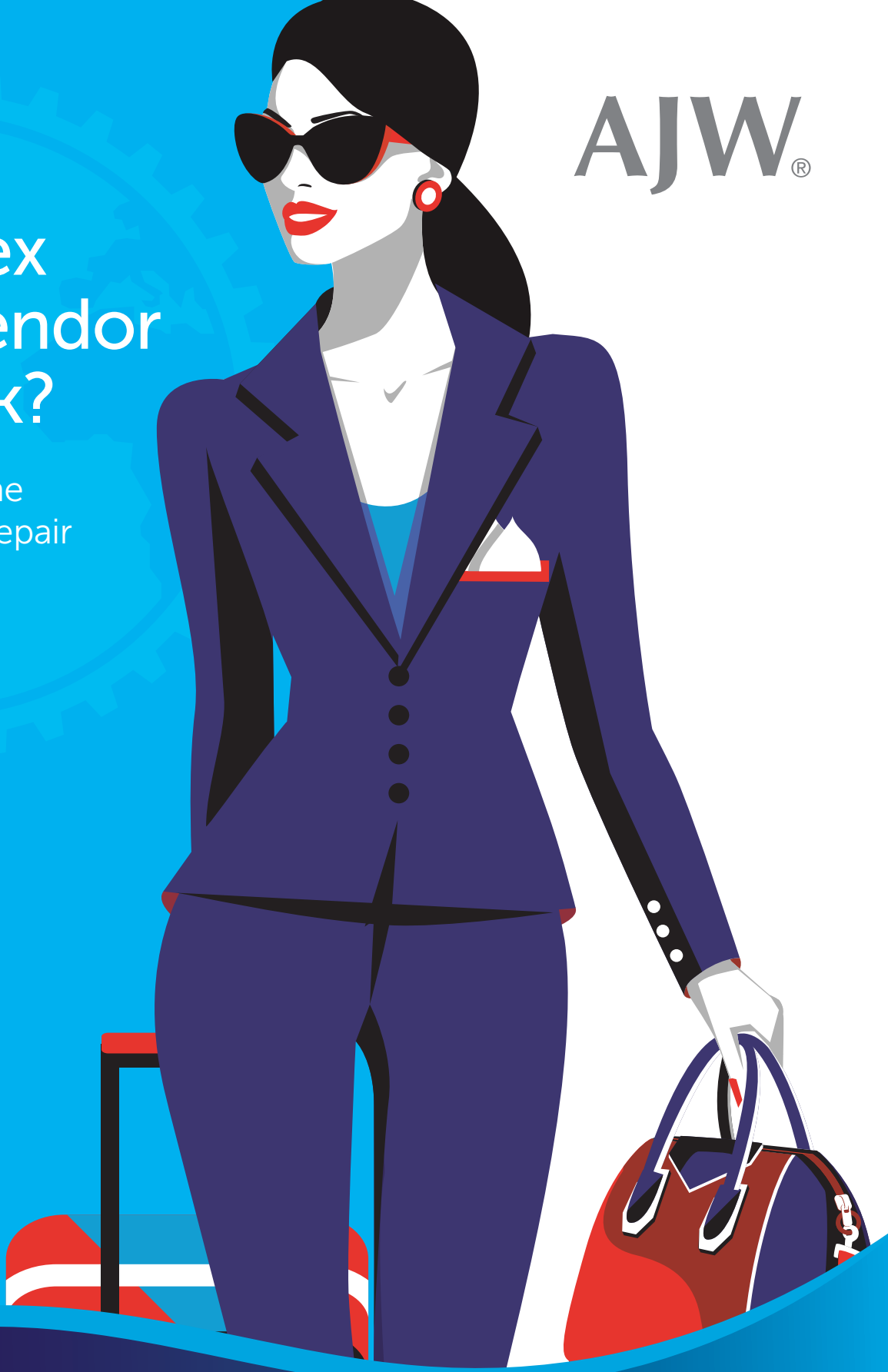

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Trax and Cathay Pacific Sign Digital Transformation Deal

Trax announced that Cathay Pacific selected Trax to power its engineering department's strategic digital transformation.

Trax's comprehensive, web-based eMRO solution, fully managed cloud hosting services, and a selection of its innovative eMobility applications, including AeroDox, VisualCheck, Line Control, TaskControl, and eContent Control, will be at the center of Cathay Pacific's shift towards real-time, data-driven maintenance operations. Trax's advanced mobile and cloud-based solutions will provide the airline with instant access to critical operational data, enabling informed decision making, improved coordination, and increased productivity, all in a paperless environment.

"Trax is honored to be at the center of Cathay Pacific's Engineering Department's digital transformation," said Andrew Schmidt, executive vice president of Trax. "We are delighted that another Tier 1 operator has joined our Trax community to experience enhanced airworthiness control, integrated planning, streamlined processes, and a fully digital and paperless maintenance environment. Our eMRO solution will enable Cathay Pacific to improve its overall fleet performance and integrate innovative practices into its daily operations."

"Trax's advanced maintenance solutions will modernize our operations, providing improved coordination and greater efficiency to support our commitment to safety, operational reliability, customer centricity, and innovation," said Keith Brown, Cathay's director of engineering. "The implementation of Trax's solutions will further enhance Cathay Pacific's goal of being an industry digital leader."

StandardAero Appoints Bondada to VP, Investor Relations

StandardAero has appointed Rama Bondada to serve as vice president, investor relations, as of March 17, 2025.

In this new role for StandardAero, Bondada will be responsible for developing and executing a comprehensive investor relations function and program. He will take the lead in maintaining effective relationships with the investment community and ensuring consistent and timely communication of financial results for the company. Bondada will report to Dan Satterfield, chief financial officer of StandardAero and will be located at the company's Scottsdale, Arizona headquarters.

Prior to joining StandardAero, Bondada served as vice president, investor relations, corporate strategy and U.S. corporate development for Lilium Aviation, where he also served as interim CFO prior to its recent privatization. Bondada has more than 15 years of experience in equity investing at several U.S. asset management firms such as First Manhattan, Balyasny Asset Management and Lord, Abbett and Co. Prior to his buy-side career he spent five years in investment banking and sell-side research at Royal Bank of Canada and Macquarie Capital.

His investment specialty has primarily focused on the aerospace and defense sector in addition to global industrials, transportation and materials. Bondada also worked for Lockheed Martin and Honeywell Aerospace.

"Rama will play a critical role in articulating the StandardAero narrative, vision and strategy, and educating the investor community in our inaugural year as a publicly traded company," said Satterfield. "His deep knowledge and experience with financial, industrial and aerospace markets, brings immediate and relevant capabilities to StandardAero, along with the know-how to raise the bar for our investor relations program and profile."

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Innovative Solutions & Support Unveils Next-Gen Prodigy 3ATI Integrated Standby Unit

Innovative Solutions & Support (IS&S) has introduced the Prodigy 3ATI Integrated Standby Unit (ISU). The company call it "a breakthrough in standby instrumentation that enhances flight safety, reliability and efficiency for both fixed-wing and rotary aircraft."

When primary systems fail, pilots rely on standby instruments to maintain control and ensure a safe flight. The IS&S Prodigy 3ATI ISU consolidates essential flight data into a compact, high-performance display system, setting a new standard in aviation instrumentation. Designed as a direct form, fit and function replacement for legacy standby systems, the ISU simplifies installation while delivering unmatched performance.

The unit presents critical flight information — including altitude, attitude, airspeed, slip/skid, and navigation data — in a familiar Primary Flight Display format. Pilots benefit from an advanced LCD screen with full LED backlighting, ensuring exceptional readability even in direct sunlight. An ambient light sensor seamlessly adjusts brightness, enhancing visibility in all lighting conditions. At the core of the Prodigy ISU is an advanced Inertial Measurement Unit that provides precise attitude and heading data. When paired with an optional air data module, the system independently calculates altitude, airspeed, and Mach number, offering pilots reliable information in critical moments.

Built for versatility, Prodigy 3ATI offers both internal and external magnetometer interfaces and includes Directional Gyro mode as well as an optional autothrottle control capability. Its intuitive user interface and customizable options make it adaptable to a wide range of mission profiles. Prodigy is a compact Level A hardware/software 3ATI display, the unit maximizes space efficiency while maintaining industry-leading reliability. Certified to DO-160G and RTCA DO-178C Level A standards, it meets the highest levels of safety and performance.

Prodigy 3ATI comes with a five-year warranty and delivers long-term reliability and reduced maintenance costs. Its Installation Configuration Module simplifies integration, storing critical operational data such as static source error correction and aircraft-specific parameters. Additional configurable options, including NVIS compatibility and standby radio management, make it a highly adaptable solution for diverse aviation needs.

The IS&S Prodigy 3ATI Integrated Standby Unit is available for commercial, business, and military aviation applications.

Intelligent Energy Safety Insight Paves the Way for Hydrogen Fights in the U.K.

A new partnership between fuel cell pioneer Intelligent Energy (IE) and the Civil Aviation Authority (CAA) is bringing the promise of zero-emission hydrogen-powered flights in the U.K. a step closer.

The collaboration will play a key role in ensuring the safe operation of the first generation of fuel-cell-powered passenger aircraft that are predicted to take to the skies this decade.

Loughborough-based Intelligent Energy, a global leader in hydrogen fuel cell technology for more than 20 years, made history in 2008 by partnering with Boeing to achieve the first manned flight powered by a fuel cell.

The company continues to push the boundaries of hydrogen aviation, with innovations including a proprietary water injection cooling system that delivers unrivalled power density.

IE's 300kW IE-FLIGHT 300 (F300) product, launched in July 2024, has been designed to meet the needs of the first commercial zero-emission aircraft. It will power the Part 23 aircraft (with up to 19 seats) and electric vertical take-off and landing (eVTOL) aircraft that are set to transform urban air mobility. First deliveries are planned for 2027.

IE has been selected by the CAA to contribute to the second round of its U.K. Hydrogen Challenge, a pivotal initiative preparing the aerospace industry for the transition to hydrogen as a zero-carbon aviation fuel. IE's primary role will be to advance the safety and certification standards for fuel cell-based propulsion systems, ensuring their compliance with aviation regulations and expediting their integration into commercial use.

Jonathan Douglas-Smith, head of business development for IE-FLIGHT at Intelligent Energy, emphasized the significance of the partnership. "The U.K. is on track to lead the world in hydrogen fuel systems, but achieving zero-emission aviation requires more than just technological breakthroughs — it demands close collaboration between innovators and regulators," Douglas-Smith said. "With our deep expertise in fuel cell design, manufacturing and real-world applications, we are uniquely positioned to bridge this gap. Our involvement in the U.K. Hydrogen Challenge keeps us at the forefront of zero-emission aviation while also shaping the future regulatory landscape for sustainable flight."

The U.K. Hydrogen Challenge was launched in 2024 and trials in this second phase will run for three years.

"The long-term nature of the collaboration reflects the significance of the opportunity," Douglas-Smith added. "Ultimately, this work will be instrumental in refining hydrogen fuel cell systems to meet aviation safety standards and accelerate their certification. We're proud of our role in the project, which helps keep the U.K. a world-leader in hydrogen propulsion."

Airhub Aviation Strengthens Asset Management and MRO Services in Lithuania

As airlines and lessors face ongoing maintenance capacity shortages, Airhub Aviation, part of GetJet Aviation Holding, is expanding to meet growing demand. The Lithuania-based company, specializing in aviation asset management, component trading, and aircraft transitions, has launched new MRO operations at Siauliai International Airport (SQQ), Lithuania.

With the global aircraft fleet projected to grow by 28% over the next decade, Airhub Aviation is adding MRO capacity in Northern-Eastern Europe. "As the global fleet matures and stays in service longer, maintenance needs are evolving beyond scheduled checks. More lessors, asset owners, and operators are turning to MRO facilities for bigger maintenance scopes, such as second 12-year checks. At Airhub Aviation, we see a growing demand for flexible MRO solutions that go beyond scheduled maintenance, and we are ready to meet that need. Therefore, we are adding MRO capacity in Lithuania," said Oleg Novak, CEO of Airhub Aviation. So far, Airhub Aviation maintains it is the only provider in the region to offer new MRO capacity.

The facility enhances Airhub Aviation's ability to handle aircraft checks and (re)deliveries, aligning with its strategy to support its owned fleet as well as partner airlines and lessors. "With aircraft replacement cycles extending and mid-life aircraft in high demand, efficient transitions and technical support are more critical than ever. Our MRO facility allows us to better serve our clients by integrating maintenance into our broader asset management expertise," Novak added.

Airhub Aviation's first MRO season was highly successful, completing over 17 maintenance inductions, including seven heavy checks on A320ceo aircraft. The company supports eight CAMO clients, manages five line stations and oversees component repair management for over 100 customers. Its client base includes World Star Aviation, GA Telesis, TrueNoord and others.

"With the global fleet aging and quick replacements not always possible, the demand for comprehensive maintenance services is rising. Our facility in Lithuania enables airlines and lessors to prepare aircraft for sale, lease, or their next mission with minimal downtime, offering EASA compliance modifications, LOPA retrofits, and engine swaps — all under one roof," Novak said.

Located in Northern–Eastern Europe, Siauliai International Airport (SQQ) offers two of the longest runways in the region (3.5 km each) and operates as a dual-use civilian and NATO military facility, ensuring 24/7 access and high-security infrastructure.

"Our presence in Lithuania strengthens our ability to support fleet operators across Europe and beyond," said Novak. "With well-developed transport links and proximity to major airline hubs, SQQ is an ideal location for aviation asset management and maintenance operations."

The Siauliai MRO facility, completed in 2023, is one of the most modern MRO centers in Northern–Eastern Europe. It has the capacity to accommodate five narrowbody aircraft simultaneously or two narrowbody aircraft and one widebody aircraft, including models up to the size of a Boeing 747-8, Airbus A350-1000 or similar. This 183,000-square-foot facility serves as a one-stop shop for maintenance services, offering warehouses, workshops, and office spaces to provide airlines and lessors with streamlined and efficient maintenance solutions.

HAECO Supports MSC Air With Line Maintenance Services in Hong Kong

HAECO announced a new line maintenance agreement with MSC Air. MSC Air is a Milan-based freight carrier that now operates under the holding company, MSC Air Cargo. Under this agreement, HAECO will provide MSC Air with comprehensive line maintenance services for its new fleet of Boeing 777-200LRF freighter aircraft at Hong Kong International Airport, the busiest cargo airport in the world.

HAECO says it is uniquely positioned to support the operational performance of MSC Air's expanding fleet. HAECO's line maintenance solutions at its Hong Kong base will be a robust foundation as MSC Air grows its cargo network and services

under the MSC Air Cargo umbrella.

"We are thrilled to partner with MSC Air as their line maintenance provider in the strategic location of Hong Kong, the world's busiest cargo hub," said Gerald Steinhoff, chief commercial officer at HAECO. "By leveraging HAECO's industry-leading capabilities and expansive line services footprint both in Hong Kong and the Chinese Mainland, we look forward to becoming a trusted partner to MSC Air as they continue to expand their competitive cargo solutions."

Merlin Achieves FAA Approval for Custom Remote Data Concentrator

Merlin has received Federal Aviation Administration (FAA) Technical Standard Order (TSO) authorization for its custom remote data concentrator (RDC), developed in collaboration with Shadin Avionics. This FAA approval supports Merlin's ability to create certified advanced automation for an aircraft platform and marks a significant milestone in the ongoing flight test campaign of its certification-ready autonomy platform.

Designed to support the Merlin Pilot's advanced automation capabilities, the RDC ingests analog data from existing and new aircraft sensors, converts it to a digital format, and transmits it to Merlin's flight control computers. Merlin collaborated closely with Shadin Avionics to define the system, hardware, and design specifications. Receiving the FAA's TSO authorization confirms that Merlin's custom RDC meets rigorous airworthiness standards for both civil and military aviation applications, and once certified, is adaptable for various aircraft types and classes, including the C-130J and the KC-135.

"Our team is meeting technical milestones regularly, which significantly advances the Merlin Pilot towards certification while enhancing aviation safety and efficiency," said Matt George, CEO and founder of Merlin. "The FAA's authorization of our RDC is a major achievement in our Supplemental Type Certificate (STC) program, reinforcing the strength of our collaboration with Shadin Avionics and our commitment to the highest aviation standards. This approval is a critical step towards integrating safe and reliable autonomy into both civil and military airspace."

MTU Maintenance Opens Zhuhai Jinwan Branch

MTU Maintenance celebrated the official opening of MTU Maintenance Zhuhai Jinwan branch in mid-March. This additional site is a branch of MTU Maintenance Zhuhai, a joint venture between MTU Aero Engines and China Southern Airlines. It will focus on Pratt & Whitney PW1100G-JM engines and have a yearly capacity of up to 260 engine shop visits annually once ramped up. Combined with its main site, MTU Maintenance Zhuhai, which lies just 20 kilometers away, it aims to be the largest maintenance repair and overhaul facility in the world, with a capacity of over 700 shop visits.

"We are delighted to be celebrating the entry into service of MTU Maintenance Zhuhai Jinwan branch," says Zeng Yongchao, vice general manager of China Southern Airlines Group. "With the coordinated layout of two factories, MTU Maintenance Zhuhai has established core advantages to seize the opportunity of strong growth in the global engine MRO market in the coming years."

"This opening is the next step in MTU Maintenance's incredible growth story and cements our position as leading MRO provider for narrowbody engines in the Asian region," adds Lars Wagner, CEO, MTU Aero Engines. "We made this timely investment in our network to increase capacity and provide the best possible service to our customers. We look forward to supporting the GTF network as the in-service fleet continues to grow."

After the test cell entered operations in 2023, the new shop buildings were built in only 18 months. The site now has over 30,000 square meters of additional, state-of-the-art facilities, including cleaning, non-destructive testing, inspection and repair areas as well as engine and module assembly and disassembly lines.

Jinwan branch will operate under MTU Maintenance Zhuhai's management and authorizations, enter operations with an initial staff of around 280 employees and grow to around 600 engine experts, once fully ramped up. "This construction was the result of great teamwork, international collaboration and the dedication of our employees," says Gert Wagner, CEO and president, MTU Maintenance Zhuhai. "Thank you to the entire MTU team for your support, as well as our employees' flexibility during construction. We greatly appreciate your continued dedication as we ramp up."

SR Technics Announced Five-Year Contract Renewal with Allegiant Air

SR Technics announced the renewal of its contract with Allegiant Air, a U. S.-based low-cost airline, for the next five years. Under the terms of the new agreement, SR Technics will continue to provide heavy shop visit support for Allegiant's fleet of CFM56-5B engines.

The airline, headquartered in Las Vegas, currently operates a fleet of over 120 A319/A320 aircraft and is further expanding its fleet with Boeing 737 MAX aircraft. As a rapidly growing airline, Allegiant has relied on SR Technics' proven expertise and high-quality services to support its expanding operations since 2019.

