

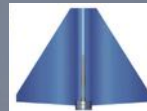
# AVIATION MAINTENANCE *magazine*



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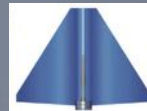
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A stylized illustration of a woman with black hair in a ponytail, wearing dark sunglasses, a purple suit jacket, and a purple top. She is holding a red and white striped bag. The background is a bright blue gradient with a faint gear pattern.

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Cover image courtesy of 8tree



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# The Dawn of the Digitization of Aviation Maintenance

BY JOY FINNEGAN  
EDITOR-IN-CHIEF

**A**s we enter the holiday season and speed toward the new year, 2025, I wanted to take a moment to recap some interesting developments in the aviation maintenance business this past year.

After the pandemic, air travel rebounded fast. Pent-up demand to travel whether to see family, to see clients for business or simply to explore the world and have fun, was enormous. It has shown no signs of slowing down yet either, and perhaps even continued growth. MRO spending is projected to reach record levels, and managing costs and operations efficiently is more challenging than ever.

At the same time, even before 2020, inklings of a true shortage of aircraft mechanics in the workforce was becoming reality. A large portion of certified A&P mechanics is retiring or nearing retirement, intensifying the need for recruitment and upskilling of new talent. The confluence of these happenings made the mechanic shortage clear and top of mind for all.

Redoubled efforts by everyone in aircraft maintenance to reach out to youth and try to entice them into the industry started happening. High school and community college outreach to funnel kids into the technical trades is happening and many are doing a great job of it. But it takes a long time to fill that pipeline and see the fruits of that labor turn into truly qualified, experienced workers in the form of A&P mechanics on the hangar floor.

Retention and attrition are issues. Wages in the industry need to rise to meet this demand and the sector struggles to retain qualified technicians due to competition from other industries and the complexity of modern aircraft systems.

Aircraft increasingly rely on sophisticated electronics, emphasizing the demand for technicians skilled in avionics and software, along with more traditional mechanical expertise. These skills gaps are challenging the industry as well and will continue to do so for years to come as retirements increase and new, inexperienced workers enter the workforce.

These truths have spurred shifts in the aircraft maintenance industry, and it has begun to look to technological innovations as they can assist in these evolving workforce dynamics like never before.

Technological advancements are helping the aircraft maintenance industry in multiple ways, but most importantly as force multipliers. Programs for predictive maintenance, driven by huge fonts of data, are helping enable operators to anticipate and address maintenance needs, improving cost efficiency and reducing aircraft downtime.

One cool development that is being embraced these days is the use of drones in the hangar. Drone technology is increasingly used for inspections, making maintenance quicker, safer and more

thorough by accessing hard-to-reach parts of the aircraft. You can read about one use case for drones in our story on dent checking, starting on page 42.

Perhaps you have seen or read about the integration of augmented and virtual reality (AR/VR) in our niche market. These tools promise to enhance training, repair accuracy and reduce reliance on manual inspections, which will eventually — hopefully — lead to increased safety and speed of service. The promise is there and now we need to see how it will play out.

What about AI — artificial intelligence? Will that be integrated even more deeply into the daily lives of maintainers, planners and related areas like operations? After all, it is a key component of predictive maintenance, the use of which is going to be crucial going forward. Other nuanced areas where AI will be key are condition monitoring, fault diagnosis and data analytics. Yes, there are legitimate concerns about the implications of AI use in aviation maintenance. But proactive measures can and must be taken to mitigate risks and maximize the benefits of AI technology to ensure safe and efficient aircraft operations.


Every maintenance operation is concerned with compliance. Modern digital solutions must come with the ability to meet regulatory requirements more efficiently. Robust security features will also be key. These can help companies protect sensitive data and avoid legal issues.

The convergence of technology adoption and labor strategies is critical for the future competitiveness and continued safety of the aviation industry. Embracing these changes offers opportunities for innovation but requires strategic investments in workforce development and technological integration.

Some say technological adoption remains slower in the maintenance sector than other areas of aviation due to regulatory and business challenges. But investment is clearly on the rise as companies seek to streamline operations through digital tools and process innovations.

Embracing technology also comes with challenges such as costs, cybersecurity risks and potential resistance to change. Companies must carefully plan and manage their digital transformation efforts to ensure they align with their overall strategy and receive buy-in from employees. But our industry must embrace it.

Those that embrace technology and digitization will gain the competitive advantage by becoming more efficient, utilizing data-driven decision-making and becoming more agile, all of which will lead to better customer experiences. Better customer experiences will lead to repeat customers and continued full hangars.

The dawn of the digitization of aviation maintenance is upon us. 



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## AFI KLM E&M Announces Leadership Transitions

Air France Industries KLM Engineering & Maintenance (AFI KLM E&M) announces significant leadership changes: Ton Dortmans, executive vice president of KLM Engineering & Maintenance (KLM E&M), will retire in summer 2025, after an impressive 40-year career with KLM Royal Dutch Airlines. Mathieu Essenberg, currently serving as EVP Hub Operations in charge of Ground Services, will succeed him on January 1, 2025.

Ton Dortmans joined KLM on August 1, 1985, and held various positions within E&M before transitioning to Ground Services, where he was responsible for redesigning ground handling processes. From 1998 to 2008, Ton held multiple roles within Flight Operations, including responsibilities for Air Traffic Management, deputy EVP Flight Operations and serving as SVP Operations Control Center in the Passenger division from 2005. He returned to E&M in December 2008 as SVP Operations and Deputy EVP, eventually becoming EVP of KLM E&M in February 2012, joining also the Executive Teams of KLM and Air France Industries KLM E&M.

In addition to his role within KLM E&M, Dortmans has represented KLM in several capacities, including chairman of EPCOR B.V. and board member of KLM UK Engineering. He has also participated in various committees with Schiphol Group, Air Traffic Control the Netherlands, and the government, such as the Regional Consultation Schiphol (CROS).

“As EVP of KLM E&M, you are responsible for one of the largest technical enterprises in our industry, tasked with timely and safely maintaining and repairing KLM’s aircraft, engines, and components, as well as those of around 200 global customers,” said Marjan Rintel, CEO of KLM Royal Dutch Airlines. “Ton has fulfilled this immense responsibility with great dedication, a passion for technology, and a deep care for the people behind it. He has successfully steered E&M through challenging times, including significant downsizing during covid and subsequent scaling up and recruitment efforts. I sincerely thank Ton for his invaluable contributions to KLM and wish him all the best in his well-deserved retirement.”

Anne Brachet, EVP Air France-KLM Engineering & Maintenance, stated, “With immense gratitude, we announce the retirement



of Ton Dortmans, executive vice president of KLM E&M, effective summer 2025. Ton’s remarkable 40-year career with KLM Royal Dutch Airlines has been marked by unwavering dedication, exceptional leadership, and a profound impact on our organization. As we welcome Mathieu Essenberg, who will succeed him, we are confident that Mathieu’s expertise and innovative approach will continue to drive our mission forward. We extend our heartfelt thanks to Ton for his precious contributions to KLM E&M and AFI KLM E&M.”

Mathieu Essenberg will start his new role on January 1, 2025. Dortmans will support Essenberg for smooth handover of all activities. In close cooperation with Anne Brachet, Dortmans will manage significant major projects for AFI KLM E&M, among other collaborations with OEMs and Supply Chain projects.

Essenberg has been with KLM since 2002 and has held various management roles at KLM Cityhopper and Flight Operations. At KLM E&M, he served as SVP Airframe/Operations, overseeing aircraft maintenance for KLM’s fleet and global customers. Additionally, Essenberg has 20 years of experience as a pilot with KLM and KLM Cityhopper, serving as captain on Boeing 737. In 2022, he became EVP Hub Operations, leading the Ground Services division.

Marjan Rintel added, “The maintenance and thus the availability of our fleet is our top priority. Mathieu has proven that he can lead significant changes while also addressing daily challenges. His strategic vision and pragmatic results-oriented approach make him the right person to lead E&M.”

## Lufthansa Technik Approves Billion-Euro Investments



Lufthansa Technik continues on its course of growth and has decided to invest well over one billion euros in the coming years. Investments will be made in all three world regions, i.e., the Americas, Asia-Pacific

(APAC) and Europe, Middle East and Africa (EMEA). “Our plans substantiate our aim to expand our leading market position,” said chief financial officer, Dr. William Willms. As part of its Ambition

2030 corporate strategy, Lufthansa Technik had announced its intention to increase its commitment not only in North America, but also in Asia.

“To finance our growth and investments, we must, of course, also generate corresponding revenues,” says Willms. Lufthansa Technik continues to target an Adjusted EBIT for the 2024 financial year at a level comparable to the record result of the previous year (628 million euros), despite the significant challenges facing the aviation industry, such as ongoing difficulties in the supply of materials. After the third quarter, the figure is already valued at 486 million euros (+5.9 percent compared to the same period last year).

The company’s revenue increased by as much as 13.9 percent to 5.5 billion euros in the first nine months of the year and is



expected to exceed the seven billion euro mark for the first time at the end of the year. Lufthansa Technik continues to successfully secure its future business and has already signed 523 new contracts this year (previous year period: 587). In addition to reaching agreements in the company's traditional core segments of engine and component services, innovations in the areas of digitization and sustainability are also paying off.

With LATAM from South America, ANA as well as EVA Air (both from Asia), Lufthansa Technik says it has, for the first time, equipped airlines outside the Lufthansa Group with AeroSHARK in recent months. The functional surface film developed together with BASF successfully imitates the skin of sharks, reduces the aerodynamic drag, and enables significant fuel savings. With its Digital Tech Ops Ecosystem, Lufthansa Technik continues to score highly with customers in the digital arena. Since its introduction in 2023, its modules have already added value in the servicing of thousands of aircraft. A special cabin modification agreement was also announced in the third quarter. As the first Boeing-licensed service center, Lufthansa Technik will modify the cabin interiors on 787 Dreamliner aircraft.

The ceremony to mark the topping out of a new hydraulics

workshop at the Hamburg location was celebrated a few weeks ago. The construction of two more large workshop buildings at the company's headquarters has become definite. The investment by Lufthansa Technik in Hamburg alone is in the mid three-digit million euro range. However, money will not only be used to expand and modernize existing sites, but also for new ones. It will soon be known where Lufthansa Technik will build a new plant for the overhaul of engine parts and aircraft components in southwestern Europe. Plans for two other major investments outside Europe are also well advanced and will be announced shortly.

To achieve its ambitious corporate goals, Lufthansa Technik is also focusing on inorganic growth. The acquisition of an 80 percent stake in ETP Thermal Dynamics of Tulsa, Oklahoma, in the U.S. this autumn, for example, represents a targeted portfolio expansion in the components business. ETP specializes in aircraft heat exchangers as well as oil and fuel coolers. The company said the acquisition not only strengthened capacities in this area but also its supply chain. In addition, significant investments continue to be made in materials and personnel. At the end of September, 24,114 people were working for Lufthansa Technik worldwide, an increase of about 2,000 employees compared to the same time last year.

## Aero Norway Appoints Kenneth Johnston to LEAP Program Manager



Aero Norway has appointed Kenneth Johnston as LEAP program manager to help with the integration of new capabilities. He will be responsible for promoting Aero Norway's LEAP capabilities and implementing the organization's readiness plan for LEAP repairs.

Johnston explains what attracted him to the role: "The LEAP engine is one of the most advanced and widely used aircraft engines in the industry, powering popular aircraft like the Boeing 737 MAX and the Airbus A320neo. By offering services for the LEAP engine, Aero Norway reinforces itself as a key player in the maintenance, repair and overhaul (MRO) market for modern, high-demand aircraft. Handling LEAP engines requires advanced technological capabilities and expertise. By successfully incorporating LEAP into our portfolio, Aero Norway demonstrates our ability to work with cutting-edge technology, enhancing our reputation as a highly skilled and reliable MRO provider.

"Overall, having LEAP in our portfolio significantly enhances Aero Norway's competitive positioning, opens new revenue streams, and aligns the company with the future of aviation technology." Aero Norway is poised to make a significant investment in specialized equipment and has undergone a comprehensive process to obtain approvals to offer LEAP MRO services. This process involved close collaboration with the OEM, extensive training and certification of personnel, facility upgrades, and rigorous regulatory oversight. LEAP engines typically require a team of dedicated specialists due to their advanced technology and Aero Norway's approach ensures that tasks are carried out efficiently, safely, and in compliance with all regulatory requirements.

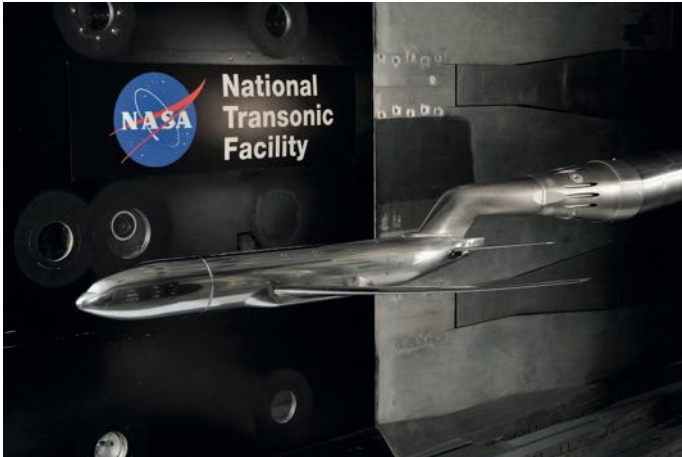
Successfully navigating the introduction of LEAP services will position Aero Norway as a leader in the advanced engine MRO sector, supporting its customers with the growing demand for these services in the global aviation market. Many airlines and operators who are currently operating CFM56 engines are transitioning to the LEAP models, especially on new aircraft such as the 737MAX and A320 neo.

The facility will be handling both CFM56 and LEAP engines, without increasing the shop footprint. The design allows for flexibility, enabling it to adapt to the varying demands of servicing these two different engine types and this hybrid approach will be the most effective for Aero Norway's customers that operate both types.

As the industry moves towards more sustainable practices, Aero Norway's expertise in engine MRO will be essential in adapting to new engine technologies and ensuring they operate efficiently throughout their lifespan. This alignment of maintenance excellence with environmental goals is crucial for the aviation industry to meet the demands of a growing traveling population while also addressing the urgent need to reduce carbon emissions.

Johnston goes on to say that the future of aircraft engines is poised for significant advancements. "The industry is increasingly focused on developing and implementing greener technologies, such as more efficient engine designs, alternative fuels, and hybrid-electric propulsion systems. In this context, MRO organizations like Aero Norway play a critical role. By extending the life and improving the efficiency of existing engines through precise maintenance and innovative repair techniques, MROs contribute to lowering overall emissions. For instance, regular maintenance ensures engines operate at peak efficiency, consuming less fuel and emitting fewer pollutants. Additionally, by refurbishing and upgrading engines with the latest eco-friendly technologies, Aero Norway can help airlines reduce their carbon footprint without needing to replace entire fleets."

## ABB Drive Modernization Gives NASA's Wind Tunnel a New Lease on Life



As part of an ABB Motion OneCare service agreement, ABB has modernized a variable speed drive (VSD) for NASA (U.S. National Aeronautics and Space Administration) to extend, by at least 10 years, the life of the wind tunnel at its National Transonic Facility (NTF) at Langley Research Center in Hampton, Virginia. The tunnel is used to optimize aircraft performance and fuel consumption by mimicking flight conditions at high altitudes and close to the speed of sound. It has been used to test the Boeing 777, the Space Shuttle and its Booster Rocket.

In 2021, NASA's engineers identified a need to upgrade the tunnel's medium voltage (MV) drive, due to the aging of the drive's components. ABB supplied the drive in 1997 as the most powerful of its kind in the world: the 101-megawatt (MW) drive can test models in air or nitrogen flowing at transonic speeds and at ambient or

cryogenic temperatures. As a result, the NTF can simulate a wider range of flying conditions than any other wind tunnel, enabling engineers to gain unique insight and hone aircraft designs.

After ABB's service specialists evaluated the performance and mechanical connections of the existing drive, the next step was to develop a solution based on modern high-efficiency power electronic components to match the original drive's maximum power, while achieving high availability and reliability. This resulted in the modernization of the drive, to replace key components inside the existing footprint with the latest ABB state-of-art technology. The scope included upgrading the small part of the drive (control unit), which minimized the duration and disruption of the project and demonstrated circularity by minimizing waste and logistics as much as possible.

"NASA relied on ABB's domain expertise, technology and services to ensure its National Transonic Facility (NTF) provides high reliability and uptime to maximize availability for its testing programs — and optimize the life-cycle value of its assets," said Oswald Deuchar, head of modernization services, ABB Motion. "Extending the life of the wind tunnel by at least 10 years supports NASA's operational goals, while upgrading the drive's key components demonstrates efficiency and circular approach."

NASA ordered the upgrade project as the first activity under an ABB Motion OneCare service agreement that also covers spare parts and maintenance. This type of agreement provides the flexibility for operators like NASA to bundle together the services they want so that they can optimize the life cycle of their motors, generators and drives.

## ExecuJet Haite Completes Three 96-Month Inspections Simultaneously on Embraer Legacy Aircraft

ExecuJet Haite's maintenance center at Tianjin's Binhai International Airport in China has completed 96-month checks on three Embraer Legacy 650 aircraft.

The work on all three Embraer aircraft was performed simultaneously and within four months. One of the aircraft completed its heavy maintenance check in nine weeks. The 96-month inspection is the most extensive on the Legacy airframe and entails over 3,000 labor-hours. This heavy check includes full removal of the cabin interior, down to the fuselage frames for structural inspection. Both the forward and ventral fuel tanks are also removed, as is the wing leading edges, flaps, landing gear and flight controls.

"Completing these highly complex projects in less than four months, further demonstrates our proficiency in managing and simultaneously performing multiple heavy base maintenance inspections while still ensuring that we keep within our customers' demanding flight schedules and budgets," says Paul Desgrosseilliers, general manager of ExecuJet Haite. "We will continue to strengthen our processes and procedures to improve our overall quality and minimize aircraft downtime."



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## AJW Group Appoints Mitsui as Sole Sales Representative in Japan

AJW Group, independent provider of aircraft component parts, repair and supply chain solutions to the commercial, business and defense aviation sectors, is further strengthening its presence in Japan with the appointment of Mitsui & Co. as its sole sales representative.

This strategic partnership enhances AJW Group's capacity to support the Japanese market, enabling the supply and support of aircraft components through contracted services such as Power-by-the-Hour (PBH), as well as providing full maintenance, repair and overhaul (MRO) capabilities for aircraft components within the region.

Aligned with AJW Group's global growth strategy, this collaboration will bolster the Group's footprint in Japan's aviation industry. AJW Technique, the Group's world-class MRO facility based in Montreal, was the first independent component MRO in the world to receive Japan Civil Aviation Bureau (JCAB) approval under the Bilateral Aviation Safety Agreement (BASA) with Transport Canada (TCCA), a milestone achieved in January 2019. This recognition underscores AJW Technique's compliance with JCAB regulations and positions the Group as a trusted partner in the Japanese MRO market.

"This partnership comes at a pivotal time for Japan's aviation market," said Tetsuro Hidaka, GM new business development, aerospace business, Mitsui. "Our collaboration with AJW, a recognized global leader in aircraft components, will enable us to

capitalize on Japan's aviation industry's growth."

Nick Ward, SVP global sales and BD of AJW Group, said, "Our partnership with Mitsui expands our ability to enhance our aircraft components and supply chain solutions to serve this key market and provides enhanced MRO support for our Japanese customers, utilizing AJW Technique's extensive capabilities."



Nick Ward

## Lufthansa Technik to Support Avianca's LEAP-1A Engines

Lufthansa Technik has entered into a non-exclusive contract with Avianca, an air carrier in Latin America, to provide maintenance support for CFM International LEAP-1A engines. This agreement marks Avianca as Lufthansa Technik's first customer in South America to benefit from Lufthansa Technik's LEAP-1A services.

Through this cooperation, Lufthansa Technik will provide quick turn services for the LEAP-1A engines powering Avianca's A320neo fleet. These services are designed to address specific technical issues swiftly and cost-effectively, allowing engines to return to service quickly without the need for a full overhaul. This approach minimizes downtime and maximizes cost-efficiency, allowing Avianca's fleet to remain in service longer.

"We are very pleased to announce a new agreement with Lufthansa Technik, this time to support the maintenance of the LEAP-1A engines of our A320neo fleet. This is a result of the great teamwork we have achieved. We are very focused on becoming more and more efficient and this agreement will allow us to move forward on that path," said Francisco Lalinde, senior vice president of engineering and maintenance at Avianca.

Lufthansa Technik was the first independent MRO provider worldwide to conclude a service agreement for the two engine types LEAP-1A and LEAP-1B, thus securing access to the fleets of the future. In 2018 the company performed the very first full performance restoration shop visit on a LEAP-1A worldwide.

"This agreement with Avianca, our first LEAP-1A quick turn contract in South America, underscores our ability to deliver fast, reliable and cost-effective maintenance solutions," said Alejandra Castellote, director of sales Latin America at Lufthansa Technik.

"We are excited to support Avianca in maintaining the high performance of their LEAP-1A engines."

In addition to this agreement, Avianca benefits from several key services provided by Lufthansa Technik, including a comprehensive Total Component Support for its Boeing 787 fleet. Additionally, the airline has adopted AVIATAR's Condition Monitoring and Predictive Health Analytics to enhance its maintenance processes. In early 2024, Avianca completed its migration to the AMOS cloud, further improving its fleet management capabilities.



## StandardAero Completes Correlation of San Antonio Test Cell for LEAP-1A, Now Offering Performance Restoration Shop Visit (PRSV) Capability for LEAP-1A and LEAP-1B

StandardAero's engine overhaul center in San Antonio, TX has completed correlation of its first test cell for the CFM International LEAP-1A turbofan engine, thereby achieving another milestone in its introduction of LEAP-1A and LEAP-1B maintenance, repair and overhaul (MRO) capabilities. The San Antonio facility is now able to undertake LEAP-1A functional and performance engine testing for Airbus A320neo family customers.

This addition of engine test capabilities for the LEAP-1A comes three months after StandardAero's 810,000-square-foot facility in San Antonio achieved correlation of its initial test cell for the Boeing 737 MAX's LEAP-1B powerplant. The achievement paves the way for the introduction of LEAP-1A and LEAP-1B performance restoration shop visit (PRSV) capability, with PRSVs now being accepted.

StandardAero supports the LEAP-1A and LEAP-1B as a CFM 'Premier MRO' provider, having signed the first North American non-airline CFM Branded Service Agreement (CBSA) for the LEAP-1A and LEAP-1B in March 2023. The San Antonio facility initially began accepting LEAP Continued Time Engine Maintenance (CTEM) shop visits in March 2024.

"StandardAero is pleased to introduce its new LEAP-1A test cell capability in support of the global A320neo community, adding to our existing LEAP-1B capability," said James Campbell, VP/

GM commercial programs for StandardAero's Engine Services – airlines and fleets division. "We will be correlating a second test cell to support the LEAP-1A and LEAP-1B in the near future, expanding our capacity and providing operators with the assurance of capability redundancy. Our team of MRO service specialists here in San Antonio are dedicated to supporting the engine MRO needs of Airbus A320neo and Boeing 737 MAX operators worldwide, in support of the LEAP open MRO ecosystem."

In addition to establishing MRO capability for the LEAP-1A and LEAP-1B at its San Antonio facility, StandardAero is also industrializing new engine component repairs for the LEAP family through its Component Repair Services (CRS) division's network of locations, and its Repair Development Center of Excellence. To date, StandardAero's CRS team has developed and industrialized more than 250 component repairs for the LEAP-1A and LEAP-1B.

StandardAero also continues to grow its team of LEAP technicians through its in-house Aviation Mechanic Training Program, located at its San Antonio site's Training Academy.



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## Eve Air Mobility Presents Eve TechCare

Eve Air Mobility announced the launch of its fully integrated aftermarket services portfolio for efficient and safe Urban Air Mobility (UAM) operations. Eve TechCare is an all-in-one suite of solutions designed to streamline electric vertical takeoff and landing aircraft (eVTOL) operations by providing the industry with comprehensive services, customer support and operational solutions.

"At Eve, our focus goes beyond developing and producing an eVTOL; we take a holistic approach to the market by creating a suite of solutions to address the necessary aspects that will turn urban air mobility into a reality. With Eve TechCare, we will ensure the best operational aircraft availability for our customers while optimizing operational costs," said Johann Bordais, CEO of Eve. "Our goal is to offer our customers everything they need from the moment they receive their aircraft onward."

Backed by Embraer's 55 years of history and aerospace industry expertise, Eve TechCare offers a unique way of serving customers with a global footprint and local presence. The aftermarket portfolio consists of technical support and solutions, MRO services, parts and battery solutions, as well as training services and flight operation solutions, which operators will access through a digital platform.

"Our portfolio is designed for operational efficiency and safety with a unique customer-centric approach. We've developed these solutions based on our aerospace expertise and diverse interactions with customers and partners. The result is a first-of-its-kind offer that will keep our customers' eVTOLs flying at a high availability rate," added Luiz Mauad, vice-president of customer services at Eve. "We are excited about this new phase in customer services at Eve, which will allow us to discuss our service packages with our customers further and recommend the best solutions for their operation."

Eve TechCare's service and support solutions will cover all the operational aspects necessary to ensure the daily eVTOL operation. This includes access to a 24/7 customer care center, pilot and mechanic training, entry into service support, technical and operational publications, material and battery services, aircraft health monitoring, and MRO services. Eve will offer a different support level approach to guarantee that each customer can benefit from its solutions according to their needs, ensuring efficiency and profitability.

Eve has a large backlog with letters of intent for 2,900 eVTOL aircraft, representing a potential \$14.5 billion in revenue across 30 customers in 13 countries. Beyond the aircraft, Eve secured non-binding contracts with 14 of these customers for service and operations — with approximately 1,100 eVTOL aircraft — representing a potential revenue of \$1.2 billion during the first five years of operation.

Eve says it has successfully assembled its first full-scale prototype and completed the selection of primary suppliers for the aircraft. The company is advancing the current stage of the eVTOL development, which involves a series of comprehensive tests with the prototype aimed to evaluate every aspect of the aircraft's operation and performance, from flight capabilities to safety features.



## APOC Aviation Secures Flexible Funding Facility With Deutsche Bank

APOC Aviation, the intuitive trading and leasing specialist focused on engines, landing gear and USM components, has secured a significant multi-faceted financing facility with Deutsche Bank AG via its transportation structured finance group. The funds will be used to expand APOC's existing business portfolio whilst underpinning further vertical integration of future complementary solutions. The flexibility offered by Deutsche Bank enables APOC to grow exponentially in both the short and medium term.

"APOC is pursuing a dynamic trajectory as the business capitalizes on opportunities that have been identified for expansion. We are pursuing a strategy of controlled growth that will propel APOC into a different stratum for trading, stocking and leasing aircraft assets," said Gavin Simmonds, CEO. "We will be very active in the market globally, so capital backing from an international major bank with an impeccable pedigree and reputation validates our plans. At the outset, we were focused on securing a facility of appropriate size with diverse borrowing criteria across a broad portfolio and aligned to our ambitious growth strategies. We have found Deutsche Bank's open approach to be closely aligned to APOC's company ethos and aspirations." Simmonds added, "We will deploy US\$140 million of capital

expenditure on aircraft and engine assets in the next 12 months."

APOC's majority shareholder is private equity investor Egeria. The Netherlands-based fund has worked closely with the company since 2020. It continues to spearhead APOC's transformative global footprint with a focus on continued vertical integration at the forefront of the industry's sustained recovery. "As the majority shareholder, Egeria endorses the funding facility with Deutsche Bank and is contributing additional equity into the business to fortify the continued growth program," says Ivo Groen in 't Woud, partner, Egeria.

"We support APOC in its strategy to become a truly international USM (used serviceable material) provider and mature asset lessor. The business will become the intuitive choice for leading airlines and it is our role to help APOC navigate a precise and unwavering path to this outcome."

Simmonds reiterates the importance of the Egeria relationship; "Their commitment continues to safeguard the heart of APOC and — as an integral part of our team — Egeria stood by APOC during the recent black swan event and are now working very closely with us as we build upon our quality-centric asset trading portfolio which is already expanding exponentially. Having just

past the considerable milestone of ten years' trading, it is fitting that we should celebrate an evolution within our business model that is fully supported by our investors and make a step-change in both size and market offerings. The future is very exciting and I know I speak for everyone involved when I say that APOC is more than ready to embrace new challenges with energy, commitment and teamwork."

Sneha Kedia from Deutsche Bank summarizes, "Deutsche Bank is pleased to have partnered with APOC on a facility that expands upon our more traditional aviation lending. We are confident

that the facility and relationship will grow and evolve as APOC penetrates a larger segment of the market with its leasing, exchange, and general trading of major assets and LRUs. APOC have demonstrated their market knowledge within the chosen Airbus, Boeing, Embraer and ATR sectors and have an aggressive expansion appetite which we are committed to funding as plans develop into tangible results."



## Revima and Asia Digital Engineering Join Forces With the Goal of Revolutionizing Fleet Management With Predictive Maintenance Integration

Asia Digital Engineering (ADE) and Revima have formed a strategic collaboration to enhance ADE's digital fleet management platform, ELEVADE, through the integration of Revima's advanced APU predictive maintenance solution, PREDICARE.

Revima, a renowned independent specialist in Auxiliary Power Unit (APU) Maintenance, Repair and Overhaul (MRO), currently supports more than 250 aircraft globally with PREDICARE. This real-time predictive maintenance and engineering support tool is focused on providing proactive solutions to minimize downtime and improve fleet reliability.

ELEVADE is an innovative all-in-one digital solution for the airline and MRO industries, the first of its kind in Asia. This platform integrates essential functions, including fleet management, aircraft health monitoring, and workforce optimization, enhancing aircraft maintenance and engineering management. Built on three pillars — fleet, people, and the upcoming feature material — ELEVADE currently monitors over 200 aircraft and 3,000 personnel across ASEAN, with three additional Asian airlines conducting trials to experience its benefits.

The collaboration aims to integrate PREDICARE into ADE's ELEVADE platform, transforming it into a comprehensive, all-in-one solution for airlines. This will enable operators to manage predictive

maintenance for multiple aircraft systems seamlessly under a single unified platform, significantly improving operational efficiency and fleet oversight.

A key phase of the partnership will involve integrating PREDICARE with ADE's primary airline customer, AirAsia, across a number of their A320 fleet to ensure operational readiness. Following this trial phase, the solution will be rolled out to airline customers globally who utilize the ELEVADE platform, further strengthening ADE's digital service offerings.

"PREDICARE solution is a great complement to ELEVADE platform," said Vikram Singh, director new services in REVIMA. "It enables us to scale our reach while providing operators with an integrated, best-in-class predictive maintenance solution for different platforms."

Adnan Mansur, head of digital and innovation services at ADE said, "We are dedicated to driving innovation and delivering smarter, data-driven solutions to enhance fleet management. The integration of PREDICARE into ELEVADE marks a key milestone in realizing this vision. Through this collaboration, we are empowering airlines to harness real-time insights and predictive capabilities for improved fleet reliability and reduced downtime. We are excited about the potential this partnership brings and look forward to offering a truly unified platform for aircraft digital maintenance."

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## RH Aero Systems Unveils New Advanced Solution Landing Gear Equipment, MLGTMULTI-2, Designed for Airbus and Boeing Widebody Aircraft

RH Aero Systems, a new company that emerged after Rhinestahl Corp.'s acquisition of HYDRO Systems in April, has officially unveiled new landing gear equipment recently.

The MLGTMULTI-2 is an advanced solution specifically designed to enhance the removal and installation operation of main landing gears on common widebody aircrafts. It is designed for the Airbus and Boeing widebody passenger and freighter fleets.

The landing gear change equipment is designed for a safer, faster and more cost-effective operation. The system offers a range of advanced features designed for safety and efficiency, and it enables quick and secure trunnion disconnection thanks to its maneuverability and flexible design. The ergonomic hand-held control panel (HMI) ensures user-friendly operation, while the MLGTMULTI-2 electrically controlled, high-precision movement provides significant advantages and ease of use compared to

the traditional processes. Ground-based operation eliminates the need for cranes or on-wing work, significantly increasing safety during the process. Additionally, the system is optimized for easy transport, enabling transport on standard pallets, without requiring special handling or exceptional transport measures.

"Our customers were very impressed with the MLGTMULTI-2 as it represents the newest generation in landing gear equipment," said Martin Dürr, executive vice president. "We were delighted to officially unveil this innovative product to our customers and to all of the MRO Europe attendees."

The equipment was showcased at MRO Europe through a digital twin of the MLGTMULTI-2. The demonstration provided customers with a hands-on experience of the MLGTMULTI-2's capabilities, showcasing the company's innovative approach to technology and the cutting-edge design of its solutions.

## AAR Signs Engine Parts Supply Agreement With Chromalloy



AAR Corp. announced the signing of a multi-year engine parts supply agreement to distribute Chromalloy's Parts Manufacturer Approval (PMA) parts for the CF6-80C2 engine high pressure turbine (HPT) Stage 1 and Stage 2 turbine blades. Under the

agreement, AAR will be the exclusive distributor of these two PMA blades to the global aftermarket with limited account coverage exclusions, due to Chromalloy's pre-existing customer agreements.

"This agreement builds on the long relationship between AAR and Chromalloy for connecting innovative solutions to our global aftermarket customers. The combination of the Chromalloy engineering and manufacturing capability, with the AAR global aero-engine channel access ensures that our PMA solutions are accessible by operators and repair stations in every region," said Chris Celtruda, Chromalloy's chief executive officer.

"AAR is pleased to partner with Chromalloy and to expand our aftermarket solution offerings to include Chromalloy's CF6-80C2 parts. AAR provides a complete range of solutions for engine repair facilities, ensuring access to the best value combination for our customers," said Sal Marino, AAR's senior vice president of parts supply.