"We are delighted to extend our long-standing partnership with Allegiant Air," said Owen McClave, CEO of SR Technics. "This contract renewal underscores the trust and satisfaction Allegiant has in our ability to deliver industry-leading engine maintenance services since 2019. We are excited to continue supporting its growth and success in the competitive U.S. aviation market."

The renewal follows the successful execution of SR Technics' previous contract, during which the company completed numerous shop visits and engine services for Allegiant's fleet. The new agreement, effective immediately, includes ongoing maintenance for Allegiant's CFM56-5B engines, ensuring the continued performance and reliability of the airline's growing fleet for the next five years.

"We are excited to continue our partnership with SR Technics," said Asad Shaikh, vice president, fleet and corporate finance of Allegiant Air. "This agreement reinforces our commitment to safety, reliability, and operational excellence. Allegiant is thrilled to build on the foundation of this successful partnership to ensure the highest standards are met for our fleet."

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True Blue Power Introduces New 45-Watt Charging Ports for 14- And 28-Volt Aircraft at AEA International Convention

True Blue Power introduced the company's newest USB charger during the New Product Introductions at the Aircraft Electronics Association (AEA) International Convention and Trade Show in Phoenix, Arizona. New TA245 Series USB chargers feature a compact footprint and an input voltage of 12 – 32 VDC, delivering the versatility required across all GA, BA and commercial aircraft.

TA245 Series charging ports are available in five configurations, including single and dual USB-C (45 W), and USB-A (36 W), with adjustable halo ring lighting. The TA245 provides reliable convenience power to smartphones, tablets, electronic flight bags (EFB), and laptop computers. Its ultra-compact design measures 1.5 inches wide and 1.25 inches deep. This ensures easy installation in tight spaces, including in-seat, cabin, cockpit and galley applications.

"With the introduction of 45-watt charging ports, we now offer USB chargers for any aircraft with a 14-volt or 28-volt electrical bus. The available range of power is unmatched and spans 15 to 100 watts per port," said Van Winter, senior vice president of sales and marketing for True Blue Power. "Customers have been asking for more power on lower voltage aircraft for years, and we're proud to offer this upgrade."

Honeywell's High-Speed Cabin Connectivity System Selected By Dassault For Falcon Fleet

Honeywell has signed an agreement with Dassault Aviation to install JetWave X, Honeywell's high-speed in-flight connectivity system, as a line-fit and retrofit solution for Dassault's Falcon business jets. Honeywell's JetWave X system will enable Dassault's Falcon jets to operate with uninterrupted coverage globally — delivering the sort of high-speed connectivity typically found in homes and offices. Honeywell says this new offering supports alignment of its portfolio to three compelling megatrends, including the future of aviation.

"Fast, reliable in-flight data is more critical than ever before, and JetWave X will enable business jet owners and operators to seamlessly connect no matter where they fly while enjoying the same high-speed connectivity they expect on the ground," said Jason Wissink, vice president and general manager, services and connectivity, Honeywell Aerospace Technologies. "Dassault Falcon customers will have access to flexible service plans and superior Honeywell support that will enable users to select the products and services aligned with their needs. For OEMs and MROs, a simplified product architecture will make the system easier and faster to install than the current-generation JetWave system and will provide an economical upgrade path to JetWave X."

JetWave X connects to Viasat's Ka-band network, including the ViaSat-3 and Global Xpress satellites, offering greater global capacity. The system's open architecture also ensures compatibility with future Ka-band networks, making it network-agnostic and future-proof. Owners and operators can switch between two networks initially and then additional networks as they come online to ensure the best connectivity at the lowest cost.

"The best level of connectivity is essential for living and working on board our fleet of long-range aircraft," said Carlos Brana, executive vice president, civil aircraft, Dassault Aviation. "The addition of JetWave X builds on our long and successful collaboration with Honeywell and keeps us at the forefront of the business jet travel experience. We are convinced that this system will satisfy the needs of our most frequent business jet travelers."

Dassault Aviation simplifies in-flight internet access with FalconConnect, an all-in-one suite of services and applications that enables operators to deliver highly efficient, reliable connectivity. Powered by Honeywell, FalconConnect is highly flexible and can be used to access networks including 3G/4G on ground, Wi-Fi, Inmarsat L-Band, Datalink, Iridium Classic and Next, Viasat Ku and Ka-Bands or Jet ConneX Ka-Band. It is also expandable to accommodate future developments.

Honeywell continues to support the current generation of JetWave systems that are installed and operating today, and it expects these existing systems will experience a performance boost from higher speeds with the recently-announced JetXP experience plans. The new JetWave X offering with Dassault is expected to enter the market in 2026 as a line-fit solution and will also be available for in-service aircraft retrofits.

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7 SONIC tools Booth 4641

8 RH Aero Systems Booth 2441

9 MK TEST SYSTEMS Booth 8301

10 BARFIELD Booth 1513/1415

13 S.E.A.L. AVIATION Booth 5102

14 AMETEK MRO Booth 1741

15 LOCK N CLIMB Booth 8643

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Buffalo Shrink Wrap

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Buffalo Shrink Wrap is a global shrink wrap supplier offering cost effective shrink wrap protection for shipping and storage. We provide a complete line of premium grade shrink wrap in white, blue and clear from 12' to 40' wide all with UVI. We offer shrink wrap heats guns, extensions and parts. Shrink wrap tape, preservation tape and all other related supplies needed for shrink wrapping. The proven easy-to learn, step-by-step shrink wrap installation process can be used to protect any size or shape item. Commonly used in the MRO, Aviation and Aerospace industry to protect entire aircraft, turbine jet engines, landing gear components, palletized shipments and more. The drum tight shrink wrap cover will keep the item totally clean and dry.

USA Borescopes

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USA Borescopes provides borescopes and videoscopes for aviation maintenance professionals. In addition, borescope repairs are available on any make or model borescope with free repair estimates.

Jet Parts Engineering

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As a leader in the development of FAA-PMA parts and engineered repairs, Jet Parts Engineering is devoted to providing spare part solutions to our global network of airline and MRO partners. We specialize in over 25 ATA chapters across most aircraft systems with capabilities to develop a wide range of part-types. Our ecommerce portal gives immediate access to pricing, availability, technical information, and the ease of order placement and tracking. Jet Parts Engineering's staff is comprised of some of the best and brightest in the industry — our people are the best part. Visit www.jetpartsengineering.com to learn more.

PWI

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PWI has designed and manufactured aircraft lighting products for more than 50 years. PWI has the engineering experience to create completely custom LED cabin lighting for any 28-volt turboprop to business jet. With OEM and international aftermarket experience, PWI continues to support its original fluorescent cabin lighting systems with new and overhauled power inverters and new lamps. PWI is creating white and full-color LED upgrades for owner/operators who desire a full fluorescent light replacement solution. PMA-approved LED cabin lighting systems for several Cessna Citation, Dassault Falcon and Pilatus PC-12 aircraft are currently available. We continue to develop LED cabin lighting for additional aircraft.

Schaeffler Aerospace

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With locations in Danbury, Connecticut and Stratford Ontario, Schaeffler Aerospace is one of the major suppliers for main shaft engine bearings and gearbox bearings for all of the commercial and military turbine engine manufacturers. Being an FAA, CAAC, EASA and TCCA approved maintenance organization, Schaeffler is known for our wide range of OEM repair approvals which allows Schaeffler to help you to significantly reduce your engine maintenance cost without compromising system reliability. With over 125 years of manufacturing and repair experience Schaeffler is a key supplier for our customers. We have locations in Germany, Singapore and China to support your needs in addition to the Americas.

TP Aerospace

MAIN HALL/1933

As the leading aftermarket supplier of wheels and brakes, we offer all operators a simple alternative to traditional component management. Depending on the customers' needs, we provide aftermarket wheels and brakes either through a long-term program or as outright sales to a recurring customer base, as well as factory new wheels and brakes piece parts and assemblies across all types and platforms. With a sharp niche focus, we're the best at what we do. We combine market expertise with extensive MRO capabilities and a global footprint, and we guarantee quality, simplicity, and value for all our customers worldwide, anywhere, anytime. It's that simple!

SONIC Tools

MAIN HALL/4641

SONIC is a market leader in the design and manufacturing of premium hand tools and toolbox solutions. SONIC products are found in the world's most progressive automotive enterprises, service centers, race shops, aftermarket businesses and personal garages. Our goal is to design and manufacture equipment that meets and exceeds all standards. For nearly 50 years, we've accomplished that goal. Faster pace of work, increased efficiency, the best value — that's what we're all about. SONIC is a Dutch-based company with facilities in the Netherlands, Germany and the United States.

Ultramain Systems

MAIN HALL/4750

Ultramain Systems delivers SIMPLE MOBILE PAPERLESS M&E / MRO and electronic logbook (ELB) software for the aviation industry. ULTRAMAIN v9 is a comprehensive suite of integrated planning, maintenance and supply software featuring new technology, Web-based capabilities and mobile applications. ULTRAMAIN MRO / M&E software integrates with ULTRAMAIN ELB, the easy-to-use ELB software which operates on installed or mobile EFBs. Together these tools can transform your organization to a full paperless operation. Stop by Booth 4623 and see what the simplicity of ULTRAMAIN software, along with mobile applications such as Mobile Mechanic™, Mobile Inventory™, Mobile Executive™ and ULTRAMAIN ELB can do to improve your operation and your bottom line.

Transport Workers Union of America – TWU

MAIN HALL/8634

The Transport Workers Union of America, AFL-CIO represents more than 150,000 members across the airline, railroad, and transit, university, utility and service sectors. We are mechanics, car cleaners, baggage handlers, disease control inspectors, bus operators, ramp agents, flight attendants, and more—and we are on the front lines of moving the American economy forward, keeping the traveling public safe and offering working people a voice on the job since 1934.

TAT Technologies

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TAT Technologies is a strategic global partner to leading players in the aerospace industry. TAT Technologies specializes in innovative OEM and MRO solutions for the commercial and defense markets. Established in 1969, TAT provides design, development, manufacturing and services for a large variety of products. We have aligned all our divisions into two Strategic Business units: Thermal Management Solutions (TAT Limco) and Power & Actuation Services (TAT Piedmont). Our experience, flexibility, and commitment to meet our customers' needs and requirements has positioned us as a trusted partner among some of the world's leading OEMs, airlines, maintenance organizations, air forces, and defense organizations. E-mail: info@tat-technologies.com

RH Aero Systems

MAIN HALL/2441

Rhinestahl, the global leader in aircraft engine tooling, delivers the highest quality and most comprehensive engine tooling solutions for airlines, MROs, and lessors worldwide. We are an OEM licensee of GE, CFM International, and Rolls-Royce for engine maintenance, repair, and overhaul tooling. Some of the comprehensive engine tooling solutions and services we offer include Engine Transport Equipment, Tooling Provisioning, Tooling Management, OEM-Approved Engine Stand Leasing, GE's 360 Foam Wash, and FutureDriveNG+. Rhinestahl CTS engineers, certified technicians, and operations experts bring deep knowledge and vast experience in engine tooling to deliver the highest level of service to keep your planes flying.

MK Test Systems

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MK Test Systems is the world leader in Loop Resistance Test equipment and High Voltage Wire Harness Test equipment & software. The ExLRT is the intrinsically safe version of Loop Resistance Tester, fully approved by Boeing for use in all AMM tasks and all environments. The ExLRT is an evolution of our popular BLRT, a Loop Resistance Tester that also includes a micro-ohm meter for standard bond testing. It includes fully integrated PC control and provides elegant work instructions built from the original AMM. These tools are the latest complement to our leading Automeg HV Wire Harness Testers and the industry's best software suite. They're the most user-friendly tools available to test continuity, shorts, HiPot and functional test.

Barfield

MAIN HALL/1415-1513

Barfield is part of the AFI KLM E&M network, a major MRO provider. With 400 employees across its facilities located in Miami, Phoenix, Louisville and Atlanta, Barfield can satisfy the needs of customers operating commercial or regional aircraft in North, Central and South America. From MRO Services to Distribution and Ground Support Test Equipment (GSTE), Barfield provides complete tailor-made support programs for Airbus, Boeing, Bombardier, ATR and Embraer aircraft to operators in need of inventory, repair management, engineering and fleet support programs, and logistics solutions.

FL Technics

MAIN HALL/2841

FL Technics stands as a leading global provider of aircraft maintenance, repair, and overhaul (MRO) services, specializing in a comprehensive range of aviation solutions such as maintenance, parts and materials supply, technical trainings, wheels and brakes, engine services, engineering, and aerospace logistics. Holding certifications, including EASA Part-145, Part-CAMO, Part-147, Part-21, FAA-145, UK CAA Part 145, and other NAA as well as adhering to the quality standards of ISO 9001, ISO 14001, and EN 9110, our operations extend across hangars in Lithuania, Indonesia, and the United Kingdom, , supported by more than 70 strategically positioned line maintenance stations worldwide.

S.E.A.L AVIATION

MAIN HALL/5102

South Florida based, SEAL Aviation Repair Services deploy to your aircraft or AOG situation for mobile fuel leak repair, non-destructive testing and structural repairs anywhere in the world. We not only service aircraft locally in the South Florida area, we proudly service aircraft all over world! SEAL Aviation maintains teams across the USA including SEAL Team Central - Kansas and SEAL Team Southeast - Tennessee, Georgia and North Carolina. SEAL Aviation will come directly to you anywhere you need mobile fuel tank repair and maintenance, non-destructive testing (NDT) or structural repair.

AMETEK MRO

MAIN HALL/1741

AMETEK MRO is a leading provider of third-party MRO services for commercial, regional military and general aviation aftermarkets. With 13 strategically placed locations across the world, our teams are capable of servicing more than 40,000+ aircraft components including actuation, avionics, aviation safety, thermal management, landing gear, power generation & more. We also offer new build and design programs as well as aircraft component management services. The AMETEK MRO brands include: Ameron, B&S Aircraft, Drake Air, Southern Aeroparts, AEM, Aeromedic, Antavia, Avtech, Muirhead and AMETEK MRO Singapore. To learn more about AMETEK MRO, please visit our website at www.ametekmro.com

LockNClimb

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Ergonomic safety ladders for MRO service: LockNClimb, LLC designs and manufactures durable ergonomic safety ladders which have been engineer-tested to meet all applicable OSHA and ANSI standards. Our ladders have been designed using feedback from MRO technicians who then field-test the ladders to make sure every component is optimized for safety, comfort and workability. These ladders enable technicians to work “within the rails,” which promotes greater efficiency and helps prevent costly accidents and injuries. Extra wide comfort treads decrease the risk of foot thrombosis. LockNClimb ladders are currently being used by most major airlines on the flight line, engine shop and MRO facilities worldwide. Custom ladders designed upon request.

Jetaire

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Jetaire provides high-reliability electronic hardware & systems support critical functions where durability & peak performance are vital. Jetaire offers aircraft avionics & modification components & modification installation kits. Jetaire’s INVICTA™ Ignition Mitigation Technology (I²MT) is an alternative, more reliable & low maintenance solution to the OEM’s NGS/FTIS nitrogen based systems for flammability reduction in the Center Wing Fuel Tanks. INVICTA™ is a show of compliance to 26.36, 25.981. •ST03450NY (B737) •ST03834NY (A320) •STCs for B757 & B767 are expected in Q1 2017 Invicta provides an effective explosion mitigation solution while outperforming the OEM solution across all key metrics.

Air France Industries KLM Engineering & Maintenance

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Air France Industries KLM Engineering & Maintenance is a major multi-product MRO provider. With a workforce of over 14,000, AFI KLM E&M offers comprehensive technical support for airlines, ranging from predictive maintenance, engineering, GSTE, and line maintenance to engine & APUs overhaul, as well as the management, repair and supply of aircraft components structured around a powerful logistics network. Adaptiveness® is our response to the changing MRO business environment. It means listening to and understanding the key technical priorities of our customers’ operations, building unique solutions meeting their specific requirements, and staying at their side as a partner to support them through their daily challenges.

Aviation Component Solutions

MAIN HALL/2306

Aviation Component Solutions is a principal in the OEM alternate product industry. A world-class PMA company. ACS designs, certifies and manufactures PMA parts for every major MRO and airline worldwide. Our forte includes: HMU/FMU fuel, vacuum generator, hydraulic pumps/actuation, pneumatic valves and air conditioning components.

AJW Group

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Transforming aviation efficiency for over 90 years, AJW Group is the world-leading independent component parts, repair, lease, engine, flight hour program and supply chain solutions integrator. Our business ethos of quality and flexibility permeates all aspects of the customer experience offering 24/7/365 support to over 1,000 airlines across 100 countries. AJW Technique, our state-of-the-art component MRO facilities in Canada and Europe, is joined by inventory hubs and offices on every continent delivering an award-winning package of global services, including end-to-end, tailored solutions for interior needs. The company has an extensive global vendor supply chain and is focused on service excellence. Nose to tail, we’ve got you covered.

HEICO

MAIN HALL/1611

HEICO Corporation is a successful and growing technology-driven aerospace, industrial, defense and electronics company. For over 65 years, HEICO has thrived by providing customers with innovative and cost-saving products and services. HEICO’s Flight Support Group is known globally as the premier provider of high-quality and cost-saving aftermarket parts supply and repair solutions for both the commercial and military aviation sectors. These solutions include new parts design and manufacturing, proprietary Designated Engineering Representative (“DER”) repairs & overhauls, distribution for OEM replacement parts, and specialty product manufacturing.

By Joy Finnegan

FL Technics — It's a Growth Story Q&A with CEO Zilvinas Lapinskas

FL Technics is an integrated aircraft maintenance solutions provider, with offices across globe. The company's expansion and growth over the last decade have been nothing short of phenomenal. It has been fascinating to watch FL Technics' growth and change over the years, and it's been amazing to document and to follow along. The company has hangars and shop facilities in most corners of the world, as well as an extensive network of line maintenance support stations across Europe, the Middle East, Asia Pacific and Canada. The company isn't finished growing yet. It is about to open a brand new, tailor-made facility in the Dominican Republic to facilitate expansion in the Americas. CEO Zilvinas Lapinskas has been at the helm since 2013 and has overseen the amazing growth of the company.

As CEO of FL Technics, Lapinskas is responsible for the financial performance, including budgeting, capital allocation and profitability, while managing operations, risk and regulatory compliance. He says his goals as a leader include driving innovation and expansion and maintaining brand reputation are key priorities, along with fostering a strong company culture and employee engagement. He says he is focused on sustainable growth and operational excellence. Aviation Maintenance had a recent conversion with Lapinskas to hear about where the company is now, how they have thrived and what's next for this global powerhouse MRO.

Aviation Maintenance: Give our readers an overview of your long list of capabilities.

Zilvinas Lapinskas: Let me start by saying that we are base maintenance providers, mainly for narrowbodies. We hold capabilities of Boeing 737 — Classic and NG — and we are about to get Maxes; then the Airbus A320 family; and we have just got Embraers — 170, 190. Before that, we had the Embraer 135 and 145. And, in our facility in Prestwick, Scotland, we support Boeing 787 and Airbus 330. That's the only place where we provide maintenance to

widebodies. As for the locations for base maintenance, mainly we are in Europe. Let's start with Vilnius and Kaunas, Lithuania, Jakarta, and Bali Island, Indonesia, Prestwick in the UK.