The agreement has an initial term of three years, and AAR has made an initial provisioning order that ensures there is inventory in place to provide for the global distribution of Chromalloy's CF6-80C2 HPT Stage 1 and Stage 2 turbine blades.

## TP Aerospace Extends Partnership With K-Mile Air

TP Aerospace has extended its partnership with Thai express cargo airline K-Mile Air with a new and updated long-term Wheels and Brakes Program.

The continued partnership will see TP Aerospace supply K-Mile Air with its all-inclusive and plug and play wheels and brakes cost-landing program, covering support of the airline's current and

future fleet of B737CL and B737NG aircraft. The program is a fully integrated partnership between K-Mile and TP Aerospace, which will see TP Aerospace further strengthening and intensifying its presence in Thailand and surrounding countries.

"K-Mile's renewed partnership is a true testament to TP Aerospace's continued commitment to supporting both established





and new airlines in the region with its financial and operational beneficial full-service programs," says TP Aerospace global

program director, Philip Broskov Hansen.

In 2019, TP Aerospace opened an MRO facility in Thailand, from where the signed CFR program will mainly be serviced. The MRO facility is located only 10 minutes from Suvarnabhumi International Airport, where the airline is based.

"K-Mile is delighted to extend our partnership with TP Aerospace and continue to benefit from TP Aerospace's comprehensive Wheels and Brakes Program. This continued collaboration ensures

exceptional, reliable support for our current and expanding fleet and reinforces our commitment to providing operational efficiency and reliable services for our customers," said Pansith Sasunee, managing director of K-Mile Air. "With TP Aerospace's growing presence in Asia Pacific, it is with genuine joy that we renew our partnership with K-Mile Air. As our customers continue to grow bigger in their respective market, we grow alongside them with continued committed support," says regional COO, APAC, Joe Tai, about the partnership.

K-Mile Air, operating as K-Mile Asia, is a specialist cargo operator serving the express freight industry from the airline's base in Suvarnabhumi Airport, Bangkok. The Thai airline was established in 2004 and began operations in 2006 providing both scheduled and charter cargo flights.

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PWI Has 50 Years of Aviation Lighting Experience

By Ian Harbison

# THE UPS AND DOWNS OF THE P2F MARKET

THE FREIGHTER CONVERSION MARKET, ESPECIALLY FOR NARROWBODY AIRCRAFT, IS IN A STATE OF POST-PANDEMIC DEPRESSION, MAINLY CAUSED BY EXTERNAL PRESSURES. IAN HARBISON FOUND OUT MORE FROM SOME LEADING PLAYERS.

# A

According to the Airbus Global Market Forecast 2024, the world freighter fleet in service will reach 3,360 aircraft by 2043, up from 2,220 in 2023, with the 2,240 deliveries split between 1,140 for growth and 1,330 for replacement, and 890 remaining in service.

For the growth and replacement category, around 1,530 will be conversions. The deliveries are further split into 970 single-aisle (10-40 tons), 880 mid-size widebody (40-80 tons) and 620 large widebody (>80 tons).

The 2024-2043 Boeing Commercial Market Outlook does not distinguish between new build and converted freighters but says the fleet will grow from 2,340 to 3,900 aircraft to 2043 and will consist of 1,250 narrowbodies (<40 tons), 785 medium widebodies (40-80 tons) and 810 large widebodies (>80 tons).

## AEI

All very optimistic, with Airbus predicting a 4.6% CAGR over the forecast period but the narrowbody freighter conversion market is a difficult area at the moment, and for the next few years, says Robert Convey, AEI senior vice president of sales and marketing at Aeronautical Engineers, Inc (AEI). The company specializes in the Boeing 737-400/800SF, Bombardier CRJ-200 SF and McDonnell Douglas MD-80SF.

Lower production rates of new aircraft and technical problems with LEAP and GTF engines means that there are very few 737-800 airframes available for conversion, that they have an uneconomically high sale price and there is a huge shortage of CFM56 engines, also inflating prices. In addition, the pandemic demand bubble for freighters has burst. For the next few years, he sees demand as being sporadic, a combination of airlines with cargo operations converting their own passenger fleet or lessors deciding to convert to keep their asset alive for a bit longer.

To illustrate the point, AEI's forecast for 2023 was for approximately 44 freighters, with the 737-800SF again accounting for most deliveries, plus four 737-400SFs, four CRJ-200 SFs and four MD-80SFs. In reality, it was 28 aircraft - 18 737-800SFs,

followed by five 737-400SFs, three CRJ200 SFs and two MD-80SFs.

While the 737-800SF will again represent the majority of deliveries in 2024, he expects the total will be slightly below 2023 figures. The company has stated that it will use this predicted slowdown as an opportunity to complete studies on potentially introducing new AEI freighter programs for the 737-900 and the CRJ 900.

Deliveries this year include a 737-800SF freighter to Democratic Republic of Congo-based Serve Air, with a further five to follow in the coming years, and the twentieth CRJ200 SF freighter to Saltillo, Mexico-based Aeronaves TSM, also the forty-second overall freighter that TSM has ordered directly from AEI.

Elsewhere, Grand China Aviation Maintenance (GCAM), a subsidiary of HNA Aviation Technic, which is the sixth authorized AEI Conversion Center in 2023, has five more 737-800SFs to deliver



*Demand for conversions may be sporadic for the next few years, says Robert Convey, of AEI, due to a combination of airlines with cargo operations converting their own passenger fleet or lessors deciding to convert to keep their asset alive for a bit longer. AEI image.*



and KF Aerospace in Canada has been working on three 737-800SF conversions for Air Inuit, two of which are in a Combi configuration.

Given the downturn in demand, the company is being cautious but using the time to study the next potential, with the 737-900 and the CRJ 900ER as two most likely candidates. The -900 will probably be first, with an agreement with Boeing hoped for by year end, which would mean entry into service in the first half of 2027.

## EFW

Jordi Boto, CEO of EFW, agrees that the narrowbody market is difficult at the moment — the company has a P2F conversion for the Airbus A320 and A321 developed in collaboration with ST Engineering, with EFW holding the Supplemental Type Certificate.

In particular, airlines are having to keep A321 aircraft in passenger service that were intended to be converted until those delivery and engine problems are resolved, he thinks in 2026/7. A problem for customers replacing Boeing 757s with A321P2F is that they could face the need for an expensive overhaul on an old aircraft. In addition, stricter noise regulations could limit future night operations in Europe. There have been very few cancellations to date but there have been several delays.

One of EFW's customers is Azul Cargo in Brazil, which received its first aircraft in October, with a second to arrive by the end of the year.

Despite the pressures, EFW signed a MoU with MRO Japan (MJP) to establish an A320P2F/A321P2F conversion line at Naha Airport in Okinawa, where air cargo is forecast to see a huge expansion. Japan's freighter and logistics market size is estimated to expand at a CAGR of 4.2% between 2024-2029, with air freight being the fastest growing market by mode of transport. The partnership in conversions will make the company Japan's first conversion site for the new-generation Airbus narrowbody P2F aircraft.

Under the contract, MJP will serve as a subcontractor for EFW, providing third-party conversion services for EFW's Airbus A320P2F/A321P2F programs. The process of onboarding MJP as EFW's new modification site involves comprehensive trainings in tooling, engineering, supply chain, industrialization and quality

*AEI says it will use any slower periods in the coming months to study the next potential conversion candidates, with the 737-900 and the CRJ 900ER as two most likely possibilities. AEI image.*



training to ensure operational readiness and excellence. The first aircraft induction for conversion is foreseen to commence by the end of 2025.

"We are excited to have MJP join our global network of P2F conversion sites," said Boto. "Collaborating with experienced and well-backed aircraft solution providers like MJP supports our capacity for freighter conversions to capture opportunities in the growing Japanese air cargo market."

Takashi Takahashi, CEO, MJP, added, "We are truly happy that the new partnership between EFW and MRO Japan has been established. It will be a significant step towards mutual growth and prosperity for both parties. Our deepest gratitude goes to

EFW for their cooperation and support. We are excited to work with the EFW team to initiate the first modification and move on to the next step.”

The A330 market has a different dynamic, Boto says. This is a new aircraft in the market, offering a much greater capability than the previous workhorse, the Boeing 767, with up to 23% more volume (A330-300P2F), 7% more payload and a 10% wider fuselage catering for 96in containers side-by-side. A seven-inch wider door allows for the transport of 16-foot and 20-foot pallets.

The company has been able to offset the delays to some extent by expanding in different areas. It recently started A380 maintenance again, the first customer being U.K.-based Global Airlines, but it has other customers lined up and will expand activities from 2025 onwards. There is a surge in very heavy and complex 12-year inspections coming up, which is beyond EFW’s capabilities, but it can take advantage of a squeeze on hangar slots to carry out lighter checks. He points out that EFW will be one of few non-airline related MROs working on the type.

Overall, progress has been good, with 18 conversions delivered in 2022, 28 in 2023 and a projected 30-35 in 2024 (the uncertainty reflecting the narrowbody market again).

## Mammoth

Brian McCarthy, VP of marketing and sales at Mammoth Freighters,

says there is some concern about feedstock as delays to the 777X could extend the in-service life of the 777-200LR and 777-300ER that form the basis of their conversion program. Typically, these aircraft have a service life of around 12-15 years before there is a combination of heavy maintenance checks and a complete cabin and IFE/connectivity refurbishment. As those refurbishments could cost from \$8 million to \$15 million, he suggests that it does not make economic sense to make that level of investment in aircraft as airlines are only buying 3-6 years of lift until new build Airbus and Boeing production catches up on the backlog.

In addition, each airline has its own distinct branding that runs through the interior, from seats and galleys to color scheme, which makes it more difficult and expensive to transition them to a new operator. However, he comments, while the 777X delays have meant that airlines like Emirates, with a huge 777 fleet, have had to make those investments to maintain their standards, those with smaller fleets cannot justify the expense.

Incidentally, Emirates Sky Cargo ordered a further five Boeing 777Fs on order, having previously ordered five, while also has 10 777-300ERs currently being converted into freighters by IAI BEDEK. That program should have been certified by now but appears, for very obvious reasons, to have encountered some delays.

He says determined cargo operators will locate and purchase aircraft where they can, with engines and spares support from the

# INSIGHTS FROM THE BOEING AIR CARGO FORECAST

BOEING’S LOOK AT AIR CARGO DURING THE PERIOD FROM 2022 TO 2041 GIVES A NUANCED LOOK AT THE MARKET FOR AIR CARGO AND THE NEED FOR CONVERSIONS. MORE ON THE BOEING.COM WEBSITE.

## Multiple Drivers of Growth

A range of issues beyond cyclical economic trends influence air cargo market growth forecasts. Among them are modal competition, globalization, market liberalization, and new air-eligible commodities. Complementing the 2.6% long-term economic growth outlook, trade and industrial production will be key drivers for air cargo growth. We forecast that trade will outpace economic growth, increasing 2.8%, and that industrial production will grow 2.2%, both annually, over the next two decades. These economic factors, as well as the regulatory and industry structure dynamics highlighted above, support Boeing’s forecast that air cargo traffic, measured in revenue ton kilometers, will grow an average of 4.1% annually from 2022 to 2041.

## Modality Competition

Measured in tons of goods moved, the maritime transport industry is much larger than the air cargo industry. In 2021, the world maritime industry carried an estimated 11.1 billion tons, compared to 60.9 million tons of air cargo. By weight, 86% of the world’s maritime trade is in raw materials and other bulk items. Most of these commodities, such as oil, metal ores and grains, are low in value, not time sensitive, and shipped in specialized vessels. These cargoes cannot be directly compared to the high-value, dry commodities associated with air transport. However, while air cargo accounts for less than 1% of the world’s trade tonnage, the high value of these goods means it is responsible for about 35% of the value of all globally shipped goods.

However, according to Boeing’s most recent Commercial Market



Outlook, the company anticipates the global freighter fleet (production and conversions) will produce up to 2,610 new freighter deliveries in the next two decades. Of these, 890 will be production freighters and the remaining 1,720 will be converted freighters.

Specifically for freighter conversions, it is forecasting demand for 1,720 converted freighters over the next 20 years to replace aging freighters and accommodate future growth. This includes 1,200 narrowbody conversions and 520 widebody conversions.

While both maritime shipping and air cargo yields are normalizing as capacity challenges recede, maritime yields may remain elevated due to industry consolidation. In 2000, the top 10 containership operators handled 62% of the world’s shipping capacity. At the end of the pandemic in 2022, that share rose to 86%.

## Varying Requirements

Varying requirements drive a range of air cargo services. From an end user’s perspective, general freight and express offerings are fairly easy to distinguish in terms of commodity and time definiteness. However, from a business-model perspective, the lines between express and general air cargo continue to blur. Traditional providers are expanding their time-definite offerings, while express carriers, freight airlines, and postal authorities often provide general cargo service. Ultimately, cargo customers benefit from increased service options and lower prices, as competing services enter the market.



Left: Jordi Boto, EFW CEO and right: Takashi Takahashi, CEO, MJP shake hands after signing a contract to partner for A320P2F/A321P2F conversions. EFW image.



#### Airline Business Models Vary

Airlines adopt business models tailored to specific air cargo markets. Air cargo operators fall into four main categories:

- Belly-only operators provide air cargo capability within existing passenger networks.
- Cargo specialists provide dedicated main-deck freighter capability for general freight, charter operations, and specialized loading and carriage capabilities.
- Combination carriers leverage both dedicated main-deck freighters and the belly capacity of extensive passenger networks to provide reliable air connections, particularly to and from home markets and hubs.
- Express carriers operate main-deck freighter fleets of all sizes to provide time-definite services as well as general air cargo capability. Express carriers typically utilize standard body and medium-widebody freighters to support their hub operations.

With air cargo traffic volumes now running near pre-pandemic levels, and yields elevated, global air cargo revenues have reached all-time highs. In 2021, air cargo revenues hit \$170 billion, up from \$100 billion in 2019. Combination and all-cargo carriers have seen the largest increases, with both segments roughly doubling their 2019 revenues in 2021, while revenues for express and belly-only carriers increased roughly 45% compared to pre-pandemic levels.

Over the next 20 years, global GDP is expected to grow 2.6% on average. South Asia will lead the world with 5% growth, followed by

China and Southeast Asia. Advanced manufacturing and expanding consumer economies — key building blocks for global trade — will drive growth for these regions. Trade is expected to expand at 2.8% on average over the next 20 years, with essential contributions not only from South and Southeast Asia, but also from many developing countries, as well as substantial, established traders like China. Advanced economies remain foundational parts of the global economy. While GDP is expected to grow at less than the global average, the size and economic breadth of these markets makes them indispensable as traders of advanced goods and services, as well as destinations for the exports of many emerging economies.





relatively few part-outs that are occurring, but he warns that, if freighter demand is strong enough, those part-outs will decline and could constrict surplus parts availability.

However, Mammoth already has commitments for 29 -200LRMFs and six -300ERMFs with airframes already designated and with planned start dates for the conversions. These will take place at Aspire MRO in Fort Worth and at STS Aviation in Manchester, U.K.

Identified customers are launch customer Jetran, which took Cargojet Canada's four -200LRMFs early positions in the Mammoth program. Jetran has additional orders for 777-200LRMFs, while AviaAM Leasing has the six -300ERMFs and DHL has eleven -200LRMFs coming from Mammoth via Jetran. Some of Mammoth's customer commitments are undisclosed at this time.

The first -300ERMF is in work at Aspire and the first two -200LRMFs at STS, with the second -300ERMF to be in work at Manchester no later than January 1, 2025. He points out that having multiple aircraft under conversion simultaneously is more efficient as labor can be moved to the area of highest activity. The first 777-200LRMF cargo loading system was delivered by Collins Aerospace in July, while the door cut on the first -300ERMF was completed at Aspire a month later.

McCarthy says having such a backlog buys Mammoth some time to get new orders as it proceeds towards certification. One source of those orders might be airlines who are flying production 777F alongside passenger aircraft, which gives them a degree of flexibility in having their own feedstock.

Another reason that makes this a possibility is that next-generation freighters will be later than planned. It takes some time to deliver the bow wave of initial orders before the production rate settles down to allow the introduction of new build freighters to the line, so the 777X freighter is some way off. He suggests that Airbus may be able to take off some of the pressure through A350 passenger aircraft deliveries, allowing 777 retirements for conversion — the Mammoth advantage is nearly the same amount of cargo for \$100 million less.

The potential total market is 200-250 aircraft in the forthcoming years, split between Mammoth, IAI BEDEK and the third

*Mammoth has commitments for 29 -200LRMFs and six -300ERMFs with airframes already designated and with planned start dates for conversions, the company says. Mammoth image.*

777 conversion project by Kansas Modification Center (KMC) and WERX, part of Wichita State University's National Institute for Aviation Research.

His experience shows that once a program is out there flying, there is a tendency for one to become the standard, as happened with the Boeing 757 during his time at Precision Aircraft Solutions, based on payload/range, quality and reliability. There is room for two, but not three, 777 conversion providers, says McCarthy.

Another consideration is that the bow wave effect will also be seen here, so there is a need to be ready for 18-20 aircraft per year. Mammoth already has the capacity to build 24 cargo doors per year. There are five conversion lines in Fort Worth and two in Manchester, each capable of around three aircraft per year, so 21 aircraft in total.

The next step is certification, with the master STC for the -200LRMF and an amended STC for the -300ERMF. The first aircraft, a -200LRMF, should be ready for company flights in late December/early January. Formal FAA light tests will follow in the first quarter which should yield FAA Type Inspection Authorization (TIA) within that quarter. The hope is certification in March, with the -300ERMF following in August. No certification work will be done in the U.K., however, as the company is planning both EASA and CAA validation of FAA STCs.

The first -300ERMF is in work at Aspire, along with four -200LRs awaiting conversion. These will be followed by the first two -200LRMFs at STS, with the first in work and the second arriving in early November.

Depending on the market, a further conversion line might be established in the Asia Pacific region, where, he says, customers typically have a lot to say about where they would like to see aircraft converted. If the business presents itself in the years ahead, Mammoth will not hesitate to establish a presence there. **AM**



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# Schaeffler Aerospace Repair Services:

## A Tradition of Excellence, Reliability and Sustainability



When Charles Lindbergh completed the first solo, non-stop transatlantic flight in 1927 in his now-legendary “Spirit of St. Louis,” the propeller shaft of the aircraft’s Wright-J5 “Whirlwind” engine was supported by a cylindrical roller bearing manufactured by a Schaeffler Aerospace predecessor company. Of course, material

advancements, design innovations and engine demands have changed considerably since Mr. Lindbergh touched down safely in Paris, but Schaeffler’s leadership in this market has never wavered. Today, Schaeffler Aerospace is a leading supplier to every major engine manufacturer in the aviation industry.

Decades of diligent research and development work enabled Schaeffler to be the first company to formally introduce the concept of infinite fatigue life to the industry in 1983. Since then, it has been acknowledged that useful bearing service life is primarily limited by damage caused by environmental factors such as contamination, corrosion, overheating, etc.

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### Bearing Remanufacturing: Control Costs Without Compromising System Reliability

Schaeffler Aerospace provides remanufacturing services that can help you reliably lower your total maintenance costs by repurposing existing assets. Your bearings are restored back to their original “as-new” condition using the same engineering experience, manufacturing methods, production personnel and testing procedures. Of course, in addition to lowering life-cycle costs, bearing recondition also reduces CO2 emissions — an important element of Schaeffler’s commitment to sustainability.

As a matter of course, Schaeffler Aerospace’s refurbishment techniques always include refinishing the bearing’s raceways, replating (or replacing) the cage and replacing 100% of the rolling elements. All replacement components are manufactured to the original new specification by our OEM-approved processes. Any repurposed and remanufactured components undergo 100% non-destructive testing (NDT).

Today’s cutting-edge aerospace applications demand the

highest-quality, reliable rolling element bearings — so why settle for anything less than the quality and experience offered by Schaeffler Aerospace? By working with us, you can lower your bearing replacement costs by having your bearings reliably remanufactured by an OEM-approved manufacturer.

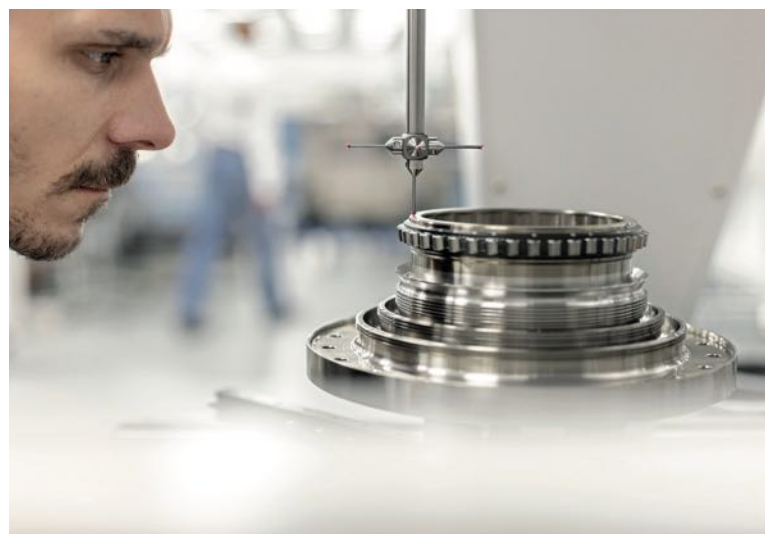
Moreover, Schaeffler’s reconditioning capabilities are not just limited to bearings: our MRO expertise extends to virtually any aviation-grade rotating equipment on an aircraft — which is something not many companies in the world can do.

### A Few Words About Sustainability

Sustainability is an integral part of Schaeffler’s DNA — and bearing reconditioning dovetails perfectly with that commitment. Our production processes focus on energy efficiency, environmental compatibility, and conservation of resources. To that end, Schaeffler has laid the groundwork to achieve carbon-neutral production by 2030. At the same time, we are continuously expanding our climate protection ambitions, which we are increasingly incorporating into our entire supply chain.

### Schaeffler — We Pioneer Motion

The Schaeffler Group has been driving forward groundbreaking inventions and developments in the field of motion technology for over 75 years. With innovative technologies, products and services for electric mobility, CO<sup>2</sup>-efficient drives, chassis solutions and renewable energies, the company is a reliable partner for making motion more efficient, intelligent and sustainable — over the entire life cycle. Schaeffler describes its comprehensive range of products and services in the mobility ecosystem by means of eight product families: from bearing solutions and all types of linear guidance systems through to repair and monitoring services. With around 120,000 employees and more than 250 locations in 55 countries, Schaeffler is one of the world’s largest family-owned companies as well as one of Germany’s most innovative companies.



# SCHAEFFLER

Schaeffler  
[www.schaeffler.com](http://www.schaeffler.com)





We pioneer motion

## Control Costs without Compromising System Reliability

You already know Schaeffler Aerospace as a leading OEM supplier to the rotary wing aerospace industry. But did you know that we also offer industry-leading repair and overhaul services that can help your maintenance team ensure supply chain reliability and control costs across a global network? Moreover, Schaeffler's reconditioning capabilities are not just limited to bearings: Our MRO expertise extends to virtually any aviation-grade rotating equipment on an aircraft – which is something not many companies in the world can do.

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





## AirNxt

Imagine preparing for a high-stakes chess match in an industry where precision meets complexity — but your pieces are scattered, and your board is outdated. This is the daily challenge many aviation maintenance teams face: using legacy systems that feel like playing chess blindfolded. Try AirNxt, the next-gen MRO software designed to bring order to this chaos and redefine how aviation maintenance is approached.

### What Makes AirNxt Different?

Aviation maintenance has historically been stuck in the past, bogged down by outdated systems and manual processes that demand extensive training and lengthy implementation cycles. Teams often find themselves juggling expensive software only to return to familiar but inefficient tools. AirNxt changes that narrative by introducing an intuitive, AI-powered platform that doesn't just keep up with today's standards — it sets new ones. It empowers teams to work smarter, faster, and with unmatched precision. Built on a foundation of industry expertise, AirNxt's innovations are reshaping what's possible in aviation maintenance.

### Key Features of AirNxt That Change the Game

- 1. Instant Onboarding and No Training Required**  
In the time it takes for most legacy systems to reach their first phase of implementation, AirNxt is already up and running. With an intuitive user interface, teams can start immediately without extensive training. Say goodbye to months of onboarding and hello to seamless integration.
- 2. AI-Assisted Data Import**  
One of the most arduous tasks in aviation maintenance is migrating historical data. With AI-assisted data import, AirNxt automates this process, ensuring your data is integrated accurately and swiftly, leaving more time for what really matters: maintaining and optimizing your fleet.
- 3. Predictive Maintenance for a Proactive Approach**  
Reactive maintenance is a costly gamble. AirNxt's predictive maintenance tools harness the power of AI to foresee potential issues before they happen. This reduces unexpected downtime and extends the life of assets, saving both time and money.
- 4. Electronic Logbook and Offline Sync**  
Maintaining compliance while keeping records accessible has never been easier. AirNxt's electronic logbook automates data recording and ensures it's readily available, even when you're

offline. Whether your team is 30,000 feet in the air or stationed on the tarmac, essential information is always at their fingertips.

### 5. Transparent Pricing

Forget about hidden fees and complex negotiations. AirNxt offers transparent pricing, ensuring you know exactly what you're paying for.

### Why AirNxt Is the Future of MRO

Unlike the traditional, clunky systems that require extensive training and adaptation, AirNxt is built for the modern age. Its development comes from a deep understanding of the aviation industry's needs, guided by Mahmoud El Sawah, a seasoned professional with over a decade of experience in MRO and CAMO operations. Mahmoud and his team have shaped AirNxt as a product that doesn't just catch up with the industry's demands but anticipates and leads them.

### What Does This Mean for Your Operations?

Implementing AirNxt is like upgrading from a typewriter to a state-of-the-art computer. You move faster, make fewer errors, and work smarter. The platform's AI-driven analytics provide real-time data that allows you to make informed, proactive decisions. Maintenance teams can finally focus on what they do best — keeping fleets operational and safe — without the burden of managing outdated processes. AirNxt equips your team with the tools to tackle challenges head-on and optimize every aspect of maintenance. The future of aviation maintenance is here, and it's more accessible than ever.

### Get Onboard with AirNxt Today

Why stay grounded when you can elevate your operations? Whether you're managing an airline, an independent CAMO, or an engine shop, AirNxt equips you with the tools needed to move forward confidently.



AirNxt

Visit [www.airnxt.ai](http://www.airnxt.ai) to learn more and see how AirNxt can transform your maintenance operations.

# Introducing the 1st Next-Gen MRO Software



In an industry where every moment counts, AirNxt redefines aviation maintenance with next-gen MRO software. Say goodbye to outdated aircraft maintenance systems and unlock efficiency with AI-driven insights, rapid implementation, and predictive maintenance that keep your fleet a step ahead. AirNxt's user-friendly interface requires no training, while mobile access ensures your data is always within reach. Designed by aviation experts, AirNxt is the comprehensive MRO solution that propels you forward with agility and confidence.

**Transform your operations - Experience the power of AirNxt today.**



# Elliott Aviation: 85+ Years of Innovation and Excellence in Aviation Services

Since 1936, Elliott Aviation has grown, evolved, adapted, and innovated to meet the ever-changing needs of its customers. Our world-class service company began quite modestly in the '30s when Herb Elliott started Elliott Flying Service on a grass airstrip in DeWitt, Iowa. We have since expanded to even better serve our clients.

Elliott Aviation is now a diversified aviation services company with four U.S.-based locations. These locations include the company's headquarters in Moline, Illinois, and its three additional facilities located in Atlanta, Georgia; Des Moines, Iowa; and Minneapolis, Minnesota.

With over 85 years in the industry, Elliott is one of the longest-standing companies in aviation. Our services include aircraft sales (as Elliott Jets), avionics service and installations, aircraft maintenance, FBO services, accessory repair and overhaul, paint, interior, parts, and aftermarket avionics sales.

Elliott works on Hawker, Citation, Beechjet, King Air, Challenger, Phenom, Gulfstream, and Falcon airframes. Our experienced technicians excel in maintaining light-to mid-sized jets and turboprops; we offer expert solutions to meet your every need.

## Nose-to-Tail Quality

We are a factory authorized service center and repair station for multiple airframes — our services are unsurpassed in the industry. With factory-trained technicians from Textron, Bombardier, Embraer, Cessna, Falcon, Gulfstream, and Challenger, our team has the training and expertise to understand your aircraft inside and out.

At Elliott Aviation, we also provide competitive pricing for engine overhauls. Whether an overhaul, upgrade, or exchange is the best option, our team will work with you to determine the right choice for your needs. Once the scope is determined, the Elliott team will complete the engine removal and installation. Additionally, we will manage your project, providing you the highest level of support with the engine supplier.

With four U.S.-based locations, we have expanded our footprint to better serve you. These multiple facilities, located in the Midwest or the South, allow our expert technicians to provide a consistent, satisfying customer experience every time you visit.

## Cutting-Edge Technology

Elliott Aviation leads the industry in installation expertise, with avionics upgrades that increase the safety, performance, and value of your aircraft. Committed to delivering innovative aircraft solutions, we have been a world leader in gaining STCs for the installation of high-technology equipment — FMS, Wi-Fi, TCAS, TAWS, EGPWS, Flat Panel Systems, and others — in a variety of turbine aircraft. And we have developed RVSM solutions for a range of turbine aircraft. The level of sophistication in Elliott Aviation's engineering department keeps us at the forefront of new STC development.

Our in-house, advanced engineering capability is a significant value-added service we offer our customers. Our staff develops STCs for new equipment installations and finds ways to interface new technology with existing equipment. We work with systems



and modifications to provide increased safety, performance, and utility for your aircraft and are continuously coming up with technological innovations for total aircraft solutions.

Elliott Engineering Technicians, with years of design and engineering expertise, operate multiple CAD stations to produce high-quality, professional wiring diagrams. Because of their precision, Elliott Aviation wiring diagrams provide clear, concise instructions for our installers. Surprises are eliminated because the design is often completed long before your aircraft ever arrives at one of our facilities.

Complete documentation is provided for your aircraft, allowing for permanent record-keeping and FAA traceability. Advanced design and engineering systems also mean less downtime due to our ability to pre-engineer an installation.

## Turn Your Vision Into Reality

Elliott Aviation's aircraft interior and paint design professionals work with you throughout the design process, learning preferences and molding a custom design.

Whether you are remodeling an existing cabin or designing a completely new exterior finish, our designers aim to make the process simple for you. We will provide options from an endless array of different colors, textures, patterns, and materials. Our team can even integrate a new cabin entertainment package with the help of our top-rated avionics staff. Additionally, we can re-engineer your seat configuration with our in-house engineering team.

From leather and fabrics to carpet and veneer, you have a nearly endless variety of options to best suit your needs. Our expert designers will help you decide which options will transform your interior into the luxurious, functional, and comfortable interior you've always wanted! Once specifications are determined, our design professionals and master craftsmen provide the ultimate in aircraft interior customization.

## Decades of Expertise

Developing and delivering quality solutions ever since those beginnings in 1936, Elliott is big enough to handle all your aircraft needs, yet we are small enough to still provide the personal touch you deserve. With state-of-the-art facilities and equipment, proven processes, and highly-trained and experienced technicians, we deliver world-class quality and service customized to you and your aircraft.



Elliott Aviation

[www.elliottaviation.com](http://www.elliottaviation.com)



# ELLIOTT<sup>®</sup> AVIATION



*A leader in Aircraft Solutions*

S  
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**ACCESSORIES**



**AFTERMARKET PARTS**



**AVIONICS**



**INTERIOR**



**MAINTENANCE**



**PAINT**

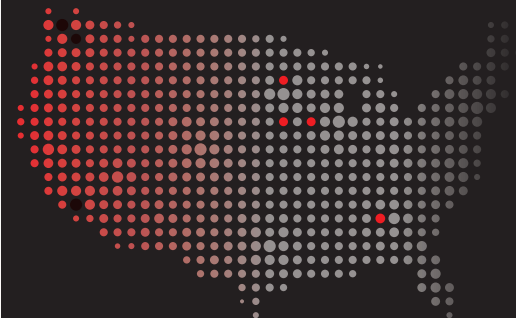
LOCATIONS

DSM

FCM

MLI

PDK



[sales@elliottaviation.com](mailto:sales@elliottaviation.com)

[www.elliottaviation.com](http://www.elliottaviation.com)

# Solutions for Better Aircraft Data Management

Teledyne Controls, a leading provider of avionics and aircraft data management solutions, built its name on innovative solutions that collect, manage and deliver aircraft data more efficiently. Teledyne's proven technology and collaborative customer relationships have revolutionized the way aircraft operators can access, distribute and utilize their data to improve flight safety, compliance, operational efficiency, and passenger experience.

The company offers an adaptable suite of products that includes solutions for aircraft data acquisition and recording, wireless data transfer, cabin air quality monitoring, secure software parts loading and distribution, onboard networking, along with cloud-based data analysis services. Combined together, these products provide comprehensive data management solutions that leverage aircraft data intelligence and create value for the operators.

## Simplifying data distribution, while meeting today's secure dataloading requirements

One of Teledyne Controls' standout offerings is their suite of dataloading solutions, which are designed to streamline and automate the distribution, storage, and management of Loadable Software Parts (LSP) and databases across an airline's operation, while meeting today's secure dataloading OEM requirements.

As aircraft continue to integrate powerful new systems and networks into their design and the amount of software parts increases, the software distribution process becomes more complex. With more software parts being loaded, more often, the opportunities for cyberattacks multiply.

Built from the ground up with security in mind, Teledyne Controls' latest dataloading products, the PMAT XS portable loader and the eADL XS onboard data loader, represent a new generation of dataloading technology that meets the stringent ARINC 645-1 requirements for OEM secure dataloading.

With advanced features, such as built-in wireless connectivity, comprehensive validation of digital signature, and secure boot, they ensure the integrity of software parts and protects against unauthorized access at every stage.

Teledyne's eADL XS was recently certified for use on the Boeing 737NG aircraft series and is in the process of being certified for other aircraft platforms.