Aviation Maintenance: What is your base maintenance expansion plan?

Lapinskas: In October this year, we will open a facility in Punta Cana, Dominican Republic. In the Dominican Republic, we are building the facility for narrowbody aircraft base maintenance — A320 family and Boeing 737s, NGs and Maxes.

Aviation Maintenance: FL Technics operates a network of line stations across Europe, Asia Pacific, North America and the Middle East. Tell us about your line maintenance work?

Lapinskas: We have roughly 100 line maintenance stations. Line maintenance stations in Canada where we acquired the company Wright International in 2020 was our entry into the North American aviation services market. In line maintenance, we provide maintenance to all the aircraft types: narrowbody and wide-body aircraft.

Aviation Maintenance: Who are some of your big line maintenance customers?

Lapinskas: Wizz Air, SAS and SAS Link and Turkish are big customers for us. Such airways as Qatar Airways, Etihad Airlines are line maintenance customers at our line maintenance stations in Europe. On the other side of the globe, in Canada line maintenance stations, we provide maintenance to such airlines as Iceland Air, Avianca, Egypt Air, Aero Mexico, Flair, Tap Airlines, Saudia Airlines.

Aviation Maintenance: Talk about FL Technics' capabilities.

Lapinskas: We cover base and line maintenance, CAMO services (Continuous Airworthiness Management Organization) with more than 100 aircraft under CAMO. We have our own design and production organization, where we provide interior minor and major modifications. We design, print and apply livery decals. Recently, we expanded our scope and opened our own in-house sewing shop, approved under Part-21G.

The biggest part of our business is component trading. So, we buy narrow bodies like 320s and NGs and perform teardown of airframes. After the teardown, serviceable parts are released to the market and sold. It also provides us with our own stock. We have more than 500 customers all around the world. We have sales offices in Vilnius, Dubai, Thailand, Jakarta, Miami and so on. Latin America is not as well covered at the moment with spare parts trading, but it will be covered in the near future.

Another business stream at FL Technics is assets management. Assets such as engines, landings gear and airframes. We buy engines, and much like the airframes, we perform teardown and sell the parts.

We also repair engines in our engine shop (or our partners' shop) and sell engines. We have our own engine shop, a hospital repair engine shop in Kaunas, next door to our hangar where we repair and maintain the CFM56 engines: CFM-3, CFM-5, CFM-7.

Aviation Maintenance: What about wheels and brakes? Do you maintain wheels and brakes?

Lapinskas: Yes, now we come to wheels and brakes. We say that we are the number two provider of wheel and brakes service in the world. We have more than 600 aircraft under our contracts and programs. Our biggest customers are Tui, Norwegian, Wizz Air. We have dedicated wheels and brakes facilities in Hanover, Germany; in Budapest, Hungary, and opening a new facility in Bergamo, Italy. We also have a wheels and brakes shop in Vilnius, our base maintenance facility. It's just the beginning. We have big ambitions and anticipate further growth of this business.

Aviation Maintenance: FL Technics also does logistics, correct?

Lapinskas: We also have a dedicated team for logistics. A few years ago, we decided to offer aerospace logistics services, as we deliver hundreds of parts each day for our customers. So, we offer our parts transportation know-how for third-party customers by providing the logistics [for them]. Not all logistics companies have an understanding of how aviation components, like engines, should be handled. We are planning to grow this business line as well.

Aviation Maintenance: There is also a training component to your business. Tell our readers about that.

Lapinskas: Yes, we have a very well-developed business of technical training. We provide technical training in more than 70 locations around the world. We have customers in Asia Pacific Central America, Africa, Europe, etc. Currently, we do not provide technical trainings in the United States because of the different regulations. We are an EASA Part-147 organization. More than 5,000-6,000 technicians get certifications from our technical training organization each year. In addition to technical training, we also offer online courses. And our strategy is very simple. We send our instructor to the customer's place. I mean, if we have a customer somewhere in Central America, it doesn't mean that this

Storm Aviation provides light and base maintenance, operating a 24-hour comprehensive level of support for commercial aircraft operators. The wholly-owned subsidiary of FL Technics provides customized services including AOG support, workshop facilities, aircraft modification programs, 147 Technical Training, aircraft fuel tank repair, tooling hire and a UKAS-approved tooling and equipment calibration laboratory. FL Technics image.

In January this year, FL Technics Indonesia achieved approval by the Civil Aviation Safety Authority (CASA) of Australia. This is the first time CASA has extended this level of approval to FL Technics Indonesia, thereby authorizing the company to deliver a range of aviation maintenance services at both I Gusti Ngurah Rai International Airport (DPS) in Bali and Soekarno-Hatta International Airport (CGK) in Jakarta. FL Technics image.

group of 25 people are coming to our hangar to do the training. It's easier to send the instructor to their place instead of sending 25 guys to our place.

Aviation Maintenance: So, there has been a lot of expansion and growth into multiple areas during your tenure here.

Lapinskas: The revenue for 2024 was 400 million euros. When I joined the company at the end of 2013, the revenue was $80 million. So, during these 10 years, we grew five times, to 400 million. But we have to remember that we lost two years for COVID.

Aviation Maintenance: it is an amazing story. It's been interesting to watch, and to report on over the years. Talk about some of the challenges that you've met as the company has grown.

Lapinskas: We have always been very active in the market with ambitious growth plans. When I joined the company, there was one hangar in Vilnius, a few line maintenance stations in Central Asia, and Vilnius. We started component trading business shortly after I joined. We also started expanding our line maintenance business. We built another hangar in Kaunas [Lithuania]. In parallel, we were looking at other regions for growth and aviation aftermarket in Asia-Pacific was growing, there was a demand for MRO services. So, we rented the hangar in Jakarta, Indonesia, in 2015, and we built the MRO facility there from scratch.

We've got long-term customers; we've got a strong presence there and have started looking into expansion. We started talking to different airports in Indonesia. We considered if they would like to build a hangar for us, and we are ready to utilize it for the next 20 years. Finally, we got an agreement with Bali International Airport. They built a hangar, which we officially opened in November 2024. Right after the opening, we received maintenance approval from Australian CAA. We're looking forward to the customers from Australia, Due to a huge number of flights from Australia to Bali Island, we can offer our customers to fly to our facility for maintenance without a ferry flight. It's a good competitive advantage.

Aviation Maintenance: There were some acquisitions at that point, correct?

Lapinskas: In 2020 we acquired company in Italy -Flash Line Maintenance for the line maintenance expansion. Our subsidiary Storm Aviation also expanded. and in 2021, we acquired the Chevron Aircraft Maintenance and Chevron Technical Services, a family business MRO in Prestwick and Manchester. So, we now have a group of companies in the UK. We are growing organically, and we are growing by acquisitions.

To develop a closer relationship with our customers, we have opened an office in Dubai, UAE. We have much better connectivity with Africa from our Dubai office, and now we have built a strong client pool from Africa. That business is growing 20% each year.

Aviation Maintenance: What about your line maintenance business?

Lapinskas: We acquired Wright International Company in Canada, which had five-line maintenance stations — it was the beginning of our business in North America. Wright International has line maintenance services up to 'A' level checks, A.O.G. support and training for airlines at Canada's major international airports, including Toronto Pearson, Vancouver, Calgary, Montreal-Mirabel and Ottawa. Wright is a Transport Canada and EASA Approved Maintenance Organization (AMO) licensed to service most commercial aircraft types.

Aviation Maintenance: You make it sound easy.

Lapinskas: What I'm telling you sounds very simple. It was not so simple. It was very challenging. A lot of hard work and dedication and I say that for great success you need 95% hard work and 5% success to be where we are today. Some of the cases, for example wheels and brakes might seem easier than others. In three years, we became the second largest Wheels and brakes services provider in the world because we were in the right place at the right time. A previous provider decided to close their wheels and brake shop in Europe and the customers came into the market. That's why we have Norwegian, Wizz Air and Tui in our client's pool today. That was the beginning. [There was] strong and fast growth of that business. This is just the beginning.

Aviation Maintenance: It is very difficult to manage a business that exists all over the world. Some places are harder to get to than others. Talk about things like standardization and keeping the quality of your work the same throughout the company, even in these locations around the world.

Lapinskas: I can answer that. I'm quite a big fan of LEAN methodology. We have standard procedures, standard practices, and guidelines on how we provide services, especially in base maintenance. We have our own time calculation system. We created our own production system. We call it base system. We use it in all of our facilities. When we implemented that, we became competitive and attractive to customers from Western Europe – When I joined the company at the end of 2013, 90% of the revenue was from Russia and CIS. It was a challenge to do that full turnaround of the production system, change the mindset of people and so on. And then, of course, when we entered completely new markets like Asia Pacific, [lean] is their mentality.

You have to be very flexible with your understanding and with your expectations. You cannot expect the same approach from the people in Europe as from the people in Asia-Pacific or North America, Latin

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When the first stage of development is finished, FL Technics' facilities in Punta Cana, Dominican Republic, will include five bays for base maintenance operations including a complex of supporting shops. The total area of the new infrastructure will be 52,000 sq. m., including the hangar and bays facility of 20,000 sq. m. FL Technics image.

America. The cultures and mentality are different. Also, you have to understand the local mentality, how to organize the work, build trust with employees. That was a challenge. But aviation is a multicultural business. Every day you meet people from different parts of the world, but we are all united by the passion for aviation.

Aviation Maintenance: What are some of the milestones that you're most proud of during your tenure as CEO?

Lapinskas: I would say the global expansion of the company would be one of the proudest milestones. MRO from Vilnius expanding to Jakarta, to the UK, Canada, Africa, Italy, Bangladesh, Thailand office, now moving to Punta Cana, we can say we are a global player. I'm really proud of my team. The bigger part of the team has been working with me for up to 11 years. We are not just colleagues. We are real partners.

Aviation Maintenance: Why have you chosen expansion in Punta Cana?

Lapinskas: The new facility in Punta Cana represents a significant milestone in FL Technics' expansion, bringing our aircraft repair and overhaul expertise closer to operators in the Americas. Customers from United States and Latin America can reach us easier. We can have a well-diversified business with quite an attractive cost base.

Aviation Maintenance: The project in Punta Cana, Dominican Republic sounds exciting. Can you tell our readers what stage this project is at?

Lapinskas: The facility is nearing completion construction, we have already secured key specialists and are actively recruiting the remaining team. Additionally, the certification process with the Federal Aviation Administration (FAA) and Instituto Dominicano De Aviación Civil (IDAC) is currently underway.

Located in Punta Canta, the site will open in October 2025 and will allow us to provide heavy maintenance operations in the Americas through a 52,000-square-meter complex, delivering base maintenance for Airbus A320 and Boeing B737 family aircraft.

We will roll-out of the new state-of-the-art aviation maintenance hub in three strategic phases. Phase one of the project will introduce a 20,000-square-meter hangar, featuring 5 maintenance bays and an integrated series of support workshops with sheet metal, composite, paint, and interior capabilities. This October we start operations with five. 50% of the hangar facility's construction has already been completed.

Phase two of the project will see the facility expand to 12 maintenance bays, positioning Punta Cana as a strategic MRO hub for airlines operating in the region. The third and final phase will grow the facility to 20 maintenance bays.

Aviation Maintenance: How many people do you expect to be employed there when hangar in Punta Cana opens?

Lapinskas: With five bays, there're will be roughly 350 people. Initially, we're planning to bring people over from oversees. And then, of course, our technical training department will help to train locals.

Aviation Maintenance: Any unforeseen issues with the construction?

Lapinskas: There is a rainy season in Punta Cana, and, of course, that influences the construction. But now everything is going smoothly, according to the plan. We have a supervisor who is over there all the time. In September the hangar is going to be ready for the audit and we're opening it in October.

Aviation Maintenance: Talk about winning business and being better than your competitors.

Lapinskas: We have to fight for our customers every day, as we do not have any guaranteed contracts from the airlines.

We are speaking about a labor-intensive business. Eighty percent of the cost is labor. And if your people are not working effectively, you will not earn any profit and you will not be competitive in the market.

Aviation Maintenance: And LEAN methodology has been a key part of that?

Lapinskas: Yes. We must fight for the customers every day, so it

means that we have to be flexible, we must have a very good approach to the customers, and we have to be very, very efficient. So lean methodology, this way of thinking, how we can do better, how to remove all the waste from our processes — it helped us a lot.

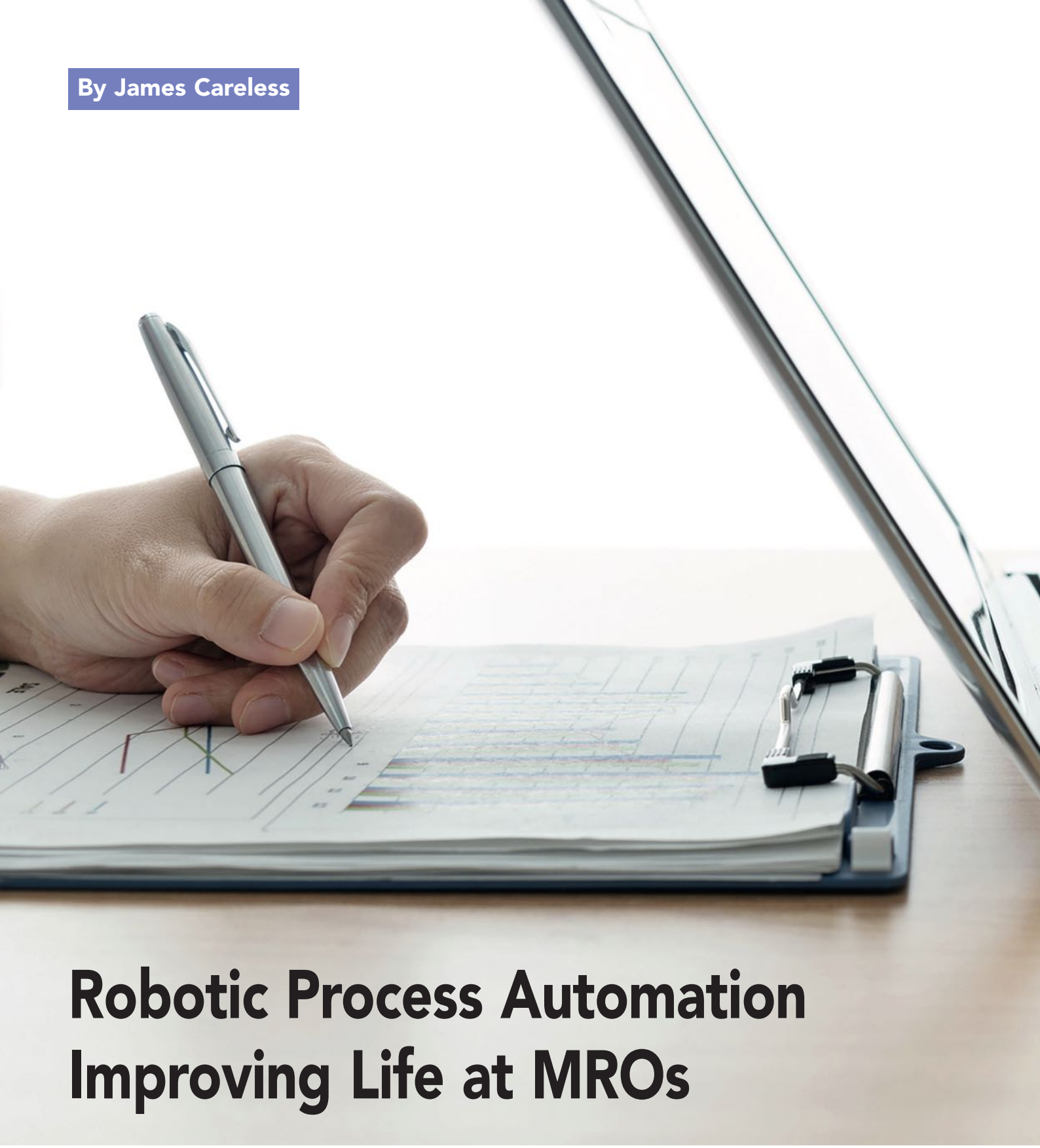
Aviation Maintenance: Talk about being a part of Avia Solutions Group and the support that they give you and how that works.

Lapinskas: We have a strong board of professionals in aviation. I'm also a member of the board of Avia Solutions Group. We have good discussions, and we have a very serious guy with a vision, our chairman and founder of Avia Solution Group Gediminas Žiemelis, leading us. We are part of the management team are our shareholders, so we are partners sitting in the same boat and moving in the same direction, simply speaking. And, of course, the expertise from the airlines in the group and the support, sharing contacts, sharing the experience, sharing the knowledge — that's good.

Aviation Maintenance: Where else do you see growth?

Lapinskas: We have prepared the plan for FL Techniques group goals. We call it Plan 2030. As I mentioned before, 2024, it was e400 million euros revenue. The plan for 2030 is one billion. That means we want to grow two and a half times by 2030. This is not just a vision. Each business line has its own business plan with all the steps calculated and what we must do, what we must reach, to get there in 2030. We are speaking about new acquisitions. We are speaking about new facilities. We are speaking about new investments into assets, into spare part business, into capabilities and so on and so forth. All these numbers are prepared now, and we will be working on reaching those goals. There's a clear plan with all the financial figures, 2030, and we are moving in that direction. For the last seven, eight years, we have been growing by 10 to 20% each year. [We hope to keep] the same speed. Of course, you know, it's a plan. Sometimes you have to adjust the plan or some circumstances which you cannot influence occur. But this is the vision, this is the direction that was presented to the board, the board approved it, and we are moving now in that direction. Our employees also believe in that vision, and they follow that vision. AVM

By James Careless



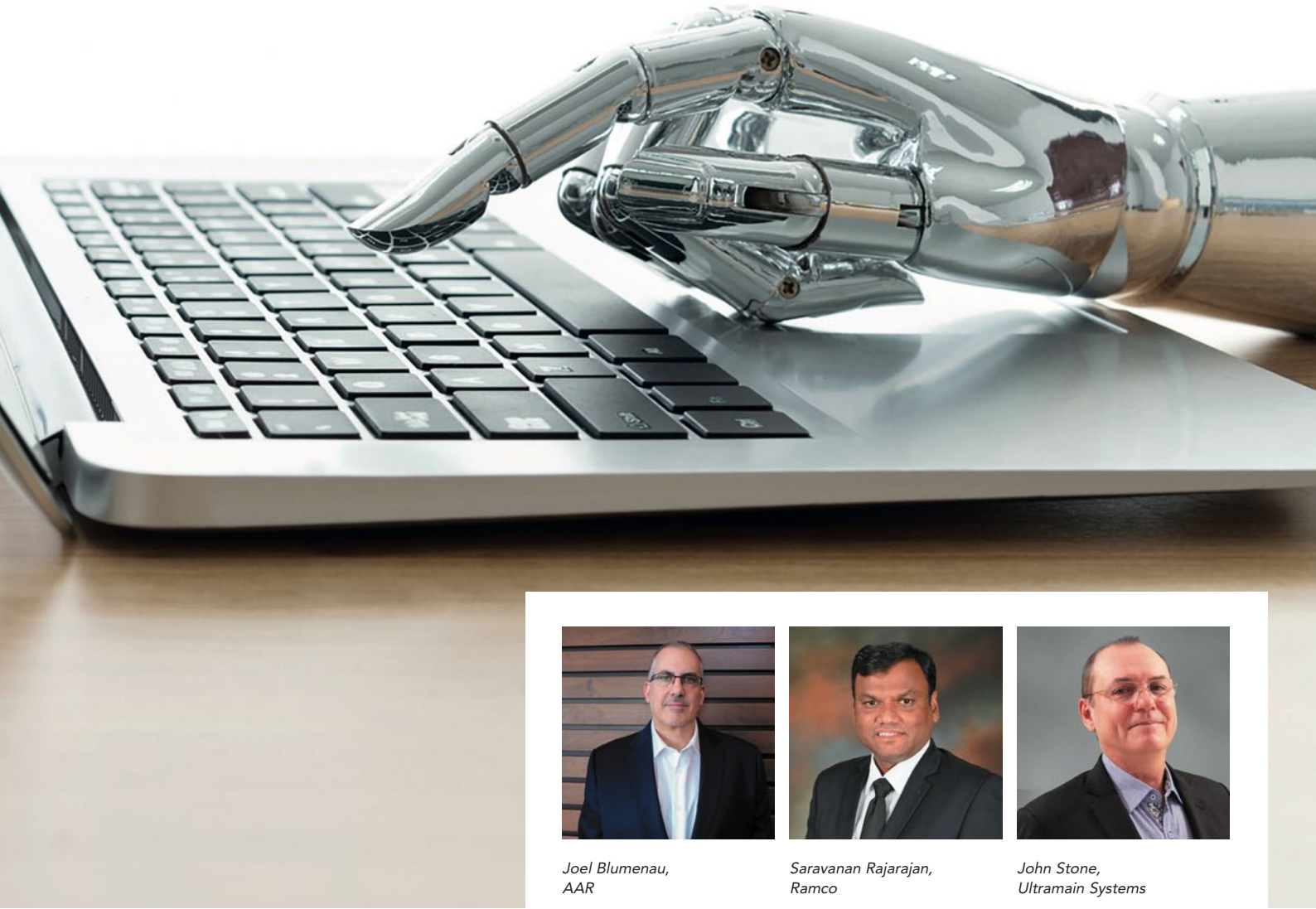
Robotic Process Automation Improving Life at MROs

The term robotic process automation (RPA) has a nice science fiction ring to it. In the MRO context, RPA conjures up images of aircraft being serviced by automated robots zooming back-and-forth across the shop floor, all working with maximum efficiency, productivity, and safety.

The realities of RPA are a little less futuristic than this. Still, real-world RPA is delivering some significant improvements for the MROs who use this technology and making life better for their humans as well.

What is Robotic Process Automation (RPA)?

The "process" in the term RPA refers to software processes. Once this distinction is made, "RPA is exactly what it sounds like: The use of software robots to automate repetitive processes across systems," said Joel Blumenau, AAR's senior director of strategy, planning, and innovation. (AAR is a global aerospace and defense aftermarket solutions company with operations in over 20 countries that has been employing RPA for some time.) "Typically, these processes are carried out by humans and involve efforts such as data gathering and entry. The RPA bot is designed to



Joel Blumenau, AAR

Saravanan Rajarajan, Ramco

John Stone, Ultramain Systems

free up precious human time for more value-added activities that a robot could not accomplish, such as relationship management, strategizing and personalized sales activities."

In a practical sense, RPA is a workflow tool that automates repetitive, routine, and replicable tasks in order to perform them efficiently, accurately, and without direct human intervention. "When applied in the right process flows, RPA can improve operational efficiencies by speeding up the process," said Saravanan Rajarajan, associate vice president - solution consulting with Ramco Systems (a global enterprise software provider). "Ramco Aviation Software leverages RPA tools to streamline the MRO work packaging process and enable repair order automation for its clients."

Ultramain Systems, maker of ULTRAMAIN M&E/MRO software, also uses RPA to make life easier for MROs. "More than just automation, RPA enhances data integrity by performing real-time validation, ensures records transition seamlessly through their life cycle, and optimizes compliance workflows — reducing manual effort and minimizing errors," said John Stone, the company's vice president - product management. "At Ultramain Systems, we have integrated AI and RPA utilities into ULTRAMAIN, allowing MROs to streamline operations and improve regulatory compliance.

Our live, production-ready RPA technology also helps ensure faster, more accurate record processing with intelligent workflow automation, plus optimized resource allocation that enables personnel to focus on high-value tasks."

How RPA is Being Used by MROs

Dr. Kenneth Low, ST Engineering

Robotic process automation has the potential to be applied across all aspects of MRO administration. As such, it is not surprising that the companies interviewed for this story have found many useful ways to employ RPA in their operations and products.

A case in point: Singapore's ST Engineering (a solutions provider whose products include the MRO sector) is using RPA to improve the procurement process for MROs. "When procuring materials and parts, information such as stock quantity, lead time and price are crucial for decision making, which also has to take into account logistical details including airway bills and shipping time," said Dr. Kenneth Low, head of innovation & sustainability with ST Engineering's Commercial Aerospace division. "When sourcing for parts, we use RPA to automate and aggregate part listings found on OEMs' and suppliers' websites. This allows us to compare and choose the most cost-effective option, saving time that otherwise would be spent on painstakingly gathering information. It also provides us with greater visibility over parts in transit."

ST Engineering also uses RPA to retrieve information from maintenance task cards, whose content can span hundreds of pages. "Previously, our technicians had to spend hours reading task cards line-by-line to transcribe them into documents, a tedious process which could lead to mistakes," Low said. "Today, when airlines send over task cards, RPA extracts the information into a web form that is easily retrievable by our technicians, reducing the time taken for this process by 90% as well as eliminating the risk of human error."

According to Ramco's Rajarajan, RPA bots are vital for ingesting client task cards (aka work cards) into an MRO's Enterprise Resource Planning (ERP) platform efficiently and accurately. "Third-party MROs normally receive work packages from airlines, which are mostly in the XLS and PDF formats," he explained. When humans are used to input the data from these cards, it can be hours or even days before the resulting work orders can be issued to the production floor.

When RPA bots are used to ingest this data, the time delays fade away. This is because the RPA bots automatically extract task numbers from the PDF work documents and compare them with Tally sheets for validation. The RPA bots also compile lists of the parts and tools required to do the jobs, and check on their availability and locations in stock. The result? "With automation, the lead time to process these steps has been reduced by 70-80%," said Rajarajan.

Meanwhile, AAR's most recent RPA implementations have been in very manual and repetitive activities handled by their sales and administrative teams, such as responding to part requests and email inquiries. "This effort includes the generation of purchase orders and other internal documentation via our main Enterprise Resource Planning (ERP) system," Blumenau said. "Eventually, we want to roll RPA out for more MRO complex tasks in our digital ecosystem, Concourse."

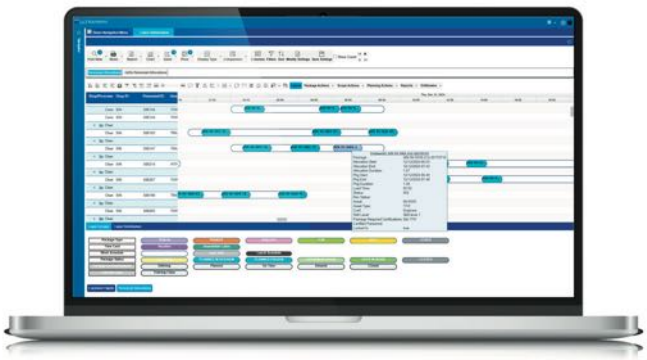
As for Ultramain Systems? "ULTRAMAIN includes built-in RPA management tools, enabling customers to modify existing automation processes or create their own to fit their unique operational needs," replied Stone. By providing an RPA builder in its software, ULTRAMAIN allows MROs to implement automation instantly, adapt processes on demand, and tailor automation to align with their specific maintenance environments. "This self-sufficient approach ensures customers can achieve automation benefits faster while maintaining control over their MRO digital transformation," he said.

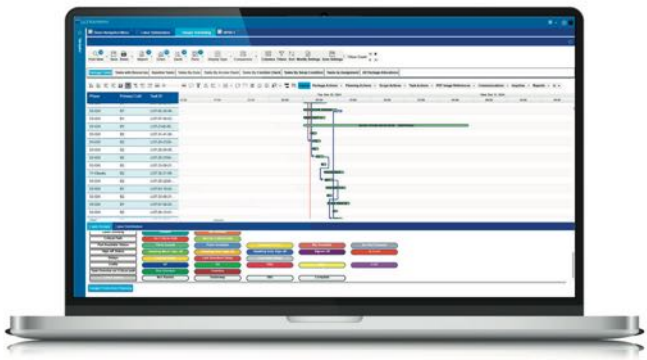
Many, Many Benefits

We have already seen how RPA can speed up the intake and processing of MRO-related data — reducing errors as it does so while delivering and sharing results faster than any human can. The beneficiaries of these improvements include MROs, their customers, and the suppliers that support them. In fact, everybody benefits when data input is handled far more quickly and accurately than ever before.

But the benefits of robotic process automation don't stop there. According to John Stone, improved data ingestion, processing, and distribution allows an MRO to work faster yet better on behalf of its customers. This means that aircraft get fixed faster and more accurately. In turn, customers get their aircraft back sooner, allowing them to resume making money for their owners and operators rather than sitting on the shop floor.

RPA also allows MROs to "tighten up" the scheduling of their personnel and workspaces, and the allocation and replacement





RPA can help MROs with scheduling personnel and workspaces, as well as the allocation and replacement of parts and tools being used. Ultramain images.

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of parts and tools that they use. These improvements can reduce labor costs without compromising quality. They can also ensure better compliance with industry and government standards due to the inherent consistency built into automation. RPA also makes it easier for MROs to provide updates to customers on the progress of their work orders. Such transparency keeps customers happy, and more likely to return the same MRO for their next job. The takeaway: "By leveraging ULTRAMAIN's RPA capabilities, MROs not only streamline internal operations but also deliver faster, more reliable service to their customers, ultimately enhancing competitiveness in the industry," Stone said.

"Repair order processing involves multiple steps, which are mostly manual and prone to errors," agreed Ramco's Rajarajan. "As well, the right workflow design involves integrating tasks performed by RPA bots and tasks that must be done only by qualified persons due to sensitivity to safety, regulations, or commercial exposure. For example, unserviceable units removed from aircraft can be screened automatically by RPA bots based on predefined attributes like parts, capability, warranty, and supplier contracts. All told, smart screening and automation have the potential to reduce the repair order processing effort by 70%."

The bottom line: Utilizing RPA for any of the following three objectives — productivity enhancement, improved customer experience, and efficient scaling — can yield benefits. "In one of our customer deployments, an RPA bot that auto-created purchase orders improved productivity by 60%, and it was able to scale to manage their operations even when the number of PO transactions had increased five-fold," Rajarajan reported. "No additional investment was needed for training the RPA or increasing the number of procurement personnel."

RPA Challenges and Solutions

Clearly there are a tremendous number of benefits associated with deploying robotic process automation at MROs. But making it happen isn't as simple as clicking on an icon with a mouse. "Automation often involves making disparate systems communicate data efficiently without any loss of data integrity between systems," said AAR's Blumenau. "This can present challenges along the way that require solutions unique to the systems involved. We have had our share of those challenges, of course, but with a good implementation team putting their heads together, a solution can always be found to keep the efforts progressing."

"While robotic process automation (RPA) offers significant benefits to maintenance, repair, and overhaul (MRO) operations, its implementation does come with challenges," Stone noted. "However, ULTRAMAIN has taken steps to mitigate these issues and ensure a smooth transition for customers." For instance, integrating RPA into existing MRO workflows can be complex, especially in environments with legacy systems or highly customized processes. To address this challenge, ULTRAMAIN software comes with modular, configurable RPA bot tools that allow MROs to start small and scale automation gradually.

"Automating processes without proper oversight can lead to data inconsistencies or errors propagating across systems," added Stone. "ULTRAMAIN incorporates real-time data validation and integrity checks to address this problem, ensuring that automated processes maintain accuracy and compliance. ULTRAMAIN's built-in RPA management tools also allow customers to modify existing automation or create their own, ensuring long-term flexibility and scalability without dependency on software updates."

To deploy robotic process automation properly, "RPA initiatives should start by identifying the proper business process to automate and the desired target state, focusing on the workflow steps to reach it," Rajarajan said. "Areas and tasks where RPA can provide a significant impact will be the automation of data inputs, data aggregation, standard transactions, and document processing."

A comprehensive understanding of how RPA can coexist with other technologies and integrate into the workflow design will yield better results than a stand-alone deployment. As well, "workflow design should ensure seamless integration between RPA and employees with the proper handoff, status, and audit controls," he said. "As automation programs expand and grow complex, silos within the organizations can hinder performance if the business areas do not coordinate. RPA should be leveraged as a way to enhance human productivity rather than replacing it."

Noteworthy: Because robotic process automation is rule-based by nature, problems can arise when these systems interact with websites whose content has been changed. "Even minor changes such as the removal of a keyword could break the RPA," ST Engineering's Low said. "To address this issue, we have an automated status check and notification system to investigate such occurrences and reduce downtime. At the process level, we also involve our continuous improvement teams to optimize end users' processes and make RPA deployments more efficient. As RPA that constantly runs in the background may incur expensive license fees, we also evaluate if such an arrangement is necessary

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for each RPA use case."

Finally, the human factor should be taken into account whenever robotic process automation is being implemented at an MRO. "The use of RPA may also spark technicians' fears of job displacement," said Low. "Early engagement of the workforce is hence crucial to address their concerns. Based on our experience, implementing RPA with workers' inputs provides confidence and assurance. In fact, a number of our technicians who were initially wary of RPA embraced the technology after they realized how the technology could help them in their work."

Advances in RPA

As technology continues to advance, so does the capability and flexibility of robotic process automation. For instance, Ultramain Systems has enhanced the self-service RPA creation tools in ULTRAMAIN, broadened the range of pre-configured RPA solutions within this software, and developed new and more efficient RPAs in collaboration with its customers. "These advancements ensure that ULTRAMAIN's RPA capabilities remain cutting-edge, adaptable, and increasingly effective in streamlining MRO operations," said Stone.

Looking forward, "future RPA solutions will go beyond rule-based automation, incorporating context-aware processing to handle more complex workflows with minimal human intervention," he said. "Automated decision-making enhancements will allow RPA to manage exceptions more effectively, reducing the need for manual overrides. RPA will seamlessly connect with a wider range of MRO systems, including inventory management, regulatory compliance tools, and third-party aviation data sources. Automated workflows will anticipate maintenance needs, flag potential issues earlier, and auto-schedule preventive tasks, reducing unplanned downtime. And RPA tools will become even more user-friendly, enabling non-technical users to build, modify, and deploy automation with simple drag-and-drop functionality."

According to Kenneth Low, "AI is becoming the next big thing, and the MRO industry may move towards a collaborative model that harnesses the strengths of generative AI and RPA," he said. "It is also possible that further advances in generative AI could phase out the use of RPA in MRO operations. Regardless, when it comes to driving efficiency and optimizing workflows, the MRO industry stands to benefit either way."

As for Saravanan Rajarajan's predictions? "Future workflows will combine technologies, including digital OCR [optical character recognition] to automate data inputs, RPA to replace manual tasks, machine learning models to interpret data, and agentic AI to make decisions and execute tasks," he said. "It's crucial to resist the temptation of blind trust in RPA and instead foster the right workflow between machines and humans that amplifies the strength of both while mitigating their weaknesses."

All told, robotic process automation is one of the best things to happen to the MRO industries in recent years — even if it doesn't involve actual robots racing around the MRO shop floor. AVM

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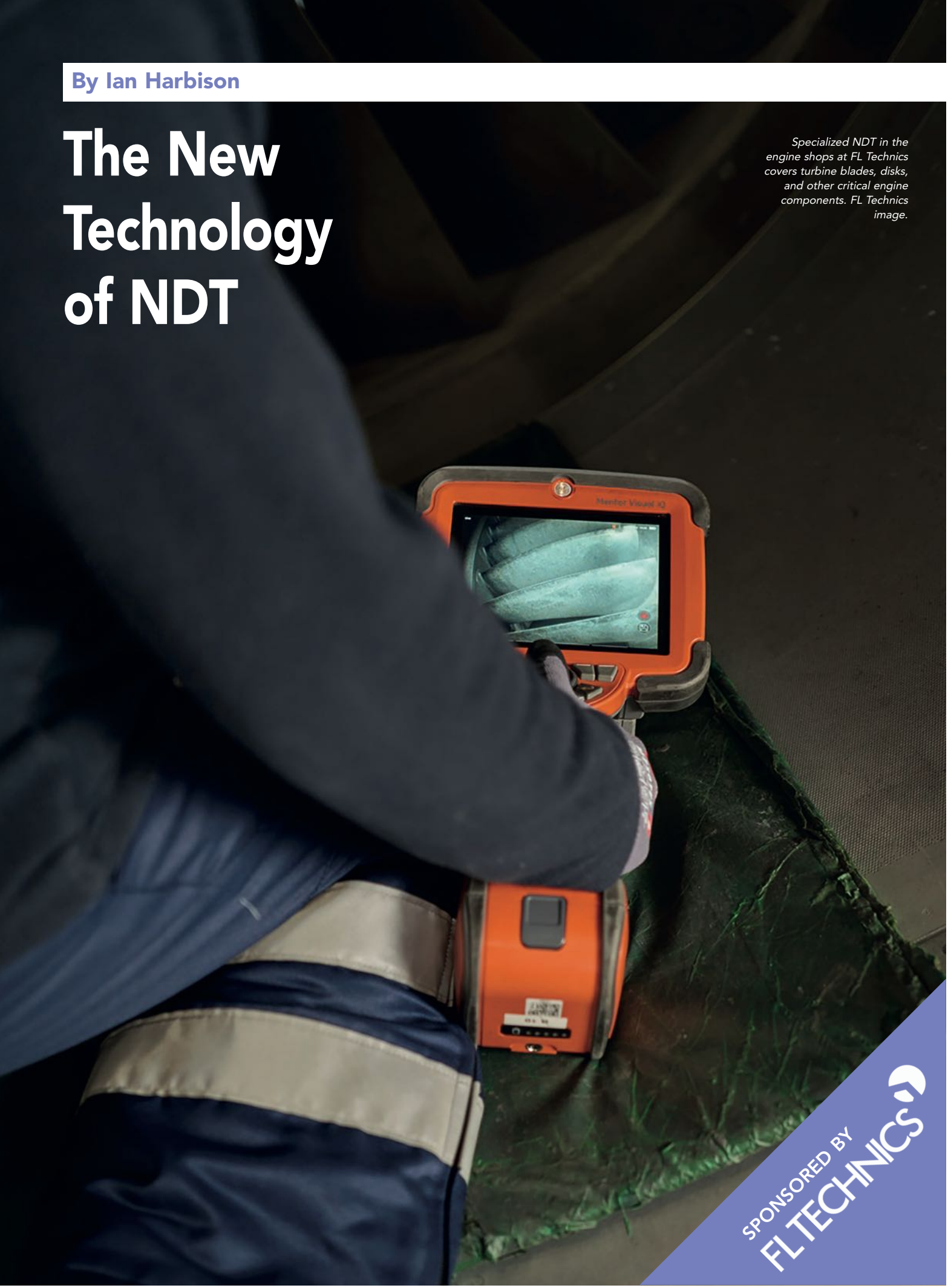
By Ian Harbison

The New Technology of NDT



Specialized NDT in the engine shops at FL Technics covers turbine blades, disks, and other critical engine components. FL Technics image.