Teledyne's eADL XS offers several key benefits:

- **Advanced Security:** Fully compliant with ARINC 645-1 security standards, ensuring data integrity and robust protection against cyber threats.
- **Wireless Connectivity:** Built-in cellular and Wi-Fi connectivity, for fully autonomous software part distribution with or without Teledyne's GroundLink® Wireless Quick Access Recorder.
- **Ease of Integration:** Designed as a plug-and-play replacement for existing data loaders, simplifying the upgrade process for operators.
- **Enhanced Fleet Management:** Integrates with Teledyne's ground distribution systems to automate software configuration control and load reporting.
- **Increased Onboard Storage:** Expanded internal mass storage for onboard retention of software parts, facilitating reloading at any location and reducing risks of delays and cancellations.



In addition to these dataloading hardware solutions, Teledyne Controls provides the LoadStar® Server Enterprise 3 (LSE 3), a comprehensive software parts management system that offers configuration control and load reporting capabilities, further enhancing the efficiency and reliability of the dataloading process.

Teledyne Controls' commitment to innovation and customer collaboration has positioned it as a leader in the aviation industry. By providing advanced dataloading solutions, the company helps airlines and aircraft operators to enhance the safety and efficiency of their operations.

With a global network of offices and field representatives, Teledyne Controls is dedicated to supporting its clients worldwide and providing them with the personal service and attention they deserve.



**Aerospace Electronics**  
Teledyne Controls

### Teledyne Controls

[www.teledynecontrols.com](http://www.teledynecontrols.com)

*Headquartered in Southern California, Teledyne Controls LLC is a wholly owned subsidiary of Teledyne Technologies Incorporated (NYSE: TDY).*

# The New Era of Secure Dataloading



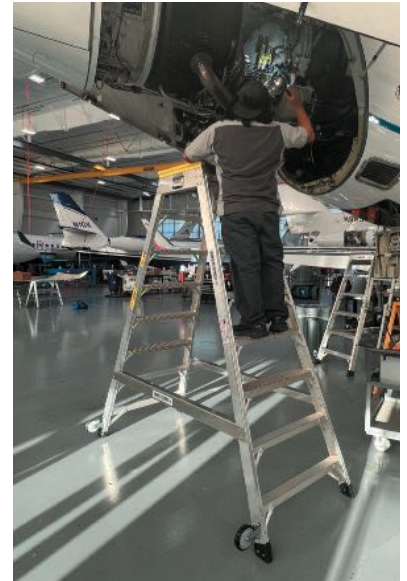
## Meet today's OEM requirements and regulatory guidance for secure dataloading

Fully compliant with ARINC 645-1 security standards, Teledyne's PMAT XS® and eADL XS™ new generation data loaders facilitate the distribution, onboard storage, and management of software parts and databases across an airline's operation. Built from the ground up with secure dataloading in mind, both loaders ensure the total integrity and authenticity of software parts during transfers, and protect against unauthorized access at every stage.



# LOCKNCLIMB

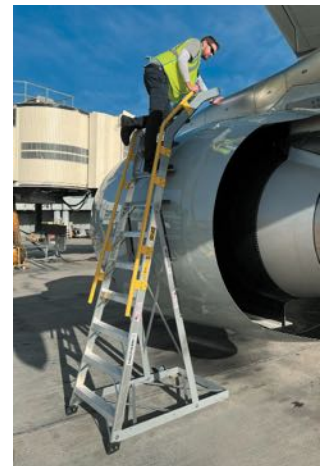
*"Ladders Designed by Mechanics for Use by Mechanics."*



Aframes 3' to 12'

LockNclimb designs and manufactures ladder stands used by maintenance professionals to access service points on Boeing, Airbus, McDonnell Douglas, Embraer, Gulfstream, Bombardier, Dassault, Cessna and other commercial and corporate aircraft. LockNclimb ergonomic safety ladders are currently in use in leading MRO facilities around the world. **SPECIFICATIONS: OSHA rated 300-lb. Special Purpose Ladders.**

- Free standing ladders with yellow safety handrails and guard rails.
- Engineered to meet all applicable OSHA and ANSI standards.
- Patented industrial 6061-grade aluminum support base, frame and slip-resistant platforms.
- Extra wide comfort treads and hard rubber wheels for rolling.
- Made in the U.S.A.



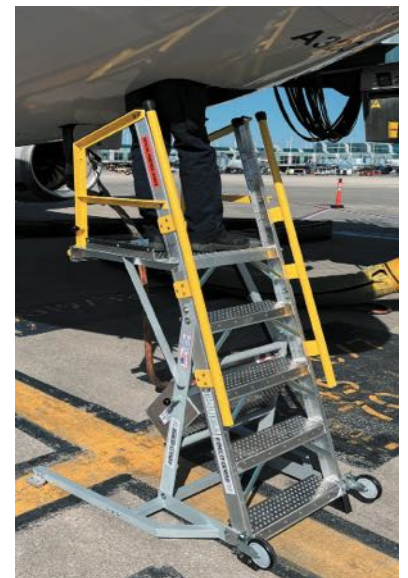
Cowl pylon ladders

Contact:  
Aircraft Ladder Sales  
LockNclimb, LLC  
2500 West Laurel Street  
Independence, KS 67301  
Office (620) 577.2577  
sales@locknclimb.com

LockNclimb.com



**www.locknclimb.com**  
**www.locknclimbaframes.com**



Rolling w/platforms



# LOCKNCLIMB

## Ergonomic Safety Ladders for Easier Aircraft Maintenance

LockNClimb designs and manufactures ladder stands used by maintenance professionals to access service points on Boeing, Airbus, McDonnell Douglas, Embrarer, Gulfstream, Bombardier, Dassault, Cessna and other commercial and coporate aircraft. LockNClimb ergonomic safety ladders are currently in use in leading MRO facilities around the world.



Rolling w/platforms



Cowl pylon ladders



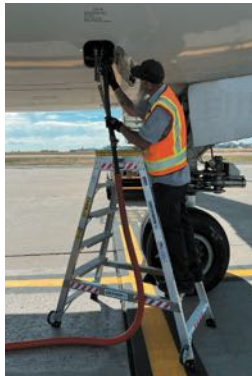
Aframes 3' to 12'



Fiberglass extension



Tall step-through



GPU cord ladders



Cargo bay ladders



MiniPylons 4' to 6'



Tall specialty



Interior cabin

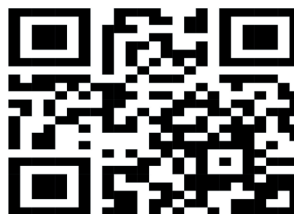


### Specifications

OSHA rated 300-lb. Special Purpose Ladders. • Free standing ladders with yellow safety handrails and guard rails. • Engineered to meet all applicable OSHA and ANSI standards. • Patented industrial 6061-grade aluminum support base, frame and slip-resistant platforms. • Extra wide comfort treads. • Made in the U.S.A.

*"Ladders designed by mechanics, for use by mechanics."*

LockNClimb.com



Contact:

Aircraft Ladder Sales  
LockNClimb, LLC  
2500 West Laurel Street  
Independence, KS 67301  
1+ (620) 577.2577  
sales@locknclimb.com

Watch videos at [www.locknclimb.com](http://www.locknclimb.com)  
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# Buffalo Shrink Wrap



As an industrial quality shrink wrap supplier, we understand the importance of protecting company assets from harm. Therefore, we provide a wide array of wraps and tools to preserve your equipment and give it as much

longevity as possible. With the right tools and the proper application, you can protect your company assets from sustaining damage and make sure your equipment will see future use.

Depending on where you store your machinery, your assets may be exposed to several threats that can damage it, causing lasting harm and making expensive repairs or replacements necessary. However, there are ways to add an extra layer of protection to safeguard your machinery from environmental hazards and keep it safe during storage. Heavy-duty industrial shrink wrap is a great way to protect your industrial machinery and keep it safe for extended periods of time.

Heavy-duty shrink wrap offers a cost-effective way of protecting your machinery without requiring more expensive alternatives.

With a durable seal, shrink wrap provides long-lasting protection and is simple to repair when the need arises after a tear. You can save your company with an investment in industrial shrink wrap not only due to preserving your equipment but also because of the low cost and minimal maintenance involved. Equipment preservation doesn't need to put a huge dent in your budget.

Do everything you can to protect your equipment; preserving it now is significantly cheaper than purchasing replacements down the line. Allow us to be your industrial quality shrink wrap supplier and provide your equipment with the protection it needs to ensure future functionality. For any further questions or business inquiries, don't hesitate to give us a call or send us an email. We're happy to help you with whatever your company needs when it comes to shrink wrapping systems.



### Buffalo Shrink Wrap

9300 County Rd Suite B, Clarence Ctr, NY 14032-9530

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# Vallair

## One world of experience

Vallair is a multi-disciplinary aviation company focused on maximizing the life and value of aircraft, engines and parts.

We provide integrated support for mature aircraft, engines and major components with our streamlined and complementary business units that are founded upon engineering excellence, knowledge, and the delivery of quality services. These include aircraft & engine MRO, trading & leasing, project management, teardown of aircraft & engines, aerostructures, material management, technical support and CAMO. These offer aircraft operators and owners worldwide cost-effective solutions to extend the life of their assets or to dispose of them in an economically beneficial and environmentally acceptable way. Vallair is a leading player in the trading and leasing of A320 family, ATR and B737 aircraft, and a leader in the passenger to freighter conversion market. Vallair is the sum of its parts, and our teams work closely with customers, partners and suppliers around the world to offer a single stop solution. Vallair MRO's European hub in France comprises two EASA/FAA accredited facilities in Châteauroux and Montpellier, which provide heavy maintenance programmes, painting and modifications. We also offer narrowbody line maintenance capability to airlines and operators landing in Vatry airport near Paris.

For more than twenty years Vallair ASSETS has been a leading participant in the trading and leasing of mature narrowbody aircraft & engines for sale, lease, teardown and part-out. We have a strong materials management division that supervises the repair and provision of parts to airlines and MROs worldwide.



Vallair

*Vallair is a historical founder of AFRA (Aircraft Fleet Recycling Association). We offer aircraft operators and owners worldwide cost-effective solutions to extend the life of their assets, or to maximize value at end-of-life in an economically beneficial and environmentally acceptable way.*

#### Capabilities:

- MRO & Painting
- Engines
- Aerostructures
- Logistics
- Material Management
- Project Management
- Trading & Leasing
- Teardown

Visit us: Booth #256

**MRO Middle East**

February 10-11, 2025  
Dubai, United Arab Emirates

# One world of experience



MRO & Painting  
Engines  
Aerostructures  
Logistics



Material Management  
Project Management  
Trading & Leasing  
Teardown

**Airbus** A320 | A330/340

**Boeing** B737

**ATR** 42/72

vallair.aero



View our digital brochure here.

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## Urgent: Fuel Tank Safety Compliance Deadlines Approaching!

Is your fleet ready to meet the upcoming mandated fuel tank flammability reduction requirements?

- Airbus compliance deadline: February 2026
- Boeing compliance deadline: November 2026

### INVICTA™ by Jetaire: Your Cost-Effective Compliance Solution

- Military-grade fuel explosion suppressant foam
- One-time installation, zero maintenance
- Compliant with FAA, EASA, AFAC, ANAC & TCCA for 25.981 requirements
- Installation in as few as 3 days
- No modification or altering of the FQIS
- Lowest total cost of ownership pathway to meeting regulatory requirements

Why risk AOG scenarios when you can secure your flammability reduction means technology from the company that pioneered foam-based solutions for FTFR compliance today!

### Act Now: Contact Jetaire to Learn More About INVICTA!

Ensure your fleet's safety and regulatory compliance. Let



Jetaire's expert team guide you through a seamless INVICTA installation process.

*Fly safer, smarter, and fully compliant with INVICTA.*



Jetaire Group

[www.jetairegroup.com](http://www.jetairegroup.com)



## The Countdown is On for Airbus & Boeing Flammability Reduction Compliance!

INVICTA™ is the premier alternative to nitrogen-generating systems backed by the industry's leading warranty, from the company that pioneered the technology for commercial passenger aircraft.

Learn More at [www.jetairegroup.com/INVICTA](http://www.jetairegroup.com/INVICTA)

# SYSTRATEC: Ten Years of Innovation and Precision in Aeronautical Weighing

In the demanding aircraft and helicopter maintenance sector, accuracy in the measurement of weight and center of gravity is crucial. Innovative weighing systems by SYSTRATEC provide highly accurate measurements of these mass properties, enabling load optimization and weight distribution strategies based on quality data. SYSTRATEC's unique technology assists in the constant quest to improve the sustainability of the aviation industry, pursuing the optimization of mass properties to achieve lower fuel consumption and reduction in aircraft CO2 emissions. SYSTRATEC is the undisputed leader in this field, offering state-of-the-art, highly durable solutions that provide superior long-term value.

## The key to SYSTRATEC's success lies in its technological innovations:

1. First manufacturer to incorporate carbon fiber into its weighing platforms to develop ultra-rigid structures that eliminate flexing and improve linearity and measurement accuracy, while providing incomparably long service life.
2. First manufacturer to put on the market a portable weighing platform capable of measuring, in addition to weight, the exact position of the wheel on each platform with millimeter precision, which greatly reduces uncertainty in critical aeronautical balance calculations in portable systems.

3. First manufacturer to incorporate exclusive laboratory technology into industrial instruments, making available to the MRO sector a quality that was only available to the largest aircraft manufacturers. These innovations translate into fewer errors, less downtime and a better ROI.

## SYSTRATEC offers:

- CARBON|aero: System of high-end portable weighing platforms of 10, 20 and 30 tons, capable of measuring with extraordinary precision the weight and position of each aircraft wheel.
- Jack|WS: Optimal, cost-effective solution for the conversion of existing lifting jacks into a high-end aeronautical weighing and centering measurement system. Applicable to any aircraft, it provides measurements in relation to the aerodynamic mean chord, without additional calculations.
- Static|WB: Perfect for measuring the weight and center of gravity of parts or assemblies in the quality laboratory. The best way to certify static mass properties from the initial stages in the supply chain. The benefits of using SYSTRATEC include improved accuracy, superior durability and continuous firmware upgradeability.



Systratec

[www.systratec.com](http://www.systratec.com)

General Phone (English & Spanish): +34 955 976 956

## Aircraft on-jack Jack|WS SYSTEM

Convert your traditional **lifting jacks** into a **high-end weight & balance** measurement system



## Laboratory quality instruments for day-to-day operations in the maintenance hangar.

Superior Precision: High-end **HBM®** force sensors deliver laboratory-grade accuracy and a long service life.

Enhanced Versatility: Accurately weigh almost any aircraft or helicopter, and achieve consistent results across different locations.

Specialized Electronics: Our **aircraft|REFERENCE** electronics system is user-friendly, eliminates external calculations, minimizes errors and ensures precise measurements.

Portable and Durable: Safe storage and transport with a military-grade Peli® case that offers unmatched protection.

Contact **SYSTRATEC** today and go one step further in your **Weight & Balance measurement operations.**



[systratec.com/jack](http://systratec.com/jack)

## Sonic: Tools for Aviation Technicians

Sonic is the only tool company in North America that has developed comprehensive tool kits for every professional technician's skill level in the aviation market. Sonic tools are designed for one thing: Efficiency.

Our customers choose Sonic because of the quality and durability of our tools, the increase in productivity and positive tool control technicians experience when using our toolkits and our Sonic Foam System for organization. Using Sonic tools greatly enhances FOD prevention, tool accountability and inventory control through our innovative contrasting foam inlays, inventory control sheets, and tool serialization.

Technicians using the Sonic Foam System can audit a drawer in seconds. With a quick scan of a drawer, a technician knows immediately if a tool is missing — virtually eliminating FOD occurrences. Technicians also work 20% more productively when using Sonic's Foam System. Each tool's precise location is clearly shadowed in durable, chemical-resistant foam, with numerical identifiers for effortless organization and inventory — meaning a

work area for technicians that is efficient.

Sonic is trusted by some of the best in the aviation industry: SpaceX, American Airlines, Piedmont Airlines, Pacific Southwest Airlines, Alaska Airlines and more. Built to last a lifetime, we stand behind every Sonic tool we make.

Sonic's Intermediate 263-pc Aviation Toolset: Sonic created this comprehensive 263-piece tool set with direction from aviation industry experts and is one of our most popular toolsets with A&P technicians and MROs. This toolset is available with or without a toolbox. This set comes standard with a serialized tool ID laser etched on each tool.

**SONIC** | **GET MORE DONE**

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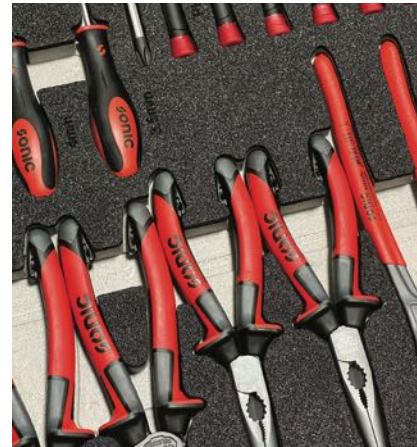
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By Richard Scarborough



# MAJOR UPDATE TO AIRCRAFT RECORDS AC

## WHAT TO KNOW ABOUT THE PROPOSED CHANGES.

**A**ircraft maintenance is a broadly defined term involving the care and keeping of aircraft. The industry continues to develop best practices, and maintenance tactics evolve directly proportional to aircraft developments. Accurately documenting such actions is not to be taken lightly. It is often

jested among maintainers that eventually, one would need to operate two aircraft in tandem; one to fly passengers and cargo and the other to haul all the airworthiness paperwork.

Aircraft maintenance record-keeping is a serious business. During my MRO ownership stint, the Feds spent almost the entire annual inspection visit pouring over work orders, looking for non-compliance. Only when satisfied that the paperwork was in order, would they take a lap around the shop. While conducting this portion of the inspection, they typically looked for tool calibration

labels, correctly identified aircraft parts and appropriate repair station-specific signage. The question of workmanship rarely entered the conversation. They stuck to their checklist and ticked off each block unless they received a formal complaint.

I say this not to cast shade on FAA inspectors but to highlight how vital record-keeping is to aircraft safety. After an accident or incident, inspectors will review the aircraft's logbooks, maintenance records, and airworthiness information. Refer to Section 7. Safety, Accident, and Hazard Reports of the Aeronautical Information Manual (AIM), in which the Federal Aviation Administration (FAA) aircraft safety includes maintenance and record-keeping.

### AC 43-9C - Maintenance Records

The FAA issues Advisory Circulars (AC) to inform the aviation public systematically of nonregulatory material. Unless



incorporated into a regulation by reference, the contents of an advisory circular are not binding on the public.

Advisory circulars are issued in a numbered subject system corresponding to the subject areas of the Code of Federal Regulations (CFR) (Title 14, Chapter 1, FAA). In other words, ACs keep the public informed concerning FAA rules and regulations. And they are plentiful.

AC43-9C, entitled Maintenance Records, is up for revision even after receiving two change notices during its tenure:

- Change one, issued on April 7, 2017, simply clarified regulatory references.
- Change two, issued on May 8, 2018, updated paragraph 15 by adding maintenance manuals to the list of documents containing aircraft/powerplant part life limits and reorganized the table in Appendix 1, Airworthiness Directive Compliance Record (Suggested Format).
- Revision D will be the first significant overhaul of the AC since its inception in 1998.

The FAA granted an extension to October 18, 2024, for comments on the Advisory Circular AC No: 43-9D. Currently in draft mode, this latest revision would replace AC43-9C, published on June 8, 1998. The Feds use comment periods to get public input on various issues.

The FAA Flight Standards Service, updated September 11, 2024, provides details on the AC revision, including 1) a summary, 2) a list of references, 3) documents for downloading, 4) a comment portal, and 5) related information.


At first glance, the FAA may need to catch up on aircraft record-keeping. However, aviation maintenance is making great strides in advancing electronic records, artificial intelligence (AI), and predictive maintenance. With advancements moving at unprecedented speed, updating maintenance records is timely.

The draft of AC43-9D, Maintenance Records, describes acceptable methods, procedures, and practices for demonstrating compliance with General Aviation (GA) maintenance record-making and record-keeping. Why is that important? We shall discuss that shortly. At first glance, you will notice that Rev D weighs in at a hefty 20 pages compared to the 12 pages of Rev C.

I spoke with Ian Gregor, a public affairs specialist at the Office of Communications for the FAA, who stated, "This is a draft document for public comment. We can respond to questions about the document when we finalize it." Once the public comment period closes, the FAA reviews those comments, taking the industry's thoughts into consideration. When asked about the period between closing the comments and the AC going live, Gregor responded, "It takes time for us to review, respond to, and possibly make changes as a result of comments we receive before finalizing an AC." We agreed to reconnect after the new revision goes live.

Ric Peri, vice president of government and industry affairs for the Aircraft Electronics Association (AEA), shares his thoughts

"DRAFT"



U.S. Department  
of Transportation  
Federal Aviation  
Administration

# Advisory Circular

**Subject:** Maintenance Records      **Date:** DRAFT      **AC No:** 43-9D  
**Initiated by:** AFS-300      **Change:**

---

**1 PURPOSE OF THIS ADVISORY CIRCULAR (AC).**

**1.1 Recordkeeping.** This AC describes methods, procedures, and practices that have been determined to be acceptable means of showing compliance with the General Aviation (GA) maintenance record-making and recordkeeping requirements of Title 14 of the Code of Federal Regulations (14 CFR) parts 43 and 91. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

**1.2 FAA Form 8130-3.** This AC also discusses the procedures for the use of Federal Aviation Administration (FAA) Form 8130-3, Authorized Release Certificate, Airworthiness Approval Tag, for approval for return to service under part 43.

**Note:** Except for FAA Form 8130-3, the information in this AC does not apply to air carrier maintenance records made and retained in accordance with 14 CFR part 121.

**2 AUDIENCE.** The audience of this AC is persons authorized by part 43, § 43.7(b)-(c) to approve aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, or alteration; and FAA personnel tasked with the review and oversight of said entities.

**3 WHERE YOU CAN FIND THIS AC.** You can find this AC on the FAA's website at [https://www.faa.gov/regulations\\_policies/advisory\\_circulars](https://www.faa.gov/regulations_policies/advisory_circulars) and the Dynamic Regulatory System (DRS) at <https://drs.faa.gov>.

**4 WHAT THIS AC CANCELS.** AC 43-9C, Maintenance Records, dated June 8, 1998, is canceled.

**5 RELATED REGULATIONS.** Title 14 CFR parts 1, 43, 65, 91, and 145.

**6 DISCUSSION.**

**6.1 Terms and Conditions for Airworthiness.** Title 14 CFR states that a U.S. Standard Airworthiness Certificate is effective until it is surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator. In addition to those terms, a U.S. Standard Airworthiness Certificate is effective only as long as the maintenance,

on the proposed revision, stating, "The current AC 43-9 has never been complete or either regulatory requirement, 43 or 91." Even in 1998, AC43-9 lacked clarification on critical aspects of aviation maintenance.

Sarah MacLeod, executive director of the Aeronautical Repair Station Association (ARSA), and I sat down to discuss Rev D. Her initial thoughts concerning the FAA's revision were, "The FAA is using this update to move the information currently contained in Order 8130-21 for maintenance providers. This AC will now contain the information for completing that form."

Sarah is speaking of the AC introducing procedures for completing FAA Form 8130-3, Authorized Release Certificate, and Airworthiness Approval Tag for approval for return to service under part 43. Sarah and I highlighted that the 8130-3 tag is typically completed by the type certificate holder on the left side or returned to service by a Part 145 Certified Repair Station on the right. She also commented that completing the FAA Form 8130-3 is in the AC, not Order 8130.21. The 8130-3 tag has been in play for quite a while. The FAA is taking this opportunity to include language to aid in completing the form. It is important to note that every 8130-3 tag accompanying parts and components to the airplane becomes part of the aircraft record. In its publication Common Logbook Mistakes, Business Aircraft Records lists Not Including the FAA Form 8130-3 Approval Tag with the Logbook Entry When Components are Changed as one of the

common errors. The 8130-3 is strikingly similar to the EASA Form 1, thereby ensuring continuity among component airworthiness recording and part traceability.

MacLeod goes on to say that the AC needs to adequately address roles and responsibilities. For example, 90% of the AC deals with 14 CFR Part 91 General Operating and Flight Rules, as opposed to 14 CFR Part 43 Maintenance, Preventative Maintenance, Rebuilding, and Alteration.

Peri echoes that sentiment. He states, "The major change is specific to part 43 in that the FAA has included expensive instructions on using FAA form 8130-3. Opening up this AC for comment is generating a proposal to separate the part 43 maintenance records (combining AC 43-9 and 43.9-1) from creating a new part 91 record-keeping AC specific to the requirement of part 91. This concept will better differentiate the two regulatory requirements."

Another addition to Rev D is section 22.2, Information Systems and Automation. The FAA introduces language stating, "With advances in technology, the collection of the form data can be generated electronically in a variety of ways and then be stored that way." They also mention AC120-78, Electronic Signatures, Electronic Recordkeeping, and Electronic Manuals, which provide guidance that may be useful in developing such a system. This is a step forward in electronically recording maintenance, paving the way for predictive maintenance and, eventually, the use of artificial intelligence (AI). For further information on AI, check out the Aviation Maintenance article AI/ML is A-OK for aviation maintenance tracking and predictive maintenance published in March 2024.

## Why Request an Extension for Comments?

With the added material comes increased responsibilities. Industry leaders felt the need for additional time to review the proposed changes. It is no secret that every time the FAA makes a change, the effects flow downstream, and everyone must comply. Ignorantia juris non excusat.

On August 9, 2024, eleven leading aviation trade organizations sent a letter to the FAA requesting additional time to comment on the Draft AC43-9D. The FAA quickly responded with an extension. (ARSA) published an announcement stating in part: This AC provides acceptable means of showing compliance with general aviation record-making and record-keeping requirements according to parts 43 and 91. Though not regulatory, it provides a method, not the only method, and the industry continues to push the FAA to carefully align its guidance with the regulations.

Some of the entities credited with the letter include, but are not limited to:

- Aeronautical Repair Station Association (ARSA)
- Aircraft Electronics Association (AEA)
- Aircraft Owners and Pilots Association (AOPA)
- General Aviation Manufacturers Association (GAMA)
- National Air Transportation Association (NATA)

The letter contains the complete list of those requesting the extension, and mentions form 8130-3 clarification, bilateral agreements, and maintenance implementation documents.

The entities mentioned above constitute only five of the industry leaders petitioning the FAA to extend the review period of AC43-9D. Please download the letter and keep a copy in your digital toolbox. These organizations work tirelessly to ensure safe and efficient operations. How important is their role, and does it

make a difference? I spoke with Suresh Narayanan, founder and CEO of Jets MRO at DFW, and his answer was an emphatic yes. After starting his business, Narayanan joined the National Business Aviation Association (NBAA). "By surrounding oneself with like-minded individuals, one has opportunities to gather good intel. The NBAA badge is a sign of respect for the company. Our industry's strength is the self-policing credibility. There is no fake it 'til you make it."

Organizations like ARSA, GAMA, and NBAA offer a place to gather and network with other aviation professionals. Actions like the letter mentioned above are just the tip of the iceberg. Advocacy is only effective in groups. There is indeed strength in numbers. Other benefits include safety workshops, industry panels, and focus groups. The industry used this extended time to investigate AC43-9D and review all the FAA's proposed changes.

## What Does This Mean for the Aviation Industry?

When I asked AEA's Ric Peri what these changes mean for the aviation industry, he replied, "The proposed change is reasonably benign, mostly editorial changes." That said, it is crucial to understand what the FAA requires, especially in record-keeping. The 8130-3 does have particular nuances that maintainers need to understand. For example, Block 8. of the form, labeled Part Number, indicates the Type Certificate Holders' identifier for that component. This includes Parts Manufacturer Approval (PMA) parts, regardless of type. A specific instance occurs when an Identity by License PMA gives the manufacturer authority to produce and distribute parts that replace original equipment manufacturer (OEM) parts. The replaced part or specification can be referenced in Block 12. of the 8130-3 labeled Remarks. Block 12. can also include information such as technical publications, Supplemental Type Certificates (STC), Engineering Orders (EO), or other specific documented maintenance references.

Sarah MacLeod and I also discussed the revision and its ramifications for owner/operators and pilots. She mentioned, "The average pilot needs to understand the requirements of part 91—this AC currently contains that information. It is not the mechanic's job to ensure maintenance records are complete; it is the owner/operator's responsibility. That fact is not understood by many pilots who own and operate their aircraft."

The industry group working on the issue will propose to separate the requirements for maintenance providers to complete maintenance and inspection records correctly from the information owners and operators of aircraft subject to part 91, which are required to obtain, maintain, and make available to the government. In other words, AC 43-9 would be directed solely at the maintenance providers' requirements of part 43, and a new AC would be directed at part 91 records. The bottom line is this revision principally deals with the guidance of the FAA 8130-3 form and language concerning electronic record-keeping.. Many Certified Repair Stations have already deployed the 8130-3, and many more have adopted electronic records. The FAA has simply updated AC43-9 to bring it current with standard industry practices.

Now that the comment period is closed, the industry will follow the pattern as the FAA collects, reviews, and determines appropriate action for the intel it gathered. In many ways, aviation maintenance has come a long way since the first version of AC 43-9 launched on February 2, 1975, but the bottom line remains the same: Document what you do, nothing more, nothing less. **AM**



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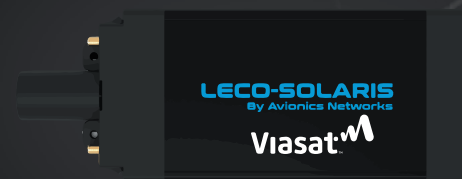


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# INNOVATIONS IN DENT DETECTION

**NOT JUST COSMETIC, AIRCRAFT  
DENTS REQUIRE ATTENTION  
AND SOME INNOVATIVE  
SOLUTIONS CAN HELP.**



*8tree tools are calibrated under ISO17025 — the highest standard a metrology device can achieve. 8tree says as a result, dentCHECK measurement results are traceable to national standards and cannot be manipulated. 8tree images.*

debris (FOD) like hailstorms, loose objects, small rocks, bird strikes and even accidental impact with service vehicles during loading operations. Regardless of their origin, Leonard Buck, marketing and business development manager at 8tree, Constance, Baden-Württemberg, Germany, says, "Dents are safety critical since they influence the structural integrity of the aircraft. Any dent has to be assessed prior to continuing aircraft operations." Airports, airlines and maintenance crews must be aware of dents and their origins, and take the necessary precautions to minimize them via proper training, procedures and maintenance programs.

## Dent Detection Methods

There are procedures and equipment in place for MRO engineers to find, measure, evaluate, document and repair dents on aircraft skin, but it's not always easy. Dent detection via visual inspection is tedious, time-consuming and subject to human factors. They can be located in hard-to-reach areas of the aircraft with complex curved geometries or on leading edges, not always clearly distinguishable even by trained engineers. Also, inspection can occur at height and in challenging conditions, outdoors, where light and weather can interfere. Because dents can be smooth and without well-defined boundaries, with a depth often lower than 1 mm, they can be difficult to detect.

Buck explains that there are three distinct, different methods for dent assessment:

- **Traditional Tools (ruler, flashlight, depth-gauge and pen).** "This is the manual inspection method. Very time-consuming and error-prone. It's industry knowledge that 'you get 10 results if 10 people measure the same dent'."
- **General Purpose 3-D Scanners.** "3-D scanners require

**A**ircraft dents happen. While some dents may have minimal effects, others can damage thin aircraft skin and compromise the aircraft's structural integrity and aerodynamic performance via the damaged area that is pushed in from its normal contour. Varying in size and severity, dents can range from minor indentations to more significant distortions of the aircraft's surface.

Dents on an aircraft's surface can disrupt the smooth flow of air over the wings' fuselage and other surfaces. These disruptions can increase air resistance, resulting in decreased lift, increased drag and reduced fuel efficiency. Dents can trap moisture and lead to corrosion. Furthermore, they can shorten fatigue life and contribute to the propagation of cracks. Failing to repair a dent in time can result in non-compliance with aviation regulations, leading to fines, aircraft grounding or other penalties.

Dents can result from old age and also impact with foreign object



*Zeiss says they have products that offer scanning, probing, and tracking in a single system, a scalable field of view and high precision. Zeiss image.*

significant surface preparation (stickers applied on the surface) and produce datasets and point clouds, which must be post-processed in specialized software and demands the expertise of highly trained metrology personnel.”

- **1-Click 3-D Dent-Mapping Tools.** “Application-specific designed tools developed for the needs of mechanics and engineers. This tool contains a projector that displays the dent dimensions directly on the surface i.e., augmented reality.”
- **AR-enabled 1-Click 3-D Dent-Mapping Tools.** “Application-specific designed tools developed for the needs of mechanics and engineers. Using Augmented Reality (AR), the tool projects the dent dimensions directly on the inspected surface. Mechanics will always receive instantly actionable results with the click of a button. That’s what is needed on the line or in the hangar.”

Despite these tools’ dent-detection benefits, Buck believes that while “Dents are highly safety-critical and aviation (maintenance) is a highly regulated field ... when we’re looking at dent measurements, many airlines and MROs are still relying on guess work. Industry knowledge and studies show that traditional dent measuring is nothing but guesswork.”

However, Buck adds that there are tools available today to solve this issue. All 8tree tools are calibrated under ISO17025 — the highest standard a metrology device can achieve. “The dentCHECK measurement results are therefore traceable to national standards and cannot be manipulated (thinking of compliance — big issue),” he says. “Any mechanic can operate the tool after a few minutes training. The AR-enabled dentCHECK tool was purposely designed for dent-mapping on aircraft. The projection of instantly actionable results on the aircraft surface is a giant leap for any airline/MRO/OEM operation and for passenger safety.”