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Non-destructive testing (NDT) has always had an important role to play in aviation production and maintenance. It has had to adapt to examine new materials and processes but has also developed technology to improve fault detection and analysis. Ian Harbison reports.

As well as basic visual inspection by eye or with magnification, there are a number of other techniques in common use to inspect a variety of components in a range of different materials.

MPI

Magnetic Particle Inspection (MPI) generates a magnetic field inside the component, which must be made of ferromagnetic materials. Magnetic particle powder is applied to the surfaces which is attracted by the magnetic flux leaking through any defects. This makes it easy to spot surface problems, such as toe cracks, crater cracks as well as areas of porosity in castings, shafts, and welds.

DPI

Dye Penetrant Inspection (DPI) service is used to detect casting, forging and welding surface defects such as hairline cracks, toe cracks, crater cracks, as well as surface porosity, leaks and fatigue cracks. The components, such as shafts, castings, and welds, along with machined small components, are coated with a dye and then illuminated by white light or UV light, for which a fluorescent dye is used. It is generally used on non-ferromagnetic materials.

Ultrasonic Testing

Ultrasonic Inspection (UT) uses ultrasonic waves to scan for flaws, delamination or other discontinuities in materials like composites and aluminum, or to measure thickness in a wide range of materials and applications. It can measure internal defects in most materials and is also useful for inspecting forgings, castings, and structural steel welds. It can also be used to scan for collision damage or to carry out post-repair surveys.

A development in ultrasonic inspection is Phased Array testing. A disadvantage of conventional methods is that the ultrasound source has to be moved manually around the component. Using a phased array means the sound direction can be steered electronically, reducing the survey time.

Radiography

In radiography, the component is placed between a gamma or X-ray radiation source and a detector holding photographic film. The rays pass through the component and an image is imprinted on the film. When processed, the image will show any internal defects.

A development here is computed tomography, which rotates X-ray beams around the test article to generate a series of detailed images. Advanced reconstruction algorithms then compile the images into a highly detailed 3D model that can be used to detect internal flaws such as voids, cracks, and inclusions.

Just as there is a range of techniques, there is a range of OEMs and end users.

FL Technics

Ovidijus Rucinskas, head of NDT at FL Technics, says a variety of techniques are used across the company's activities. Comprehensive inspections are routinely carried out during scheduled heavy maintenance checks, while line maintenance uses on-wing inspections for in-service aircraft, addressing immediate airworthiness concerns.


Ovidijus Rucinskas, FL Technics

Specialized NDT in the engine shops covers turbine blades, disks, and other critical engine components and the component shops use magnetic particle and dye penetrant inspections for crack detection, for wheels and brakes, for example. FL Technics has the capability for eddy current testing, ultrasonic testing, magnetic particle testing, penetration testing, thermography testing (water ingress method) and engine and APU borescope inspection (B1 rating) as part of its base maintenance capabilities in several locations.

It provides services for operators, MROs and leasing companies. Services can cover one-time or periodic inspections, fleet-wide support or long-term maintenance agreements. The company can also dispatch teams within 24 hours to a client's chosen location globally to provide any type of NDT service.

As NDT is not only used in aviation, but in rather a lot of other industries, he sees that aviation does not evolve as quickly as other sectors might. It takes rigorous testing and evaluation to get approval for new NDT techniques from the regulatory authorities. In fact, approval is required from every authority that FL Technics is involved with, such as EASA, U.K. CAA and Bermuda.

As materials evolve, NDT equipment has also advanced to meet OEM-prepared procedures, ensuring compliance and improved accuracy. New techniques such as computed tomography (CT) scanning, laser ultrasonics, eddy current array and others are being developed. However, these are primarily used in

FL Technics can do eddy current testing, ultrasonic testing, magnetic particle testing, penetration testing, thermography testing (water ingress method) and engine and APU borescope inspection (B1 rating) as part of its base maintenance capabilities in several locations. FL Technics image.

Ben Linke,
Waygate Technologies

the manufacturing process rather than in maintenance. In maintenance, traditional ultrasonic, eddy current, magnetic particle testing and penetrant testing remain the primary methods.

Waygate

Ben Linke, CEO of Waygate Technologies, says aerospace non-destructive testing (NDT) accounts for 30% of the company's business with a 50/50 split between MRO and manufacturing. Other sectors include space exploration, automotive, rail, electronics, battery, and research and development. It offers ultrasonic, radiography and computed tomography (CT) solutions for aerospace, as well as visual inspection systems (RVI).

The company works with various key stakeholders in the market to effectively modernize the industry. Waygate Technologies has signed a joint technology development agreement (JTDA) in 2023 with GE Aerospace to develop software and hardware inspection solutions for commercial aircraft engines. It has also been partnering with Rolls-Royce to develop the so-called Intelligent Borescope to inspect high-pressure turbine (HPT) blades.

The Intelligent Borescope uses Waygate Technologies' Mentor Visual iQ+ video borescope, which has two-way communication with Rhinestahl's turning tool and Menu Directed Inspection (MDI) for specific step-by-step instructions to ease the inspection workflow and standardize data.

In both cases, the applications are powered by AI – the aim is to avoid the traditionally labor-intensive and time-consuming processes that generate inconsistent data that can result in repeat inspections and, more importantly, can see engines removed prematurely for maintenance, causing unnecessary expense for operators.

By using high-resolution, templated imaging systems that capture detailed visuals of the HPT blades during inspections and combing them with AI-powered algorithms to subsequently analyze the images, even the smallest amount of wear and tear can be quickly identified. The data is then easily and immediately accessible in a cloud to enable accurate maintenance decisions and optimize the time-on-wing of the engines. The imagery can also be used to develop repair schemes to return the blades to optimum aerodynamic efficiency.

He points out that HPT blades are subjected to temperatures of 1600°C and extreme centrifugal forces. With engine OEMs pushing for even higher operating temperatures for greater efficiency, and increased pollution causing more blade erosion, regular checks will become even more important.

A newer application of computed tomography is scanning components produced by additive manufacture. This is the only way that any voids in the material can be detected, caused by problems as material is being laid down layer by layer.

Looking further ahead, in 10-15 years, or 25 years if Airbus concerns about infrastructure are correct, hydrogen powered aircraft will be around. One of the most important checks that will have to be made after construction of composite fuel tanks is to check for micro cracks on the interior surfaces that could lead to leaks. The company is already working on the problem in collaboration with the U.K. National Composites Centre.

Ease of use will also become more important in the future, he says, because of skill shortages. There is a retirement bulge looming so there will be many young recruits coming into the industry. Technology developments can help them get up to speed quickly.

SEAL Aviation

For Jerel Bristol, president of SEAL Aviation Repair Services, NDT is an integral part of the company's fuel leak and structural repair services. These can be carried out at its facilities in Fort Lauderdale and Treasure Coast International Airport in Fort Pierce, Florida, or the company will deploy a team to the customer's

WaygateTechnologies' Mentor Visual iQ+ is an advanced video borescope for engine inspection in the market. Waygate Technologies image.

With Powerscan HE, Waygate Technologies owns one of the most powerful industrial CT scanners in the world to inspect large high-density parts and additive components in aerospace. Waygate image.

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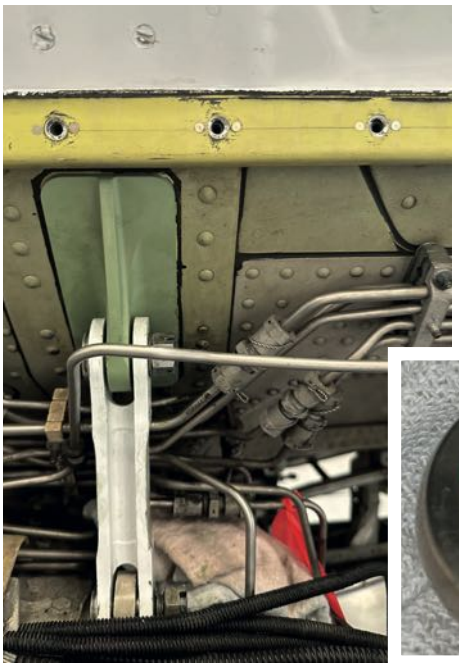
location to deal with AOGs. Capabilities include radiography, eddy current, ultrasound, bond testing, paint thickness testing, liquid penetrant, magnetic particle and optical prism testing.

These can be applied to a wide range of aircraft, although business jets are a specialty. A recent example of how the different aspects come together was on a Hawker 800A. An inspection found corrosion on the wing link attachment fitting. The company brought along its own jacks, pads and shoring to support the aircraft, as well as installing a temporary wing link to ensure structural rigidity. This type of work usually involves an engineering mechanic and a sheet metal technician, making SEAL Aviation a one-stop shop. The removed link was then tested to determine the level of corrosion and repaired. After this, to determine airworthiness, it is tested again to confirm complete removal of the corrosion and that the reaming thickness of the material is within limits.

Bristol notes that, with more manufacturers using composite materials, the use of ultrasonic testing and phased array testing is becoming more common to find discontinuities such as cracks, delamination and disbonding. AVM



Left: Shown here is the corrosion found on the wing link attachment fitting of a Hawker 800A. SEAL Aviation image.

Below : A closer look at the corrosion on the removed link. The piece was then tested to determine the level of corrosion and repaired. SEAL Aviation image.

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FL Technics is a leading global provider of aircraft maintenance, repair and overhaul (MRO) services, specializing in a comprehensive range of solutions such as maintenance, parts and materials supply, technical training, wheels and brakes, engine services, engineering and aerospace logistics. Holding certifications, including EASA Part-145, Part-CAMO, Part-147, Part-21, FAA-145, UK CAA Part 145 and other NAA as well as adhering to the quality standards of ISO 9001, ISO 14001 and EN 9110, their operations extend across hangars in Lithuania, Indonesia and the UK, supported by more than 70 strategically positioned line maintenance stations worldwide.

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Flawless Flaw Detection with Evident's OmniScan X4

By Joy Finnegan

Aviation Maintenance had the opportunity to see Evident's OmniScan X4 flaw detector in action at a recent trade show. The OmniScan X4 is a portable, powerful solution that offers speed and versatility for detecting flaws and corrosion. The company says the unit can help boost productivity while increasing confidence in assessment results. The X4 has advanced phased array capabilities, total focusing method (TFM) and phase coherence imaging (PCI) to detect and interpret challenging flaws. Utilizing it can help identify damage earlier, Evident says. We spoke with Evident's Rod Matheson, director, global product marketing NDT and Victor Chumillas Puya, NDT and RVI sales specialist, to learn more about this latest iteration of the OmniScan.

Aviation Maintenance: Tell us about the OmniScan X4 flaw detector.

Rod Matheson: It's really an evolution, both in terms of the transition from the OmniScan X3, but also in terms of future advancements. We provide quarterly updates of the instrument's software free of charge to our customers. As the demands of the aviation industry expand and there are more requirements in

The Evident OmniScan X4. Evident image.

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certain inspections, this flaw detector will be able to grow and evolve with the customer's needs. What we tried to do with the X4 is to help ensure a simple transition for existing OmniScan users, and customers looking to get on board with the OmniScan X4 can quickly get up and running. It's an advanced flaw detector equipped with the tools they need to help them carry out these critical inspections as efficiently as possible.

Victor Chumillas Puya: It's an instrument that can be used for many applications in aerospace and oil and gas. For instance, it's equipped with phase coherence imaging (PCI) to detect and accentuate historically hard-to-find flaws, including hook cracks and stress corrosion cracking (SCC). With PCI, you can identify individual flaws in areas of many fine cracks and characterize them with certainty. This is particularly helpful in aerospace inspections that require metallic crack imaging and sizing.

AVM: Why is it better than what was available before?

Matheson: It's all about the evolution. It has a more powerful processor on board that makes the software faster and more responsive. It also has one terabyte of storage, which is crucial for large-area scans and handling large data sets.

Technicians want the space to store their inspection data and not have to constantly stop to transfer it. They may have an aircraft on the ground, which as we all know, is a huge cost, and they need to get that aircraft back into the skies. Since downtime is costly, speed and workflow efficiency are critical, it's key that customers have confidence and trust the results, trust that it's reliable. The OmniScan X4 is a ruggedized unit designed to work in challenging and hazardous environments, whether in aerospace or the oil and gas sector.

AVM: It looks fairly user-friendly. Is it?

Matheson: The interface and the workflow are very much something that we've developed over 20-plus years, culminating with the OmniScan X4. I would say that what we have developed here is really something in terms of simplicity and speed for our customers.

Chumillas Puya: Another important contributing factor to its speed is that we offer an OmniScan X4 model that supports a phased array group of up to 128 elements. It enables technicians to achieve much wider coverage with one pass when using a 128-element probe, such as the one in our RollerFORM XL wheel probe. So, this is very interesting because it's more efficient, quicker, and saves time. Its detection and measurement capabilities help to identify and evaluate the severity of damage before it becomes critical.

Evident says the OmniScan X4 allows for wider coverage with one pass. Evident image.

AVM: Even though it is powerful, it is also portable.

Matheson: Yes, it's a portable system. If we go back years ago and look at what phased array systems used to look like, they were much bulkier. Even by today's standards, this is a truly portable system. It's packed with a lot of power, yet it remains a portable solution in phased array.

AVM: Give an example of when the OmniScan X4 would be used.

Matheson: It can be used in many different applications, with a wide portfolio of probes and scanner solutions. A good example in aerospace is wing inspection. We have various accessories, including the GLIDER scanner, that allow the technician to efficiently inspect a large area. Connected to the OmniScan X4, the GLIDER scanner enables the inspector to manually scan a large area of the composite material, acquiring precise 2-axis encoded data of the volume.

Another example is our RollerFORM XL scanner, which is a wheel probe used to inspect composites and other smooth-surfaced materials. You can actually roll it across the component. It gives us a complete visual understanding on the display as well as the data behind that. It helps technicians locate and size defects with confidence. We also offer a vast array of complementary phased array probes to match the type and thickness of the material you need to inspect.

AVM: What would you use the different probes for?

Matheson: It depends on the application. If you're inspecting some sort of complex geometry, for example, you should choose your probe accordingly. Whether it's for a wing, aileron or fuselage, first, you need to understand the inspection requirements, and second, you need to know what the manufacturer specifies for that inspection. If it's an Airbus or a Boeing, there'll be specific criteria. Then we can build a comprehensive solution based on the OmniScan X4 flaw detector and associated probes, scanners, software, and accessories.

AVM: What about training? Do you offer training with the product?

Matheson: Absolutely. Training is one of our key strengths. Evident has a global training network with specialists all around the world. That's huge when you consider the critical nature of aerospace inspections. Whether it's to help you get the best out of the instrument, to support your ongoing calibration requirements, or if your equipment needs repairing, we have repair centers globally as well. Providing a high level of support is very important to Evident. When you invest in an Evident solution, you gain access to comprehensive service and assistance.

AVM: Explain the inspection process.

Chumillas Puya: Before inspecting the part, the user is able to create an overview in the scan plan workflow, assisted by our intuitive application presets. These presets can help speed up the setup and improve the consistency of results. We provide presets for common corrosion and flaw detection applications, and they can be used to help with the setup of some of our industrial scanners, such as the HydroFORM, RollerFORM, or FlexoFORM scanner. Each option provides preprogrammed parameters that can be edited as needed.

After the technician is finished scanning, they can analyze the data on the instrument or export the info and analyze it with PC software, which we also supply to our customers. It is very easy. The instrument helps and, as we said before, the interface of the instrument is user-friendly. We made sure to design an interface that is very intuitive for everybody.

Matheson: Phased array detection is based on multiple beams of sound as opposed to conventional ultrasonic flaw detection. Phased array UT enables the technician to get a full visual understanding of the inspected component. And then, we can go in and examine that data in more detail. Using the OmniScan X4 and RollerFORM XL scanner, data is acquired very quickly, whereas if you were using a traditional phased array probe, it takes longer.

Chumillas Puya: So, very quickly, I have the information about the size, I have the information about the thickness and I can also identify the location of the indication.

Matheson: I think it's also worth mentioning our dedicated ScanPlan software. It has the same intuitive user interface and tools as the onboard OmniScan X4 scan plan. With ScanPlan software, users can create basic setups that can then be imported into the device. ScanPlan software's 2D and 3D views are easy to prepare, and inspectors can take screenshots for reporting purposes. The idea is to speed up the process and give you more flexibility in terms of equipment management.

The OmniScan X4 unit can also be used in collaboration with others; for example, using the Remote Calibration Service. You can use the RCS to communicate via the OmniScan X4 with the manufacturer, sharing information with them or with the line maintenance manager, that sort of thing. The X4 is equipped with cloud connectivity, so you have the ability to share data and collaborate.

With the ScanPlan software, users can create setups that can then be imported into the device making it easy to prepare. Evident images.

AVM: What else should readers know about Evident and the OmniScan X4?

Matheson: It's a brand that's known all over the world. Ultimately, we are about aviation safety, of course, the critical safety of an aircraft, and this touches the entire life cycle of the aircraft. From raw material through manufacturing, to in-service maintenance and even the decommissioning of the aircraft, throughout each stage, the OmniScan X4 can be of service.

We continue to evolve the OmniScan X4 with each MXU software update, so that adds value for the customer, at no additional cost. The instrument's performance will continue to evolve quite literally. We also want to work with aerospace professionals — manufacturers, maintenance organizations and industry experts — to get their insights on how we can further enhance their inspection efficiency. It's a journey, and we're committed to evolving alongside our customers.

By Mark Robins

Austrian-based Dynell designs, builds, distributes and maintains aviation ground support and charging equipment. Dynell image.