Levis, Canada-based Creaform’s VXintegrity–Aerospace, is dedicated 3-D visualization software designed to assess and characterize dent damage on different aircraft components, sizes and surface finishes. Its guided workflow approach simplifies the measurement extraction of 3D scan data and obtains the exact dimensions required for the assessment. More accurate and faster than traditional methods, the software limits operators’ impact on measurements and shortens the time needed to generate final reports, providing airlines with comprehensive data on issues that require further analysis.

## Complex Geometries and Curved Surfaces

Complex geometries and curved surfaces have been known to be the bane of aircraft dent detection, but that’s changing. Buck says it’s becoming less difficult. “Inlet cowls, leading edges, acoustic

panels etc., can be inspected with dentCHECK. Double-curved and highly curved surfaces are almost impossible to measure by hand (referring to the ‘guesswork’ statement again).” dentCheck has 1-Click 3D dent-mapping with real-time visual feedback providing go/no-go damage inspection through augmented reality. It can be used at the line, in the hangar, on the tarmac or in AOG situations.

Computer vision (CV) is an application of artificial intelligence (AI) that trains computers to identify, interpret and track objects in photos and videos. The technology is primarily driven by recognizing patterns that repeat themselves over a given set of data. For inspection purposes, AI can detect dents automatically on an aircraft, which could take a human worker up to hours to inspect, while trying not to lose focus on the task.

Jake Bauer, senior data scientist at Striveworks, Austin, Texas, says, “CV models are trained on ‘ground truth’ data: properly labeled examples of what the analyst expects to encounter in the real world. If an analyst is using AI to review complex geometries, then those same complex geometries need to be part of the model training. Striveworks pairs data scientists with customer subject matter experts to better understand the nuances and challenges in manual workflows. Together, they can create an optimal training dataset for a complex task like dent detection. A CV model optimized for complex geometries and curved surfaces will outperform general CV models at the same task.”

## AI and Dent Detection

AI has indeed provided real improvements in efficiency for aircraft dent detection. Striveworks worked with a leading Fortune 500 logistics company to create CV models — fine-tuned on imagery of aircraft dents — to help inspection teams identify dents and process vast amounts of imagery.

“Inspection teams using AI were able to find 27% more dents and work through images 50% faster than by doing the work manually,” Bauer says. “These improvements allow teams to review vastly more aircraft surface in a shorter period of time, an obvious benefit when entire fleets are grounded following hailstorms. Because of the complicated challenge of teaching machines how to identify dents in photographs, advanced ensembling i.e., majority voting’ and data preprocessing techniques are needed to add resilience.”

When using AI to perform dent detection, Bauer believes specificity is key. “This starts with capturing data that is as similar as possible to what would be expected during an actual aircraft inspection. Using the exact same type of aircraft, lighting, paint color, camera sensor, camera angle, etc., for model training will improve a model’s ability to correctly identify dents during a real inspection. There is no substitute for expertise when it comes to safety and inspection. While AI can recommend locations of possible dents with high accuracy and speed up the process, a trustworthy inspection should always have a human in the loop. Ultimately, the safe maintenance of aircraft requires a well-trained inspection crew.”

## Drones and Dent Detection

Improvements in drone technology have allowed analysts to capture dent imagery faster and at less expense. “Drone photography provides a critical AI input, both to tune CV models to perform optimally on the task of dent detection and during actual inspections,” Bauer says. “Tuning models on the same



Donecle is a Toulouse-based aircraft manufacturer that has developed autonomous aircraft inspection UAVs. The company offers single UAVs and swarms of UAVs to visually inspect the exterior of airliners. Donecle image.

sensor data (drone altitude, camera angle, image sensor, etc.) that is used during actual inspections improves the performance of models. When any changes occur with the environment or sensors, the dent-detection models can quickly be retrained on the new, real-world imagery to improve performance.”

Buck predicts drones used in dent detection represent the future.

They will complement the handheld measurement capabilities. “The first IRIS dentCHECK dent-mapping drones are being delivered to the end customers. The IRIS dentCHECK is the ‘flying version’ of 8tree’s handheld dentCHECK dent-mapping tool. It is the result of a partnership between Donecle and 8tree.” **AM**



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# RHINESTAHL AND HYDRO COMBINE TO FORM POWERHOUSE RH AERO, INTRODUCING NEW LANDING GEAR EQUIPMENT

**B**ack in April of this year, Rhinestahl acquired HYDRO Aero. Now the two companies have merged to form RH Aero. The newly rebranded, combined company touts capability across custom-designed ground support equipment (GSE), OEM-licensed engine and airframe tooling and 26 global service centers as well as engineered solutions for OEMs, MROs and operators across the globe. The two companies say they have a globally diverse workforce of more than 850 skilled professionals and unprecedented supply capacity. Aviation Maintenance editor-in-chief, Joy Finnegan, sat down with the new president and CEO, Anthony Turner, and Dieter Moeller, chairman, to discuss how things are going with the combining of these two companies and their continued development of new and innovative solutions for their customers.

## **AVM: Why did these two companies decide to come together?**

**Anthony Turner:** We set out to create a powerhouse that's going to be able to provide levels of service and support, and products that just haven't been available to our customers out there before. Through the acquisition, by combining Rhinestahl's engine OEM licenses and HYDRO's highly skilled service centers, we have become expertly positioned to support OEMs, MROs, and operators across the globe. With more than a century of experience delivering reliable full life-cycle solutions, we are setting the standard in comprehensive life-cycle solutions for aviation support equipment and services.

## **AVM: What's it like to acquire a company and merge two companies?**

**Dieter Moeller:** So first I'd say it's a lot of fun, right? I mean, these things aren't always easy. I think there's great alignment from a values perspective in these two companies and these two teams.

**Turner:** The transaction was done because of the complementary nature and the commonality and values. Two high-quality companies that believe in their products, their brands and really believe strongly in high levels of customer support. The geographic complements, the product and service complements across each of the companies, the relative strengths and weaknesses. This goes back to the question you asked earlier, which is the service. There's great strength in the history of HYDRO, of product development and innovative solution design. And I would say Rhinestahl's historical strength technically has been about the use of the practical application products in the

field, supporting our OEMs and customers. And so, when you bring that great engineering capability together with practical applications for customers, we think that's really where the sweetness curves, right? We create something really differentiated from the market. So that's the synergy.

## **AVM: Talk about the current supply chain situation and how your newly combined company can help.**

**Moeller:** With the combination of the two companies RH Aero now has, by far, the leading supply capability in the industry for the products and services that we offer our customers. We've been working really hard over the last two years because we saw the ramp coming, right? I think that's one of the things that we do really well, and I think sets us apart.

## **AVM: The ramp coming out of the pandemic?**

**Turner:** Yes. We understood we had a pretty good view of what we thought was going to take place. So, we started working on capacity, capability and development early. We started that process two years ago. We were here, we were ready, and we're prepared to meet the needs of our customers. Our objective is all about reliability, making sure we're ready for our customers and they've got a reliable source for the products and service they need. Our expectation when customers are dealing with us is they're not hearing a lot about supply chain challenges, because we're taking care, we're ahead of the wave.

## **AVM: Talk about supporting your customers.**

**Moeller:** The way the industry is today, everything is just in time. Schedules are hypercritical. We've really developed a reputation for when a customer calls us, they know that they can expect if this is a critical AOG-type situation, we've got somebody on the way as soon as the phone is put down. With having the in-region sites normally we'll have somebody there that afternoon to take care of them. And for customers today, that type of support is critical. We recently announced four new in-house manufacturing and service centers opening in Q4 2024 and Q1 2025: Hong Kong, Chengdu, China, Hyderabad, India, and Jeddah, Saudi Arabia. Standard capabilities across all locations include inspection, testing, calibration, repairs/overhaul, recertification, test of electrical equipment, modification of tools, local customer support service, pressure measurement and load testing.

**Turner:** Combined with GSE and airframe tooling, RH Aero offers a complete portfolio of end-to-end service and support for more





Dieter Moeller, Chairman



Anthony Turner,  
New President and CEO

than 100,000 tools in our installed base. This service is provided by technicians located in 26 service centers in 10 countries. Our strategy is to have qualified technicians located in-region for our customers to drive market leading turn-times and customer service. Using our Readiness Hub tooling inventory system and our Managed Services program, our Readiness Managers provide an unprecedented level of collaboration and service through our on-site, in-your-shop approach to conducting tooling management and partnering with OEMs and MROs.

**AVM: Why had these things not been available before?**

**Turner:** It was a matter of capability and the size. It's a critical mass issue with customers today asking for much more in-region support. With our level of support, which has always been at a very high level, being able to do that at customers' facilities just requires an awful lot of resources. And with this combination, we do have the resources to be able to go and supply that footprint around the world.

**AVM: You mentioned high levels of support in-region. Talk about what that means to this company.**

**Turner:** It means being able to basically be the experts in aviation support equipment and services for our customers and handle that for them. They don't have to worry about that anymore. We're taking care of it for them. We're able to reach out to customers around the world and take care of customers at 26 major service centers. Then we've got a hub and spoke network where we've got a lot more reach even than in those 26 centers.

**AVM: RH Aero has just unveiled new landing gear equipment, the MLGTMULTI-2. This is a solution specifically designed to enhance the removal and installation of main landing gears on common widebody aircraft. It is designed for the Airbus and Boeing wide body passenger and freighter fleets. You say this landing gear change equipment is designed for a safer, faster and more cost-effective operation. Tell us about the advanced features of it that are designed for safety and efficiency.**

**Turner:** It enables quick and secure trunnion disconnection thanks to its maneuverability and flexible design. The ergonomic handheld control panel makes for user-friendly operation. The MLGTMULTI-2 electrically controlled, high-precision movement provides significant advantages and ease of use compared to the traditional processes. Ground-based operation eliminates the need for cranes or on-wing work, significantly increasing safety during the process. Additionally, the system is optimized for easy

transport, enabling transport on standard pallets, without the need for special handling or exceptional transport measures.

**AVM: Tell us more about your COBRA system and how it helps engine changes go quickly.**

**Moeller:** It allows us to change engines out within hours, which is something that used to take days.

**Turner:** The COBRA system basically is a purpose-built cradle electronic system that is able to take the engine off at the angle it needs to be taken off and to be replaced. And it's able to do this in a way that is secure and safe with much less time than the old way of doing this.

**Moeller:** It can be up to about an 80% reduction in time. This kind of plays into the scarcity of qualified labor, right? The lack of technicians in the market, which is not going away. It's going to get worse. All of these things that used to take multiple people, these products reduce the skilled manpower to do these types of procedures. And given the lack of people in this field that's going to be crucial for customers.

**AVM: How do you encourage innovation?**

**Turner:** It's about being with your customers, because the best product and service ideas come from the needs of the customers. And you can't really learn about these problems unless you're spending time with customers. Voice to customer is critical. It's key. We're very much a customer-first organization, and we really, really put an emphasis on our team being with our customers, understanding their environment, the challenges they face. That's where the best ideas come from.

**AVM: What can customers expect from this new powerhouse in the future?**

**Moeller:** We are well on our way through the integration process and bringing the synergies of both companies to the combined organization. We've done that symbolically through our rebranding effort of RH Aero being consolidation of the two, Rhinestahl and HYDRO, groups, and within our leadership structure and the organization. I've moved my position from being president and CEO of the organization to being CEO and chairman. We put Anthony in and just recently announced that he is the new president of RH Aero which sets us up for the next generation. Another step toward supporting our customers worldwide. We are really excited about that.

**Turner:** From the company itself, customers are going to see the broadest capability in support equipment-related services in the market. They're going to see the highest level capacity and they're going to see the most innovative solutions coming from our company. We're pretty far out ahead of this race. Our plan is to create more distance from our competitors.

**Moeller:** Take a look at our history. I've been with the company now 34 years, and throughout those 34 years, the times when the organization, and our ability to serve customers, has been at its highest, were those times that we were experiencing the strongest growth. Those things go hand-in-hand because our people are really excited about being in a strong growth environment. I think there's so much more opportunity to take care of customers than what has been done in the past. And I think with where the industry is going, that's going to be more and more important. **AM**

By James Careless

# THE STATE OF MRO TECHNICAL TRAINING: A CONVERSATION WITH CAE'S SHAUN KULDIP



Shaun Kuldip,  
CAE

**A**ccording to the training firm CAE, the demand for new MRO technicians will hit the half-million mark in less than a decade. To understand the impact of this demand on the aircraft technician training industry, Aviation Maintenance spoke with Shaun Kuldip, global leader of CAE's Maintenance Training Centre of Excellence. In this exclusive interview, Kuldip explores the trends driving MRO technical training these days, the new teaching products that CAE is bringing to market, and what's coming next in this training space.

**Aviation Maintenance: For context, please tell us about CAE's work in aviation training.**

**Shaun Kuldip:** CAE, the company that trains the most pilots in the world, operates over 70 civil aviation training centers globally. Known for its innovative approach, CAE trains pilots and aircraft maintenance technicians. We also train air traffic controllers and commercial aircraft cabin crew.

**AVM: The demand for new MRO technicians going forward is astounding. What is CAE doing to address their varied training needs?**

**Kuldip:** Our 2023 CAE Aviation Talent Forecast predicted a need for 402,000 new maintenance technicians industry-wide by 2032. As a result of the critical need for maintenance technicians we are developing training programs that will spool up technicians more efficiently, leveraging new technologies.

As part of CAE's Ready to Lead Program, we offer a variety of courses tailored towards aircraft technicians to help them improve their leadership skills and support career advancement. This includes CAE's Aviation Interpersonal Management (AIM) course, which gives students the skills and knowledge required in managing people and projects, finance, legal issues, communication, and many other business responsibilities.

CAE teaches entry-level aircraft maintenance technician courses and in-depth initial training courses on specific aircraft. This includes the latest and most technologically advanced business aircraft being built today. Courses range anywhere from a three-day "REALCase" course to five-plus weeks for a full aircraft tip-to-tail initial course.

Our Master Technician Program is geared towards organizations and individuals who seek to attain the highest standards of technical excellence and professionalism in business aircraft maintenance. The innovative program allows technicians to enhance their skills and

competencies on two distinct tracks: Specialist and People Leader. With three levels of achievement — Certified, Advanced, and Master — trainees can reach a Master Technician status in less time than in previous Master Technician career development programs.

**AVM: What are the trends driving technical training for MROs these days?**

**Kuldip:** There are multiple factors contributing to the increased demand for maintenance technicians. One is the increase in the average age of the technician workforce leading to waves of retirement, which was accelerated by Covid. The loss of one highly experienced technician cannot be simply replaced with one new technician entering the field.

A seasoned technician in business aviation, with decades of experience on the job, is most likely certified to support, on average, four different aircraft types. In the short term, it would often require four new technicians to replace the one. In the long term, it would take many years for one new technician to gain the same level of on-the-job experience as the ones retiring, creating an ever-growing bottleneck.

**AVM: What can be done to address this problem?**

**Kuldip:** The first step in overcoming some of these challenges is exposure. We need to promote aviation maintenance to teens in the pre-college years to better attract the next generation of new aircraft technicians. This is crucial for long-term recovery.

In the interim, the industry must do a better job at retaining talented and experienced aviation technicians and attracting experienced technicians from the military. These veterans could provide a much-needed boost to the business aviation sector, however too many are not made aware of the possibilities and opportunities that exist for them and seek alternative career paths.

Training providers such as CAE also need to produce new and innovative ways to accelerate a new student's ramp-up time to become an "effective" technician that can contribute sooner. How do we cram four years of training experience in two years? This includes leveraging new technologies (VR) that resonate with the youth of today to better retain knowledge.

**AVM: Why is the aviation industry finding it difficult to recruit entry-level aircraft maintenance technicians, and what can be done to address this problem?**

**Kuldip:** I think the industry is unfortunately seen as less attractive for new job seekers. Since Covid, the graduation rates at aviation

maintenance technical schools are not keeping pace with the numbers retiring.

A lack of incoming technicians for many years and the retirement of a significant number of long-time technicians has created the perfect storm. The reality is that most future aircraft technicians are not training yet today, which is a problem.

[Fortunately] Media coverage of the current pilot shortage has benefited maintenance technicians as an awareness around the pending workforce shortfall has increased. This is now a topic that all operators are interested in seeing solved and is a topic that government workforce development programs are looking to address.

More marketing and media coverage of the improved wages, number of open jobs, and career progression potential for aircraft maintenance technicians will be necessary to continue to bring eyes to the industry and convince more people to take up the training to begin their path to a license. Government grants or scholarships will also bring in necessary attention and give more access to those willing to join the industry.

### **AVM: What new approaches is CAE considering to train the next generation of aircraft maintenance technicians?**

**Kuldip:** CAE is exploring new learning methodologies, such as Just-in-Time, that takes long and complex type-specific maintenance initial courses and breaks them down into easily accessible shorter courses that offer training when the technician is ready. This gives technicians time to learn new concepts and practice them on the shop floor before returning to training to learn the next area. This predictable cadence of training offers technicians a clear line of sight on what they will be learning and how their career will evolve.