Ground Support Equipment Supporting an Aircraft's Mission on the Ground

Encompassing a wide range of equipment, ground support equipment (GSE) is the vital support found on airport aprons that keeps aircraft flying. From maintenance and refueling to passenger boarding between flights, GSE plays a crucial role in supporting the operations of aircraft while on the ground, maintaining safety and ensuring flights can depart and arrive on schedule.

GSE Impacts

With a diverse array of GSE to choose from — everything from simple machines like aircraft maintenance platforms to advanced hydraulic test stands — what factors impact GSE?

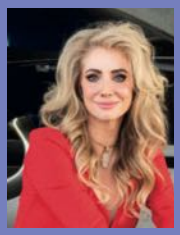
Michael Brandstoetter, head of sales and marketing at Dynell GmbH, Austria, explains that from a ground power unit (GPU) manufacturer's perspective, "The primary factor is the size of the aircraft, as this determines power consumption requirements during light or heavy maintenance programs. Larger aircraft require higher power output, while smaller aircraft have more moderate needs. Efficient power delivery systems are crucial to meet these varying demands reliably."

Obviously, safety standards are significant factors that impact GSE. When GSE is designed and manufactured in full compliance with prescribed safety regulations, Vesna Poznič, head of sales at TIPS GSE, Leskovec, Slovenia, explains, "The likelihood of errors, malfunctions and damage is significantly reduced or even eliminated. Conversely, equipment that does not adhere to these standards poses higher risks of operational failures and accidents. Additionally, factors such as the size and weight of aircraft, airport layout, and operational needs play a role in shaping GSE design and functionality. Strict adherence to safety requirements ensures not only the safe and efficient operation of GSE but also protects personnel, aircraft and airport infrastructure, making safety a critical priority in this domain."

Different aircraft cockpit features share similarities but some aircraft have special requirements due to their specific aircraft system settings, such as under- and over-voltage protection

Michael Brandstoetter, Dynell

Vesna Poznič, TIPS GSE



Eve Storm, START PAC

David Dick, Wilcox GSE

relays. "Electrically-started aircraft do not require three-phase equipment to start their engines, unlike commercial aircraft which are pneumatically started," says Eve Storm, president and CEO of START PAC, Las Vegas. "For maintenance purposes, onboard aircraft systems can be powered by 110V or 220V single-phased equipment that can provide from 25 to 400 amps of continuous power as most business aircraft, approximately 98% of them, will not require more than 400 amps continuous. Whether you are conducting engine starting or maintenance, using an external GPU has multiple benefits, including faster cooler engine starting that keeps turbine temperatures down to help extend turbine life and powering aircraft systems so that the onboard starting battery can be reserved for engine starting, thereby lengthening the ship's battery life."

David Dick, president of Wilcox GSE, Milton, Ontario, Canada, says that aircraft size impacts because GSE dimensions, such as maintenance stairs, must be compatible with aircraft heights and that adjustable GSE equipment can increase versatility. "[Also,] limited space at airports necessitates compact and maneuverable GSE to optimize valuable floor space. GSE equipment used outdoors must be robust and weather-resistant to withstand extreme temperatures, wind, rain and snow."

Today's GSE is more reliable, efficient, eco-friendly and safer than ever before. As the aircraft industry advances and innovates, the push for more efficient and state-of-the-art GSE has received more attention to align with sustainability and operational efficiency goals.

Dick explains that GSE electrification benefits reduce carbon footprint, lower noise pollution, improve air quality and reduce reliance on fossil fuels. Examples of this include electric tow tractors, GPUs and baggage handling systems. GSE sustainability benefits reduce environmental impact and improve resource efficiency. Examples of this include lightweight and durable materials like aluminum and composites, regenerative braking systems to recapture energy and efficient battery technologies for longer run times. Other GSE technology advancements are enhancing safety, improving efficiency and increasing operational accuracy. Examples of this include telematics, which are real-time tracking and diagnostics for predictive maintenance. Artificial intelligence, which optimizes routes, predicts equipment failures and improves operational efficiency. Advanced autonomous features include state-of-the art automated guidance systems for improved maneuverability and reduced risk of collisions. Enhanced safety systems include collision-avoidance systems (proximity sensors, cameras), improved operator visibility and ergonomics, and non-slip surfaces and anti-fatigue mats.

Dynell offers a range of ground power supply solutions tailored to modern maintenance requirements. These include advanced hangar setups such as pit systems paired with solid-state frequency converters for stationary operations. Additionally, "Dynell focuses on sustainable mobile products like battery-powered or hydrogen-powered GPUs, which provide an environmentally friendly alternative to traditional diesel units. Reliable power supply is essential for maintenance tasks, especially when testing systems under full load," Brandstoetter says.

START PAC has aided ground support equipment technology by reportedly being the first company in the world to create safe lithium-ion portable starting units, which were released in 2007.

Wilcox GSE makes adjustable GSE equipment to increase versatility. The company says limited space at airports necessitates compact and maneuverable GSE and since it is used outdoors, it must be robust enough to withstand extremes in weather. Wilcox GSE image.

Dynell offers a range of ground power supply solutions tailored to modern maintenance requirements including battery-powered and hydrogen-powered cc GPUs. Dynell image.

The TIPS GSE advanced damage prevention system (ADPS) combines sensors and actuators to coordinate the approach of GSE to an aircraft, preventing damage. TIPS GSE Image.

TIPS GSE says their ADPS-equipped equipment features a multilayered safety redundancy. TIPS GSE image.

Marjan Smole, TIPS GSE

"With more than 20,000 lithium units in more than 130 countries, their patented lithium products are lighter, smaller and have twice the battery-cycle life of older technology GPU equipment," Storm says. "Carrying a lighter weight portable starting unit reduces the weight penalty so a bit more fuel can be carried and with twice the battery-cycle life of lead acid, users see up to 10 to 12 years of use before needing to change the GPU battery."

One of TIPS GSE advancements is its advanced damage prevention system (ADPS). This onboard system combines sensors and actuators to coordinate the approach of GSE to an aircraft, controlling both speed and stopping procedures. "It helps by completely preventing any physical contact between the equipment and the aircraft, significantly enhancing safety and reducing the risk of damage," explains Marjan Smole, technical sales engineer at TIPS GSE. "Additionally, ADPS features a multilayered safety redundancy, ensuring reliable operation even in case of technical challenges. Our GSE products are designed with energy efficiency in mind, supporting sustainable airport operations and aligning with industry goals for reducing emissions. Finally, TIPS systems are highly adaptable, making them compatible with a wide range of aircraft types and operational environments, ensuring maximum flexibility for our clients."

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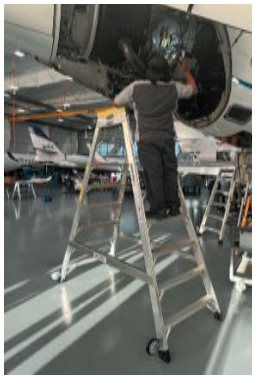

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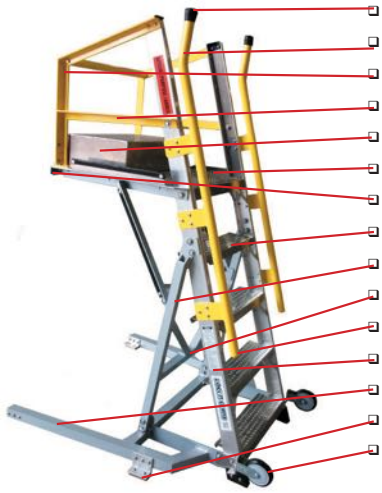

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The START PAC GREEN Machine GPU is environmentally friendly and emission-free. START PAC image.

Moving to All-Electric GSE

The transition to electric and hybrid-electric GSE environmentally friendly solutions presents both significant opportunities and challenges. Continued advancements in battery technology, charging infrastructure and vehicle design will be crucial for overcoming these challenges and realizing the full potential of electric GSE.

Dick explains there are weight optimization factors. "Minimizing vehicle weight is crucial for maximizing battery life and efficiency. Manufacturers like Wilcox GSE are redesigning equipment using lightweight materials (e.g., aluminum, composites) and optimizing component design to reduce overall mass." There are powertrain integration factors. "Integrating electric motors and battery packs requires careful consideration of factors like power-to-weight ratios, torque curves, and cooling systems."

There are charging infrastructure factors. "[With deployment], establishing a robust and reliable charging infrastructure at airports is a major challenge. This includes installing high-power charging stations, ensuring sufficient grid capacity, and optimizing charging schedules to minimize downtime," Dick adds. There are interoperability factors. "Ensuring compatibility between different charging standards and equipment models is essential for seamless operation. Early adopters [of all-electric GSE] are primarily driven by sustainability goals and a desire to improve their environmental image. [There is growing acceptance] increasingly stringent environmental regulations and the availability of more advanced technologies are driving wider acceptance of electric GSE. Minimizing charging times is crucial for maintaining operational efficiency. Ensuring sufficient battery life to meet operational demands, especially during peak periods, is a key concern. Specialized training and maintenance procedures are required for electric and hybrid-electric GSE."

Storm explains that transitioning from older technology fuel-driven GPUs to hybrid or all-electric models involves capital investment and employee training on new and unfamiliar equipment. "The flexibility in being able to use all-electric GPUs does offer several advantages such as zero fuel and noise emissions so that they can be operated in confined or closed spaces without jeopardizing employee health. Additional electric GPUs allow for a more relaxing and satisfying environment for onboard passengers or crew as these GPUs are silent running. Being emission-free, these GPUs, such as the START PAC GREEN Machine, are also a boon for the environment as all industries work towards more environmentally responsible operations."

TIPS GSE has been producing electric products for over 30 years. "Electric GSE offers numerous advantages, such as

significantly reduced maintenance costs due to fewer moving parts and less frequent servicing," Poznič says. "It also improves working conditions for operators by minimizing noise and eliminating harmful emissions, while contributing to the industry's broader sustainability goals.

"However, the transition to electric fleets requires addressing challenges like the need for robust charging infrastructure, battery-life limitations and initial investment costs. Despite these hurdles, the cyclical activity patterns of airports, with periods of downtime, make electric equipment particularly suitable as it allows for recharging during non-operational hours. Global adoption is steadily increasing, with more airports prioritizing the long-term benefits of electric GSE, including improved efficiency, cost savings and environmental impact."

GSE and IoT

Telematics and IoT (Internet of Things) technologies are becoming increasingly important in GSE. Smart GSE, equipped with IoT technology, can communicate real-time data anticipating maintenance needs before a breakdown occurs. Autonomous operations are an exciting topic that occupies the majority of R&D departments among GSE manufacturers.

Brandstoetter explains that "Battery-powered GPUs benefit greatly from IoT-enabled remote monitoring, allowing real-time access to critical battery data for improved safety and performance optimization. These technologies also enable remote supervision and updates, which enhance service levels and reduce downtime. While autonomous GSE operations are still evolving, Dynell sees these advancements as a key part of the future, improving efficiency and reliability in maintenance operations."

TIPS GSE is currently in the development phase and will begin testing the impacts of autonomous technologies for aircraft maintenance. "Telematics and IoT have already transformed ground support equipment by enabling real-time monitoring of equipment performance, predictive diagnostics and remote troubleshooting," Smole says. "These capabilities optimize equipment utilization, reduce downtime and ensure timely maintenance, all of which are critical for aircraft maintenance. As we move closer to autonomous GSE operations, these technologies will further enhance precision, safety and operational efficiency. However, the adoption of autonomous systems also requires addressing challenges such as integration with existing airport operations and the need for robust safety protocols to ensure seamless and reliable performance."

While remote-controlled ground support equipment is indeed starting to become more readily available, Storm contends, "We are still in the infancy stage of fully autonomous ground support equipment as any equipment will still require human operation of the remote as well as the connection to the aircraft. As AI continues to evolve and at an exponential rate, it will be fascinating to see how AI and autonomous equipment will be commingled to best serve the industry and its users." AVM

By James Careless

Tariffs Pose Big Challenges for the Aviation Maintenance Industry

Tariffs are a major concern for the aviation maintenance industry. The fact that the world relies on a few major brands of airliners, and that airlines frequently use MROs outside of their national boundaries, means that tariffs are going to pile up costs for MROs and their clients worldwide.

It is for this reason that Aviation Maintenance magazine is confronting the issue of tariffs head-on, with the help of two aviation industry experts. They are Jason Dickstein, general counsel with the Aviation Suppliers Association (ASA): and Christian Klein, executive vice president of the Aeronautical Repair Station Association (ARSA).

The Industry Is Not a Fan of Tariffs

Based on what the experts told us, the entire aerospace industry (of which aviation maintenance is a subset) is not a fan of tariffs.

The reason? Any tariffs that the United States imposes on other countries would be very quickly reciprocated by those countries — especially Canada and Mexico, who are two of America's largest trading partners. This fact leaves the US aerospace and defense industry extremely vulnerable to retaliatory tariffs, given that this industry's exports rose by 21 percent from 2022 to 2023, for a total value of $135.9 billion. (Source: Aerospace Industries Association.)

As for the notion that tariffs on imported products such as steel will benefit domestic producers? Well, that has proven to be the case, but not necessarily in a way that increases production and jobs in the U.S. "Historically, when we imposed the 25% tariff on Chinese steel in 2018, U.S. steel companies raised their prices to match the cost of tariffed foreign steel, because they saw it as an opportunity to increase their profits," Dickstein said. "So there is definitely a fear that even those that are already buying American steel will get caught in the crossfire of any additional tariffs and find that their costs will increase again, even though they're already doing what the tariffs appear to be intended to do — that is to say, buying American."

"I know the official statement has been that — and this is even stated in the Executive Orders — the Trump administration wants this to be an opportunity for the U.S. steel and aluminum industries to develop new infrastructure to produce more and take the place of foreign suppliers," added Dickstein. "But that wasn't what happened when we imposed tariffs seven years ago. So I think there's a lot of fear that that's not going to be what happens this time around."

So, based on past U.S. experience with imported steel, there's no motivation for domestic producers to actually invest in increased infrastructure once tariffs have been imposed. In fact, the opposite is true: the availability of tariffed imported steel (and aluminum) simply provides a pricing benchmark for domestic producers to match and profit from. That is what they have done in the past when presented with this kind of tariff scenario, and what economic logic will compel them to do again.

After all, these actions make sense. Why would any company spend billions investing in new infrastructure that won't earn money for years to come, when it can reliably boost revenues now and keep Wall Street happy by simply matching the prices of tariffed imports? What CEO whose job security relies on increasing profits and satisfying shareholders would do otherwise?

As for ARSA's take on tariffs? "It is important to state first and foremost that ARSA does not specialize in international trade issues from an economic tariff standpoint," Klein said. "Instead, we're very focused on the potential non-tariff impacts on the industry, and our overriding philosophy to help ARSA's members and clients attain the highest level of safety with the highest level of efficiency. To the extent that the government is imposing anything like tariffs that undermines efficiency, it's not a good thing for the industry writ large because the maintenance industry is obviously an inherently global industry."

"One very interesting statistic I came across that gives you a sense of how integrated the aviation maintenance sector is globally," he added, "[is that] The United States exports almost $26 billion worth of aircraft parts annually and imports $15.3 billion. In both these areas, we lead the world, with a third of all global exports and a fifth of imports. This tells you that we're critically connected to the global market for key aviation articles. There are people outside the United States that need the things we're producing and we are in the United States desperate for things that people outside the United States are producing."

An Already Battered Supply Chain

The possibility of tariffs hitting the aerospace industry in general, and the aviation maintenance industry in particular, is bad news for a supply chain that has still not recovered from COVID 19. Years after the pandemic has passed, parts are still in short supply, deliveries are delayed for months and in some cases even years, and prices remain high.

These facts account for Jason Dickstein's fatalistic response to the question of how tariffs would affect the supply chain. "It's hard to say what the damage will be," he said. "The supply chain has already been adversely affected, and at this point in time, things are bad enough that I'm not sure tariffs will make it any worse. It's sort of like you've been beaten down and now that you've been beaten down, if they rain some more punches on you, it doesn't matter."

Clearly, tariffs would negatively affect the supply chain for these non-U.S. customers, with subsequently higher prices cutting into some companies' export sales as well. Faced with these higher prices, these non-U.S. customers might look closer to home for the helicopters and components that they need to support flying. As a result, tariffs might open the door for other aircraft competition, and motivate some non-U.S. customers to turn away from manned aircraft altogether and create a push towards drones made by China or any other non-U.S. manufacturer.

Unintended Consequences

To reiterate: The stated purpose of the proposed Trump tariffs is to boost domestic production. However, their imposition could hurt the U.S. aerospace industry through the imposition of reciprocal tariffs — and it could lead to unintended consequences that could shift the balance of the global aviation market.

Just how far these unintended consequences could go was alluded to in a story supplied by Jason Dickstein. He attended a conference in China a decade ago, where China Eastern Airlines was announced as the launch customer for the Chinese designed-and-built Comac C919 narrow-body airliner. "When the speaker from China Eastern said that they were looking forward to the day when they no longer had to buy foreign aircraft, the entire room — which was 99% Chinese — leapt up into applause," Dickstein recalled. "The Chinese are just as patriotic as Americans are. If we make it difficult for China to economically use Boeing aircraft, we're simply encouraging them to adopt the C919 and other domestically made aircraft."

The same is true for countries that do not produce their own aircraft and rely on countries such as the U.S. to supply them. China has already proven its ability to match and even surpass the United States in sophisticated technology markets such as electric vehicles. Starting a trade war that makes Boeing airliners more expensive to buy and maintain internationally will only motivate non-U.S. customers to look elsewhere for aircraft.

Christian Klein, Aeronautical Repair Station Association

Jason Dickstein, Aviation Suppliers Association

To underline this point, Dickstein turned to the global satellite market. "At one point in time, the United States manufactured over 95% of all satellites, and we protected the technology," he said. "And since we told other countries we wouldn't sell them satellites, they simply developed the domestic technologies independently and it cut the U.S. sales by half because suddenly we had new competitors. So I think that it is correct to assume that other market players may take advantage of an opportunity to sidestep the U.S. trade war by creating deals between non-U.S. companies and non-U.S. countries."

Returning to the MRO market, Jason Dickstein wonders what will happen when a major carrier such as Air Canada is faced with tariffs for using U.S. MROs, and then is offered a better deal elsewhere. "For example, China has significant MRO capabilities," he said. "If China goes to Canada and says, 'Hey, we're your friends,

we're not going to impose tariffs on that sort of activity', and Canada reciprocates with, 'Well, then we're not going to impose tariffs either', that gets us to a point where China becomes more attractive to a Canadian company than the U.S. is when it comes to sending MRO activity."

But could matters actually get this bad? Christian Klein is not sure. "I don't have a good answer for you," he told Aviation Maintenance. "I think a lot of it is yet to be seen because we don't even know exactly what the administration's going to do and what countries are going to get tariffs. We obviously heard the initial offer, if you will, but we don't know where that's going to go."

A Hit on PMA Parts?

One area where U.S. aviation manufacturers have led the world is in the creation of PMA (Parts Manufacturer Approval) parts. As the FAA website explains, its PMA approval process "allows a manufacturer to produce and sell these articles for installation on type certificated products." This means that third-party manufacturers can make replacement PMA parts for OEM aircraft that are as safe and reliable to use as the originals. (Some PMA parts are even better than the originals!)

Adding tariffs to the PMA parts equation could hurt U.S. PMA manufacturers on the global market. Not only will it be more expensive for non-U.S. airlines and MROs to buy U.S.-made PMA parts, but this price differential may encourage the further development of PMA parts manufacturing in non-U.S. countries. "When you've got a non-U.S. OEM and a U.S. competitor manufacturing under PMA or TSOA (Technical Standard Order Authorizations), those U.S. companies that are filling the gap in the supply chain are going to find themselves at a weird competitive disadvantage because of reciprocal tariffs imposed on them by foreign countries," said Dickstein.

What Can Be Done?

It seems safe to say that tariffs will be bad news for the global aerospace industry. In fact, there is data from the 2016 Trump administration to prove that tariffs will only serve the government and CEOs.

According to that data, as cited by Jason Dickstein, tariffs went directly to the U.S. government, allowing it to offset tax cuts to the wealthiest Americans to some degree. But the damaging thing for the U.S. economy and American jobs was that U.S. manufacturers boosted their profits by raising prices to match those of tariffed imports. There was no incentive for these companies to invest in new facilities or hire more employees. This is the false promise: that tariffs will encourage American companies to reinvest in the American economy. It was true during the 2016-2020 Trump term, and it will be true during this term.

The bottom line is tariffs do not encourage American companies to invest in American labor. Doing so would cost more than manufacturing offshore — and that's not what their investors or Wall Street wants.

Given these proven facts, what can MROs and other companies in the aviation maintenance space do to mitigate this problem?

"It's like any other sort of risk analysis," replied Klein. "You figure out what you've got coming in and where it's coming from, figure out how significant the geopolitical risk is associated with what you're getting from where, and then start looking for alternative sources."

"For instance, if you think that Canada's going to impose a tariff on U.S. aircraft parts, then it may make sense to try and start warehousing parts in Montreal today," Dickstein said. "But that's a short-term solution. It is not possible to stockpile enough parts to cover you for the next four years. So if you disagree with the tariffs as they're being applied, especially bearing in mind that reciprocal tariffs are planned, then it might make sense to communicate with your elected representatives.

"The President's tariff authority is delegated to him by Congress," he added. "So, in theory, Congress could actually put limits on it or could negotiate with the White House on foreign policy approaches that make a little more sense. That said, I'm not sure in the current environment if even that would be effective."

The bottom line: If implemented, U.S. tariffs could start a chain of events that would only benefit the U.S. Treasury and U.S. producers of tariffed goods. Everybody else would lose, including the U.S. aerospace industry. The facts from the last round of tariffs bear this conclusion out. AVM


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By James Careless

WORK-BASED LEARNING CONSORTIUM: A Way to Train Entry-Level Hires Fast

Skilled entry-level employees are in high demand in the MRO sector, and indeed across industry as a whole. But how do you get them up to speed quickly and safely, without spending a fortune on internal training programs?

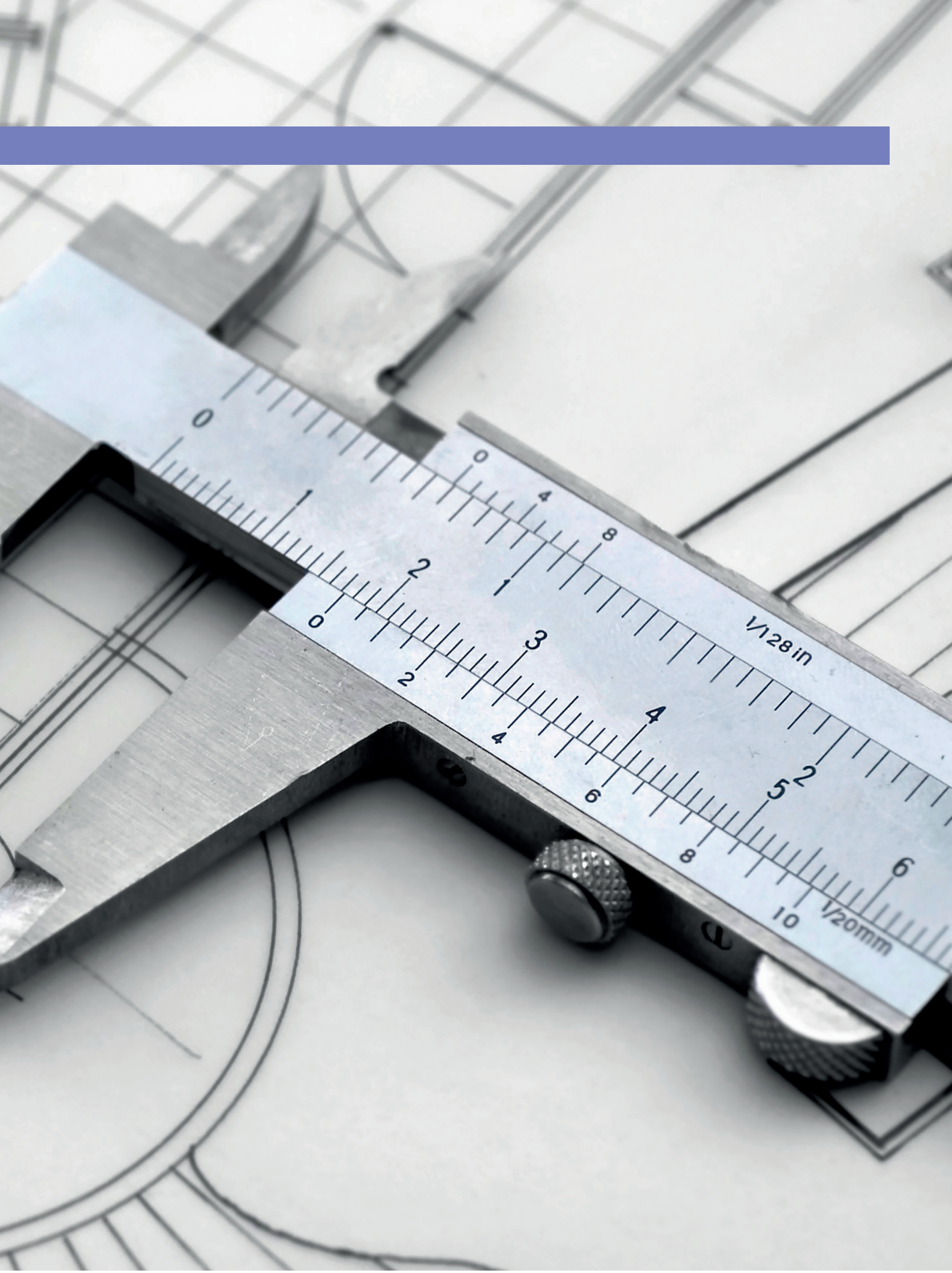
In Canada, they've come up with a solution: Work-Based Learning Consortium. "WBLC works with business and industry firms to help them fill their needs for skilled employees," says the Work-Based Learning Consortium website. "We design, develop, manage, and promote Work-Based Learning programs for entry-level to mid-level skilled jobs." Most importantly, WBLC creates these programs to deliver fast results, so that new hires get up to speed significantly faster than traditional on-the-job best-effort training practices.

Rick Stomphorst is WBLC's employer relations manager. He's the person who works with businesses interested in developing and deploying Work-Based Learning programs. Paul Coleman is a WBLC learning and program development specialist, and has helped develop their Mold Maintenance Technician, CNC Machinist, and other training programs. In this roundtable discussion with Aviation Maintenance magazine, Stomphorst and Coleman explain what WBLC is and how it works, how it can aid the Canadian MRO aerospace market, and how WBLC is ready to work with other countries wanting to set up their own programs.

Aviation Maintenance: What exactly is Work-Based Learning Consortium and what is it all about?

Rick Stomphorst: WBLC is a decade-old nonprofit that specializes in quickly developing on-site learning programs for industry. We have a "secret sauce" that allows us to rapidly identify the technical learning outcomes that industry requires new hires or upskilled existing employees to show proficiency in, and how to transform that into an actual work-based learning program.

We focus on areas that are of significant need of our manufacturing partners; areas where they cannot find the skilled trades to support the businesses that they're in. Our programs are not competing with apprenticeship programs or academia: we create very narrow, rapid upskilling, blended learning programs to solve problems that our customers are having.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Paul Coleman, Learning and Program Development Specialist, WBLC

Rick Stomphorst, Employer Relations Manager, WBLC

Aviation Maintenance: Now when you say rapid upskilling, what do you mean?

Stomphorst: Our rapid learning is not a two- to four-year program, nor are students immersed in it full time or going offsite. Take our CNC Machinist rapid upskilling program: it is a 12-week on-the-job upskilling program that takes the trainees anywhere from one to maybe three hours a week for learning. Some of that time definitely will be on the job. Sometimes the employees will do the e-learning component after hours. Importantly, employees are working while learning.

Aviation Maintenance: So why is WBLC's training approach referred to as "blended learning"?

Stomphorst: We call it blended learning because it's not a single modal training program. The training consists of a bunch of moving parts with e-learning at its core, and we have dovetailed shop floor assignments into the process to reinforce what they've been learning online.

The e-learning part is not just a bunch of slides. It is a very rich environment. It's visual, it's audio, it's 2D and 3D animations, it's video. It's virtual walkthroughs. The training process also has quizzes, tests, and exams. At the end, there's a final practical hands-on assessment.

The example I like to use is we have some very rich learning to show someone how to use a caliper, but at the end of the day, you have to grab a caliper, and you need the onsite instructor at your company to make sure you're using that caliper correctly.

So that's an example of what we do at WBLC. We will have a small e-learning unit on how to use a caliper, how to read it, and then figuratively speaking, you'll walk to the shop floor, you'll grab a caliper, you'll grab a piece of material, and you'll measure it in front of your instructor.

Trainees also meet with our e-learning instructor once a week, and that's Paul. And then we also provide some training for the company's trainer because many technical trainers have never been taught to be effective technical trainers. So, we provide them with a technical trainer effectiveness workshop to make them better overall technical trainers, and that's a skill they'll retain forever.

Aviation Maintenance: Paul, what kinds of skills do you teach to WBLC students on the job?

Paul Coleman: The virtual classes that we have once a week help fill in the "why" of a specific job, as in "Why am I doing this task?" This is something that isn't usually taught in industry because everybody's always super busy and they're just like, "here, do this, do that." And you do it. But you don't get a bigger picture of why you're doing something that you're doing.

I have industry experience, and I spend the time with the students answering questions and telling them about the whys behind what they're doing. A good example is when we're talking about feeds and speeds and machining to a Level 1 trainee. We're not going to teach them how to solve chatter problems because, as a Level 1 machinist, that's not your thing to fix. However, as a machinist, you're sitting at the machine, you hear the chatter, and then you see the surface's finish changing. If you know why it's happening, then you can go and have the right discussion with the right people to get the chatter fixed.

Aviation Maintenance: To be clear, all of this training is being done at the employer's location, and these are entry-level positions that people are being trained on?

Coleman: Yes. So, with a 12-week course where we're upskilling somebody to become a Level 1 CNC machinist, we'll take them to a point of skills that would take up to a year on the shop floor, and we can get them there in 12 weeks.

The e-learning is done on their own devices. Some companies do prefer to give them class time: they'll give them a laptop and say, "Okay, sit down and do it from 10 till noon on Tuesdays." Other people do it at home. It's up to the individuals and the companies how they want to do that.

Classes are typically done during the day and they are virtual, so we connect via Zoom. And it's nice because students get to feel like they're part of a class, not just doing e-learning and meeting with their trainer. They get to meet other people in the industry that are at the same level as them, so it works really well. It gives them a sense of community as well as filling in gaps.

Aviation Maintenance: In terms of how WBLC develops your programs, is it a matter of you sitting down with industry, finding out what they need, and then they fund you and/or the government funds you to develop and then conduct the programs on their premises?

Stomphorst: I'll pick on the CNC Machinist program to answer your question. We received government funding to build this program. We put together a consortium of CNC machinist companies to help

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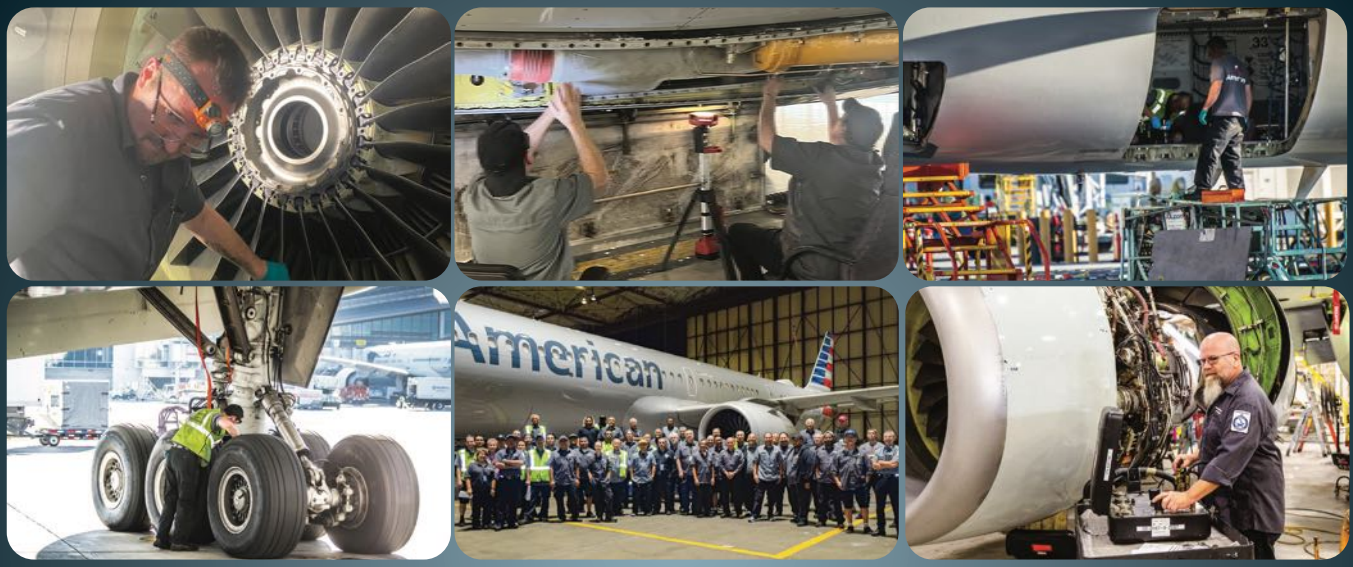

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- ✅ **CAMPAIGN AGAINST OUTSOURCING:** Secured the first comprehensive federal legislation mandating the FAA to elevate standards at foreign aircraft repair stations, which includes drug & alcohol testing for foreign workers and unannounced FAA inspections, making offshoring more costly and less appealing for airlines.

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us; manufacturers, small shops, and so forth. And through a process we extracted from them what the technical learning outcomes are that they require for an employee to show proficiency, so that you — as a group of companies — can say that this person has qualified as a Level 1 CNC machinist. We then used that data to create the training program to meet those requirements.

Aviation Maintenance: Okay. Tell me about WBLC in general. Where did it come from? What was the inspiration for it? How was it funded and why was it seen as something that would help industry?

Stomphorst: WBLC was developed just over 10 years ago because the principals at the time recognized that industry had a need for people to be rapidly trained in highly skilled jobs, and they didn't have the time to put them through a college program or an apprenticeship program. To do this quickly, they simply had to define a very narrow set of requirements.

In Canada, governments on various levels are very big on funding various training endeavors to upscale the Canadian workforce. In our case, we focus on opportunities mostly in the industrial space where we can apply our process to rapidly develop and deploy training programs, usually within a year or so. In this case, we already have the CNC Machinist program developed and we receive funding for it.

Aviation Maintenance: What sort of companies are using WBLC courses in Canada? Are they available across the country?

Stomphorst: We cover all of Canada, Pan-Canadian, because we're virtual. As an example, during the final physical assessment where we're looking over the trainee's shoulder, we developed a telepresence device using off-the-shelf components. We ship that device to the client site at roughly the week 12 point of the course. It's like setting a camera on a tripod; it's no more complex than that. They hit one button, turn it on, and then Paul or one of our other trainers interact with the trainee remotely and watch what they're doing.

Coleman: As for the size of our client companies? Well, when it comes to our CNC Machinist program, I would say mostly medium-sized manufacturers. We have a really broad base where some of them are production shops and others are more of a one-off, like a mold shop or a tool and die where somebody's going to be machining one piece and then moving on to something else.

Aviation Maintenance: What does it take to develop a course with a manufacturer? How do you fund it?

Coleman: It really helps if we have an industry partner, like the Canadian Association of Mold Makers where we can meet with a cross section of their members and the actual job that's in demand. That's because our government funders want to make sure that we're not just speaking out of our hat and that the need is actually out there.

Once we can prove the need is there, we can create the training they're looking for through our in-house development team. Then we work with that industry partner to approach the government for money through different funding channels. If we get approved, then usually they'll give us 18 months or so to develop and deliver the test pilot course. And if the test pilot is good, say we do 10 or 20 people through it, then we can go for funding for delivery.

Aviation Maintenance: Now, what sort of results have you been able to achieve so far? Because, of course, this is a good news-sounding story to the readers, but they're going to want to know what results you are generating to validate the concept.

Stomphorst: We're measuring the trainees going through the program. We routinely find that we're getting more than a 90% success rate; that's somebody who successfully completes the program and stays employed with their employer. And interestingly, in the current funding that we have, one of the requirements is we have to go back to the employer six months after the completion of the program and assess the trainees. There has to be some lift; they've either got a salary increase, they have a new position, and/or new responsibilities.

One thing we haven't mentioned is we've also developed a recruiting selection and assessment process guided by our industrial psychologist. So, if the employer needs someone new, we work with national recruiters to go the first mile to attract candidates. Then they follow our interview process to put the

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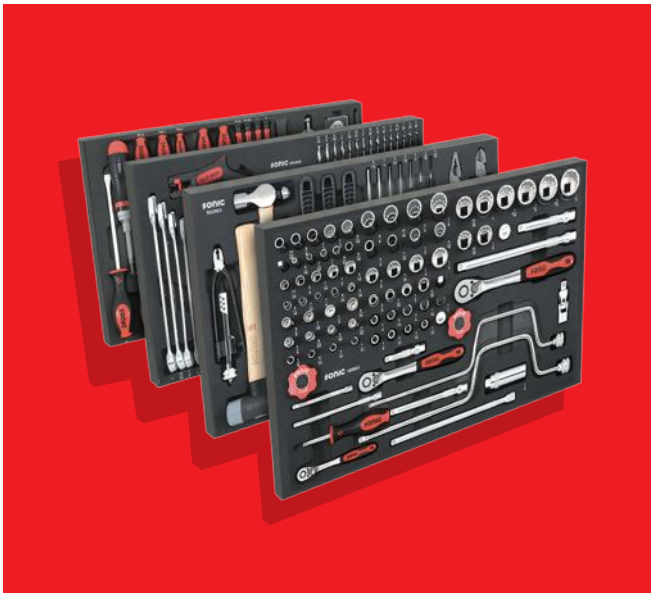

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candidate through an online psychological assessment, resulting in a candidate assessment report that really lays out who this person is for a potential employer. This also sets the stage for our high degree of success. And because of that, we've been able to demonstrate that people who normally would not have been considered for, say, a CNC machinist job, will be successful.

Aviation Maintenance: Do you have any numbers, in terms of people graduated?

Stomphorst: We've successfully put over 750 people through our programs and we've worked with over 80 companies to date. And we're being conservative with those numbers.

Aviation Maintenance: Clearly, you've been able to achieve good results in Canada, where WBLC is based, and what about the rest of the world? Would our readers outside Canada be able to get in touch with you and pick your brains about how they might do the same thing in their countries?

Stomphorst: We'd be happy to speak with them. Yeah, absolutely!

Aviation Maintenance: So where can they reach you?

Stomphorst: Via email: Rick.Stomphorst@workbasedlearning.ca

Supplier Risk and Quality Assurance — Addressing Sub-Tier Visibility and Risk in the Aerospace Supply Chain

By Christopher Brumitt

The Covid-19 pandemic exposed the fragility and inadequate depth of many industry supply chains, none more so than in the Aerospace & Defense sector. According to the International Air Transport Association (IATA), the backlog (cumulative number of unfulfilled orders) for new aircraft has reached 17,000 planes, a record high. At present delivery rates, the current backlog would take 14 years to fulfill, double the six-year average backlog for the 2013-2019 period. However, the waiting time is expected to shorten as delivery rates increase according to IATA's document, "Supply Chain Issues Continue to Negatively Impact Airline Performance into 2025."

Furthermore, labor shortages, skillset reductions and material availability (down to the raw material level) issues have reduced visibility of supply, supply quality, predictability of on-time delivery and increased lead times (which have now been reduced, to some degree). The resulting impact on OEMs and top Tier 1 suppliers has been a lack of in-depth understanding of the drivers of supplier challenges, especially at the sub-tier level, and most importantly, very poor visibility of potential critical-part disruption.

As we move further into 2025, the looming threat and reality of tariffs and other economic hardball situations have the potential to create further instability, just as the aerospace supply chain is attempting to stabilize.

Much of the efforts of OEMs and Defense Primes to recognize supply chain weaknesses focus on big Tier 1 suppliers that provide very large, very expensive, complex systems and sub-systems like landing gear, avionics, engines and aerostructures. This is understandable to a degree; however, most of these highly engineered systems are made up of hundreds, if not thousands of sub-assemblies and individual parts that come from huge numbers of smaller companies that do not necessarily have the same robust systems to manage demand and production as effectively as Tier 1s themselves. Limitations arise when OEMs attempt to gain direct, on-site access to sub-tiers; sub-tier relationships are largely directly managed by the Tier 1 suppliers and there can even be specific privity clauses in the contracts between Tier 1 and sub-tier suppliers.

Impacts of Supply Chain Visibility and the Production Readiness Audit Process

While most OEMs and Primes have supplier quality and vendor management systems (and many have highly structured production readiness processes) in place, the problem that often materializes is that there are simply too many suppliers and too many assessments to be done in a given year to keep up with. Coupled with inconsistent training and poor adherence to rigorous process, this tends to lead to assessing through 'pencil whipping' and copy / paste when it comes to vital processes. Often, thoughtful, deeper probing of supplier production readiness is set aside as readiness audits press for speed and conclusion.

In an effort to raise quality and production rates so that they can get their parts, many of the largest Aerospace & Defense OEMs and Primes are known to send dozens of their own engineers and production leads to a Tier 1 supplier for months at a time to correct design, engineering, production and supply chain issues. This is obviously an expensive effort; however, it can be worth the cost IF they can get the critical parts and systems to meet their own demand. It is not uncommon for Tier 1s (especially larger ones) to apply a similar methodology to their sub-tiers to simply keep their own supply chain moving. The problem with this approach is that the cost makes it a short-term fix at best, and even though the supplier's quality and production may go up while they are there, once the OEM or Tier 1 leaves, things quickly go back to what was being done before and sub-tier suppliers are right back where they started. The question is, why?

The reason this approach is both short-lived and limited in effectiveness is that there is not a specific, clear approach to determining the root cause of the issues, aligning on a course of action to correct the issues, and subsequently implementing an operating model change driven by strong KPIs and sustained by intensive training in order to ensure the change sticks in the long term. The other important issue that comes up is that this approach is typically only applied to critical parts, which leaves other sub-tier suppliers untouched by the OEM and mainly left to improve on their own.

Communication and Data Clarity Challenges

The complexity of this supply chain visibility weakness really begins (as in most cases of breakdowns in production maturity) with lack of clear, concise communication and poor data. First, OEMs and Defense Primes can get very frustrated with the lack of communication between their Tier 1s and sub-tiers (and likewise between themselves and the sub-tiers); however, if you were to ask most sub-tier suppliers they will tell you that they are just as frustrated with the lack of a clear demand signal from their customers (both the Tier 1 and OEM). This is an especially difficult situation for smaller Tier 2 and Tier 3 suppliers as frequently they simply do not have the capital to invest in more robust systems and processes, nor capacity to quickly raise production rates, or conversely simply slow their production due to the OEM having a sudden slowdown in their production. This churn in demand creates a rollercoaster of fluctuation that can be very difficult for suppliers to respond to as they plan their own production schedules.

In addition to communication, poor data is the second piece of this puzzle that must be addressed. Often OEMs and Tier 1s may have many different sources of information coming from several disparate ERP systems and even from Excel spreadsheets. This lack of a 'single source of truth' can create confusion when it comes to delivering accurate, reliable, and timely information to sub-tier suppliers they depend on to ensure that they are scheduling the right work at the right time. The same disconnect often happens from the sub-tier to the Tier 1 and OEM, which leads to the OEM not trusting that the supplier will be able to deliver on time and in full, which then, you guessed, starts the cycle all over again.

Moving to a Predictive Supplier Quality Process

The entire process can quickly become a downward spiral of quality and production that gets out of control fast and can have a significant impact on Cost of Poor Quality (CoPQ) for both the supplier and the OEM. But what can be done to turn this around in the near term?

The first thing for the OEM is to create a very robust supplier performance program that includes multiple elements in a process that eliminates visibility issues and gives them confidence that suppliers can deliver on time and in full. Some of the critical criteria include: supplier data consolidation; supplier risk rankings; critical parts analysis; prioritization & stratification criteria to determine highest priority sub-tiers; and a clear supplier production readiness assessment process that goes beyond just 'checking off boxes.'

Moving from a reactive to proactive to predictive supplier quality process requires a rigorous Supplier Risk and Quality Assurance process, which includes:

- Developing a Risk & Capabilities Matrix (integrated with digital enablement)
- Analyzing and enhancing current data to refine prioritization measurements and define risk landscape
- Determining current percentage of Supplier of Concern issues related to sub-tiers
- Determining an effective supplier communication strategy to engage and prepare sub-tiers for assessment
- Consolidating data, supplier risk rankings, critical parts analysis, prioritization & stratification criteria to determine highest priority sub-tiers for the Wave 1 on-site assessment
- Jointly developing a rollout plan that includes specific supplier initiation, analysis timing, logistics, etc.
- Analyzing each supplier for critical production process criteria: quality, capability, capacity, metrics, KPIs.

While it is very easy to see the potential benefits of a robust, comprehensive and cohesive supplier risk and quality assurance approach for the OEMs and Tier 1 suppliers, the upside potential for the sub-tier supply chain could be even more pronounced. Many sub-tier suppliers continually struggle with labor, material and cost impacts just like the OEMs. Aligning sub-tier suppliers with OEMs through increased visibility, open communication, and clear supply and demand signals, and supporting with reliable data to drive confidence in decision making, has the potential to enable OEMs and the supply chain to ensure predictability of supply while reducing cost and improving profitability. AM

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By Jason Dickstein

Breaking the Supply Chain Bottlenecks

The aviation community has been having serious discussions about breaks in the aircraft parts supply chain since the beginning on Covid. It appears that the problems may continue to plague the industry. One of the issues with "supply chain problems" is that it is not just one problem. If it was one problem then we could focus on solving the one problem to eliminate the industry's supply chain woes. Instead, we are seeing that Covid was just one in a series of issues that have impacted our supply chain, and that are likely to continue plaguing the aircraft parts supply chain.

Supply Chain Solutions

This article is focused on examining a few of the supply chain solutions that have been shown to be successful.

Of course, the most preferable solution is to solve the underlying problem by creating availability of the missing item; but this is not always realistic. As a consequence, it is often necessary to circumvent the supply chain disruption through some form of substitution.

A key concern in any substitution effort is airworthiness. Everything else is secondary to this concern. In the FAA's system, FAA approval is an important strategy for supporting airworthiness questions.

Parts Manufacturer Approval (PMA)

One easy substitution option is articles produced under parts manufacturer approval, or PMA. This can be an easy option to adopt because FAA-PMA articles are typically approved three different ways. The design is approved by the FAA, showing that the design is consistent with the FAA's airworthiness standards. The production quality system is approved by the FAA, showing that the production quality assurance system is adequate to ensure that each article conforms to its approved design and is in a condition for safe operation. Finally, the eligibility of the article is approved by the FAA, showing that it has been found safe for installation on at least one specific type of aircraft.

Because of the FAA's approval system, an installer can have confidence that the article is safe and airworthy for installation in the approved installation eligibilities. But sometimes an operator may want to install a PMA article into an aircraft that is not listed on the eligibility list found on the PMA supplement. This particularly happens when the application for adding an eligible installation is pending, but this is not the only fact pattern in which an air carrier can make its own determination of installation eligibility.

If an operator may want to install a PMA article into an aircraft that is not listed on the eligibility list found on the PMA supplement, then the air carrier must make its own finding of eligibility. This is typically accomplished through an Engineering Order or EO (this can also be called by other names, like an Engineering Change Order or an Engineering Design Order). An air carrier can cooperate with the manufacturer of the article to develop the engineering data necessary to substantiate such an EO.

One important feature of the modern PMA marketplace is that PMA suppliers recognized many years ago that one of the problems that they are solving is availability; so most independent FAA-PMA companies will try to maintain inventory so that they can support the industry "on demand." In the most extreme cases, even OEM repair stations who are unable to obtain needed articles have purchased PMA articles and used them in their repairs. This "OEM usage" was first reported by air carriers in the depth of Covid but we've confirmed in the past few months that the solution continues to be used by both repair stations and operators.

DER Repairs

The FAA approves technical data in the context of type certification of an aircraft, but what about technical data that is needed by the industry to support the aftermarket? Repair and alteration data is often approved by designated engineering representatives (DERs). DERs are individuals who have been granted the authority to assess and approve technical data. The approval means that the applicant has shown compliance with the relevant airworthiness standards, and the DER has made a corollary finding that the technical data adequately demonstrates compliance. This show-find sequence is at the root of most FAA approvals. The DER is authorized to stand in for the FAA and make technical findings on behalf of the FAA.

DERs typically have different function codes, and they usually can only approve data within the context of their authorized function codes. For example, a DER with RS-DER authorization is allowed to approve repair specifications on behalf of the FAA.

Repair specifications provide an alternative to the methods, techniques and practices contained in the current manufacturer's manuals, service bulletins, and instructions for continued airworthiness. They typically involve the approval of data supporting a major repair. RS-DER data can be serial-number-specific or it can be general in nature.

When the industry talks about DER repairs, and parts that have been subject to DER repairs, they are talking about a repair that was not in the manufacturer's manual system (or a repair that had limitations circumvented by the DER-approved data). The DER reviews and approves the data supporting the repair. This approval confirms that the data is consistent with the FAA's airworthiness standards. When the DER is acting within his or her authorizations, the DER approval carries the same weight as an approval from an FAA employee.

In short, DER repairs represent an FAA-approved method for performing maintenance work to return the aircraft article to an airworthy condition.

Used Serviceable Material

Another popular source of aircraft articles is the used serviceable material (USM) market. These are used rotable components that are capable of being overhauled and approved for return to service.

In many cases, the USM market is being fed by disassembly of aircraft. An end-of-service aircraft may be disassembled before it is scrapped, with anywhere from 200 to over a thousand articles being removed from the aircraft and sent back through the MRO market for overhaul.

While the USM articles are "approved parts" at the time of production, they are not presumptively airworthy at the time of removal. Thus, they will typically be sent to a properly rated MRO for overhaul after being disassembled.

Historically, the weak link in this process was the disassembler: in the United States, disassembly of end-of-service aircraft is not directly regulated. Modern commercial and airworthiness practices have changed this, and have provided a higher level of safety assurance.

Many companies performing this disassembly are performing it under the auspices of the Aircraft Fleet Recycling Association (AFRA) Best Management Practices (BMP). The AFRA BMP is a management system with elements designed to protect the airworthiness of the removed articles. The AFRA BMP also has a heavy focus on environmental compliance during the disassembly process, to help meet both domestic and international environmental standards.

Disassembly companies can choose to implement a quality assurance system in accordance with the AFRA BMP; and then the AFRA auditors can audit the company to the AFRA BMP standards to ensure that the disassembly company has adequate airworthiness and environmental systems to meet international norms. The AFRA BMP is helping to raise the bar on safe handling of USM at the time of removal, which helps to ensure that parts are more recoverable (because they are less likely to be damaged upon removal). AVM

Matching Commercial Aviation Demand with XR

By Billy Webb, senior director of business development at Mass Virtual

According to the Transportation Security Administration, a staggering 904 million passengers were screened in 2024, marking a 5% growth from 2023 and an impressive 17% increase since 2022. Despite this rapid growth, the aviation industry is facing significant challenges, particularly in workforce shortages and rising training costs. If left unchecked, these issues could hinder industry growth and impact passenger experiences.

To remain competitive, the aviation sector must explore forward-thinking solutions, with modern technology playing a pivotal role. One of the most promising yet underutilized advancements is the integration of extended reality (XR). No longer just a futuristic concept, XR is now a practical tool that has the potential to reshape workforce training, enhance operational efficiency, and address the industry's most pressing financial and labor challenges.

The Critical Challenges Facing Aviation

One of the most urgent challenges is the growing skills gap among maintenance technicians. The industry is losing experienced professionals to retirement and replacing them with adequately trained new technicians is proving difficult. As highly skilled workers exit the field, the industry struggles to replenish its workforce with technicians who meet modern maintenance demands.

At the same time, the cost of entering and remaining in the field is escalating. Training and certification expenses range from $8,000 to $80,000, creating a significant financial barrier for new technicians. Ongoing recertifications further strain both individuals and airlines, adding to the financial burden of maintaining an adequately trained workforce.

These workforce constraints are exacerbated by increasing operational demands. Airlines must maintain aging fleets for longer while simultaneously introducing more technologically advanced aircraft to meet growing passenger expectations. Addressing these workforce and training gaps is critical — XR offers a scalable, cost-effective solution.

Modernizing Training for a High-Demand Industry

Traditional training methods rely heavily on bulky manuals, classroom instruction, and limited hands-on experience, leaving trainees underprepared for real-world maintenance scenarios. XR bridges this gap by providing an immersive, interactive learning experience.

Using high-fidelity 3D models, XR enables technicians to practice maintenance procedures, troubleshoot issues, and simulate complex repairs in a controlled virtual environment. A study by PwC on the effectiveness of VR for training found that virtual learners felt a stronger connection to the content compared to classroom learners, and 40% of the virtual learners saw improvements in their confidence compared to their classroom counterparts. Both a strong connection to the content and confidence are essential components of knowledge retention, making XR learning a far more effective approach to skill development.

Beyond effectiveness, XR training is significantly more cost-efficient. Rather than grounding aircraft for training or relocating technicians for instruction — both of which are expensive and disruptive — XR-based training can be conducted remotely, anytime, anywhere. This reduces operational downtime and optimizes training investments.

Maximizing ROI with XR Training

As training costs continue to rise, organizations need solutions that maximize return on investment. XR not only enhances learning outcomes but also provides measurable cost savings.

With XR, technicians can repeatedly practice complex procedures in simulated environments, eliminating the need for physical aircraft and minimizing costly training disruptions. This hands-on, repeatable practice leads to better retention, stronger performance, and a more confident workforce.

Fostering Collaboration Across the Aviation Industry

Beyond workforce development, XR creates new opportunities for collaboration. Airlines, MRO (maintenance, repair and overhaul) providers and regulatory bodies can work with technology developers to build standardized, scalable training solutions.

This collaborative approach accelerates industry-wide adoption, ensuring that XR training meets regulatory requirements while also addressing workforce shortages. By aligning industry stakeholders around XR-driven training initiatives, aviation leaders can implement a unified, high-impact strategy.

Reinforcing Safety with Immersive Training

Safety is the foundation of aviation, and XR is redefining how airlines and MRO providers approach safety training. Through realistic, scenario-based simulations, aviation professionals can rehearse critical situations in a controlled, risk-free environment.

Technicians, pilots, and cabin crews can practice responses to system failures, emergency landings, and other high-risk scenarios. This not only improves preparedness but also raises overall industry safety standards by ensuring personnel can handle real-world emergencies with confidence.

Flying Higher with XR

The aviation industry is at a turning point. Passenger demand continues to rise, but workforce shortages and increasing training costs pose significant challenges. Traditional training methods alone can't keep pace with the complexity of modern aviation. New approaches are needed to ensure efficiency, safety, and workforce readiness.

XR is emerging as a powerful tool to meet these demands, offering a more effective, scalable way to train aviation professionals. By adopting immersive training methods, the industry can build a workforce that is better prepared, more adaptable, and equipped to meet the demands of the future.

Investing in smarter, more immersive training will be key to ensuring a skilled workforce that can sustain the industry's growth and evolving needs. AVM

Billy Webb is the senior director of business development at Mass Virtual. Webb has more than 30 years of distinguished military service and extensive industry leadership. Prior to joining Mass Virtual, he served as the field marketing representative for Boeing with a focus on Army, Special Operations and NASA programs.

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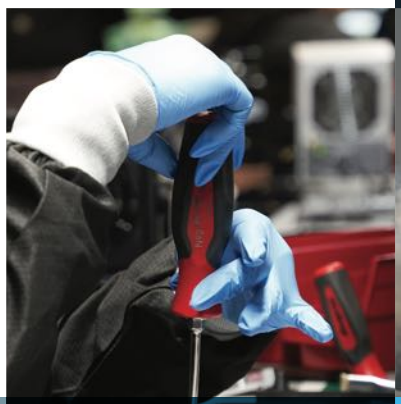

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