### **AVM: Where does virtual reality (VR) fit into your training systems?**

**Kuldip:** CAE is deploying the latest in VR technology and simulation via the cloud on our latest Gulfstream and Dassault maintenance programs for the G500/600, G650, and 6X that allow technicians to experience the entire aircraft in a virtual environment. We are coming up on the one-year mark since we started using VR.

As we gather feedback from our customers on VR, the intent is to roll out across other aircraft platforms. Technicians can perform maintenance tasks in this virtual environment in several teaching modes, including an evaluation mode that allows technicians to measure their skills independently. An instructor-led mode also exists that will guide students through the various steps to perform certain troubleshooting tasks. Technicians can experience the aircraft with no fear of damaging expensive parts or putting wear and tear on sensitive interior components. Maintenance tasks that are safety sensitive or cost prohibitive are now available for technicians to practice as much as they require.

### **AVM: What about adding artificial intelligence (AI) to your VR training systems?**

**Kuldip:** The future convergence of AI and VR represents a transformative synergy which will revolutionize how we build immersive training and skills-development solutions within the aviation industry. As these technologies continue to evolve in tandem, the convergence of AI and VR is poised to redefine the boundaries of human interaction and pave the way for new and innovative applications across diverse domains within the aviation industry. Aviation is one of the industries where the adoption of emerging technologies is accelerating.

An example of how we may converge AI and VR for maintenance technician training is to improve performance

monitoring and evaluation. Our CAE Rise™ technology uses Metrics-Based Insights (MBI) and telemetry data to show pilot instructors objective data during live training, allowing them to focus on evaluating soft skills.

The technology, which CAE has developed for both civilian and military pilot training, also provides analytics to proactively detect, and ultimately address, emerging safety trends. The technology uses analytics to identify trends and optimize training programs, ultimately enhancing the quality of training and ensuring pilots are better prepared. CAE Rise is currently only being used for pilot training but could potentially be used in maintenance technician training and other programs in the future.

### **AVM: What will the impact of AI and VR be on the training of aircraft maintenance technicians?**

**Kuldip:** As CAE gains more experience on how to deliver training with these new tools, student retention will continue to improve. Additionally, training times will start to decrease, and this comes at a time when technician demand is growing due to many factors in the aviation industry. Getting technicians trained and back to the hangar floor in less time is a key objective for CAE and VR is one of many tools that will help us do just that.

### **AVM: How is the MRO market responding to these new training tools?**

**Kuldip:** Customers love being able to bring an aircraft inside of the classroom environment. The special orientation that VR allows makes objectives such as component locations and removal and installation tasks much simpler to deliver.

Students enjoy being able to access parts of the aircraft that they normally would not be able to during routine maintenance. They can explore the maintenance computer and evaluate faults that they may not have on their aircraft.

OEMs have come to expect this level of technology from us and push us to develop further VR applications.

### **AVM: Finally, what's new and on the horizon for aircraft maintenance technical training?**

**Kuldip:** Modern day aircraft have advanced technologically whereby integrated systems now talk to each other and can to a great degree, assist technicians in the troubleshooting of aircraft issues in an automated manner. One such system is the "Centralized Maintenance Computer", a highly complex system that is difficult to teach without the use of simulation.

CAE's high-tech capabilities are an important element to effectively teach the maintenance of today's modern aircraft. The use of these tools is integrated through many of our courses so that the technician is very familiar with its use by the end of the class. Trying to work on a modern-day jet without knowledge of how these onboard systems work is all but impossible for almost any modern-day aircraft.

While CAE Rise could potentially be used in other programs in the future, it is currently only being used for pilot training. **AM**



# EXPANDED OFFERINGS IN MAINTENANCE, INSPECTION TOOLS, PARTS, OPERATIONS

**S**uppliers, MROs and operators have announced new developments in their maintenance activities and laid out plans for expanding services that support repair, overhaul and inspection efforts. The latest developments range from new offerings of inspection and maintenance tools and software, parts manufacturer approval (PMA) and supplemental type certificate (STC) initiatives for business jets and expansion of airline spares inventory and maintenance base operations. Here's a rundown.

## 4D InSpec AT's Use in Engines Grows

4D Technology's 4D InSpec AT fully automated, non-contact, 3D surface gauge will be measuring specifications, damage and wear on more aircraft engine parts following a recent customer order.

The 4D InSpec AT is compatible with automated systems like robot arms and rotary tables. Combined with a robot arm, the gauge provides a substantial increase in productivity and precision for customers measuring edge break, chamfer and round-off on aerospace parts, the company says. With the gauge rapidly positioned by a robot arm, the 4D InSpec software can take a measurement, calculate adjoining planes and determine the shape, curvature and slope of the remaining surface after edge break and round-off. (The 4D InSpec AT also can be used as a handheld instrument.)

This allows customers to check critical specifications of aircraft and engine parts like airfoils, disks and bearings, as well as

to prevent crack propagation and ensure proper fit and seal. The 4D InSpec can help overcome difficulties in measuring the numerous callouts on an engineering drawing, such as hard-to-reach inside corners, areas between blades and samples that must be perpendicular to adjoining edges.

In addition to measuring machined edges, aircraft

mechanics and inspectors use the device to assess wear, scratches, dents, corrosion and other damage that occurs in aircraft engine operation. It can assess features ranging from 0.1 inch to 100 mils deep or tall. The measurements—completed in seconds on the shop floor or on-wing — quickly determine whether critical parts are safe for use or need to be discarded.

For engine parts makers, the 4D InSpec's short measurement-to-measurement time of — about a second — means they can save hours over tedious preparation of rubber replicas for feature assessments.

"The aerospace industry has some of the most stringent parts specifications found in any macro-scale manufacturing process," 4D Technology general manager, Erik Novak, said. The selection of 4D InSpec "validates the precision of our measurement and the great value added by its speed and versatility."

Based in Tucson, Arizona, 4D Technology is a leader in innovative products for measuring surface quality and defects on precision surfaces. The company is a wholly owned subsidiary of Onto Innovation Inc.

## Snap-on Kit Reliably Moves Impact Tools

Snap-on Industrial's Portable Heavy-Duty Impact Sets help technicians reliably transport their impact tools on the work site.



The 25-piece, heavy-

duty cordless impact set with portable storage (425IMCT) comes with an assortment of tools, including:

- A 17-piece shallow-impact socket set with Snap-on Flank Drive technology, which provides superior gripping power while guarding against rounding of fasteners.
- A ¾-inch drive swivel-ball impact universal joint.
- A ¾-inch drive extensions of three inches, seven inches and 10 inches.
- An 18-volt, ¾-inch drive Monster Lithium cordless impact wrench set, with 1,300 foot-pounds (1,763 Newton-meters) of bolt breakaway torque and 1,000 foot-pounds (1,355 Newton-meters) of working torque; the set includes two Lithium 5.0 amp-hour batteries and a charger.
- A sturdy, all-weather-resistant Pelican case with a collapsible



handle and rugged wheels.

- Two-toned (red and black) colored tool control foam to securely house the tools.

The kit weighs 72.13 pounds (32.72 kilograms). The case measures 24.8 by 19.7 by 11.9 inches (62.99 by 50.04 by 30.23 centimeters). *The kit is sold through Kenosha, Wis.-based Snap-on's franchisees and its company-direct, distribution and web-based channels. For more information on the kit, visit <https://b2b.snapon.com/>.*

## Performance Plastics Expands EnduroSharp Line



Performance Plastics has expanded its EnduroSharp line of aircraft maintenance tools, adding Torlon sealant removers, three EnduroSharp adhesive reamers

and the Deluxe EnduroSharp Scraper Blade Sharpener for keeping those and other tools well honed.

The sealant removers are non-metallic, spiral single-fluted cutters designed to cleanly remove non-metallic debris such as cured sealants, fillers, coatings and adhesives from larger surface areas such as fuel tanks with no abrasion to the underlying paints, primers or metal substrates. Designed for use with a power drill, the cutters have a hex-drive mounting feature.

The cutters are made of Torlon, a material that itself can be re-sharpened. This makes the cutters and other tools made of Torlon reusable.

The multi-fluted, straight-walled adhesive reamers can be used to remove debris such as cured sealants and adhesives from fastening and bushing holes in metallic or composite structures without damaging the structures. Originally offered in nine sizes, the company has added three sizes to the lineup: the TAR 171 (0.171-inch diameter, straight-fluted, ¼-inch hex drive), TAR 234 (0.234-inch diameter, straight-fluted, ¼-inch hex drive), and TAR 296 (0.296-inch diameter, straight-fluted, ¼-inch hex drive). The reamers are also made of Torlon and are reusable.

The Deluxe EnduroSharp Scraper Blade Sharpener features a diamond abrasive material surface for sharpening and restoring a factory edge to all EnduroSharp consumable products. The diamond abrasive material itself can be resharpened.

Performance Plastics developed all EnduroSharp aircraft maintenance tools with the University of Dayton Research Institute (UDRI), and the Air Force Research Laboratory (AFRL) to provide reliable and dependable material removal tools for military and commercial aircraft maintainers.

EnduroSharp tools are approved for use by the U.S. Air Force, Marine Corps and Navy and military organizations of many other nations.

Performance Plastics is a Pexco company. Headquartered near Atlanta, the Georgia-based Pexco is a custom precision injection molder of high-performance, tight-tolerance thermoplastic components. It specializes in geometrically complex precision parts that consist of chemically inert materials. The company's

expertise led to the development of the patented EnduroSharp line of aircraft maintenance tools.

*For more information, visit [www.endurosharp.com](http://www.endurosharp.com).*

## Streamlight Unveils Brighter Tactical Light



The high-performance lighting maker Streamlight has introduced the ProTac HL6, the newest and brightest addition to its line of tactical lights.

The ProTac HL6 features a multi-function, easy-access head switch that allows for one-handed operation of the light's momentary, variable intensity or strobe modes. It also has an anti-roll face cap and a sure-grip rubber sleeve.

The system includes a charge cord and two Streamlight SL-B48 5000 milli-Amp-hour lithium-ion rechargeable battery packs with an integrated USB-C charge port.

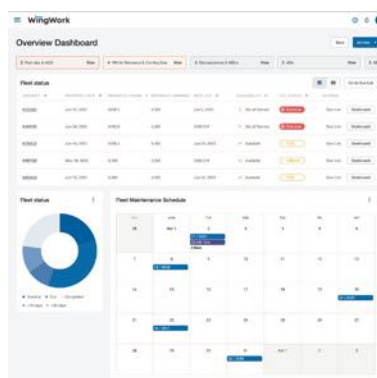
"The ProTac HL 6 is like a handheld flood light, allowing users to see all around them while also providing a powerful beam reach to put more light on a target at a distance," said Michael F. Dineen, chief revenue officer of Eagleville, Pa.-based Streamlight. He said it is the ideal light for many uses, including troubleshooting repairs under low-light conditions.

The ProTac HL6's high setting delivers up to 5,300 lumens and 80,000 candela over a range of more than 1,850 feet (566 meters). On medium, it produces 1,500 lumens, 23,000 candela and a 990-foot-plus (303-meter) beam distance. On low, the light provides 450 lumens and 6,700 candela over nearly 540 feet (164 meters). Streamlight said the ProTac HL6 can run for 12 hours and 30 minutes on low to two hours on high; in strobe mode, the light can run for four hours.

The ProTac HL 6 measures 10.5 inches (26.7 centimeters) in length and weighs 1.3 pounds (0.6 kilograms) with two SL-B48 rechargeable batteries. It is rated IPX7, making it waterproof to one meter for 30 minutes. The light also is impact resistance-tested to 3.28 feet (one meter). It comes with Streamlight's limited lifetime warranty.

*For additional information, call +1-800-523-7488, visit [streamlight.com](http://streamlight.com) or connect on [facebook.com/streamlight](https://www.facebook.com/streamlight), [Instagram.com/streamlightinc](https://www.instagram.com/streamlightinc) or [LinkedIn/company/streamlight-inc](https://www.linkedin.com/company/streamlight-inc).*

## New Part 91, 135 Maintenance Tracking Software



Miami-based WingWork has launched its cloud-based maintenance tracking platform for Part 91 and 135 mechanics.

With a modern, intuitive interface, the WingWork platform is designed for ease-of-use and comprehensiveness, the company said, allowing operators to spend more time fixing and less time

clicking. The initial launch has features covering maintenance tracking, work orders, inventory control, invoice generation, logbook ingestion and data entry. WingWork said its goal is to empower operators to better forecast maintenance events and associated costs, reducing downtime spent servicing their aircraft.

WingWork said it tapped a team of 50-plus industry advisors, including maintenance personnel at operators and seasoned aviation experts, to develop the platform.

"Our network of advisors has been a crucial element to our success," said CEO Matt Castellini. "They give us invaluable feedback on building a world-class tool to power the modern aircraft mechanic."

The WingWork team plans further product expansion driven by customer feedback.

"The maintenance industry is ready for a 21st-century solution that will utilize cutting-edge technology widely adopted in other industries," WingWork chief technology officer Karthik Srinivasan said. "We want to develop best-in-class software to help the maintenance industry make the transition from relying on manual processes to harnessing the power of next-generation technology." For more information, visit [www.wingwork.com](http://www.wingwork.com).

## PWI Gets PMA for Citation LED Step Lights



Wichita, Kan.-based PWI, Inc. is bringing the long life and low power-draw efficiency of LEDs to Cessna Citation jet steps with its receipt of PMA on components for that Textron Aviation series of aircraft.

The Citation models covered by the PMA include the Citation II, the 550 Bravo, the S550 II/SP, the Citation V 560, the Excel 560XL and the 650, as well as the Citation III, VI and VII.

The new LED step light replaces the original incandescent step lights in the door of the Citation (part number 6900163-000 and Textron part number 1021LIGHT). No aircraft modifications are required, according to PWI. It says the single PWI LED part number (6910163-003) simply screws into the steps using the original mounting holes. The installation reuses the original aircraft lighting wiring and runs on the aircraft-supplied 28 volts. All PMA-approved LED cabin lighting systems have a three-year PWI warranty.

The door-mounted step light is designed to resist cabin ingress and egress wear-and-tear. The new design uses impact-resistant polycarbonate lens material to deliver long-term durability. It also offers greater liquid and contaminant resistance to such common elements as deicing fluid, rain, snow and mud, PWI said.

"This new LED step light puts a nice touch on one of the first things you notice when entering the cabin: the doorsteps," said PWI president and CEO Robi Lorik. The PMA installation "adds a level of safety and convenience that passengers appreciate before they are seated."

*PWI has been an original equipment manufacturer of fluorescent cabin lights for the Citation as well as other business jets (Dassault Falcons, Gulfstreams, Challengers and Learjets) and*



*King Air turboprops for decades. PWI FAA-approved LED aircraft lighting upgrades can be purchased direct or through its authorized dealer and distribution network. Contact PWI at +1-316-942-2811 or [sales@pwi-e.com](mailto:sales@pwi-e.com).*

## Skyservice Targets G280 Gogo Galileo STC

Skyservice Business Aviation is developing an STC to install Gogo's Galileo HDX on Gulfstream G280s by early 2025, giving operators access to the latest high-speed in-flight internet solutions.

"The demand for reliable, high-speed in-flight connectivity is higher than ever," said Skyservice president and CEO Benjamin Murray. "Our development of this STC for Gogo Galileo HDX is a direct response to meeting that demand with cutting-edge solutions." There are about 240 of the popular super-midsize G280 in operation worldwide, the company said.

Gogo Business Aviation's latest innovation, Gogo Galileo is designed to provide operators worldwide with global, high-speed, in-flight internet and low-latency performance for business aircraft from light jets and turboprops to the largest business jets. The compact HDX aims to leverage Eutelsat OneWeb's enterprise-grade low-Earth-orbit (LEO) satellite network, which is designed for mobility to deliver low variability and consistent performance across all routes globally.

Mississauga, Ontario-headquartered Skyservice aims to get the G280 Gogo Galileo HDX STC validated by Transport Canada Civil Aviation (TCCA), the FAA, the European Union Aviation Safety Agency (EASA), the National Civil Aviation Agency of Brazil (ANAC) and the U.K. Civil Aviation Authority (CAA).

Operators can contact Skyservice ([www.skyservice.com](http://www.skyservice.com)) to submit a purchase order for the Galileo HDX, which is designed to be an easy upgrade to any AVANCE system (AVANCE L3, L5, LX5, SCS). Installations are planned for 2025's first quarter. A special promotional rebate of \$25,000 is also available for a limited time to current Gogo customers operating a legacy air-to-ground system (ATG 1000, 2000, 4000, 5000) when installing AVANCE SCS and HDX, Skyservice said.

## AvAir Broadens Lufthansa Technik Component Pact

AvAir has broadened its partnership with Lufthansa Technik Component Services, acquiring more than 1,600 overhauled wheels and brakes from the German MRO's excess inventory.

Chandler, Ariz.-based AvAir's inventory acquisition includes components for Bombardier CRJ700s and 900s, Embraer E190s and the complete range of Boeing and Airbus models, including the 787 and A350. AvAir said all parts are serviceable and come from Lufthansa Technik's material pool and aircraft teardowns. Their transfer from Lufthansa Technik facilities in Germany to AvAir's Chandler warehouse is expected to be complete by early

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February 2025.

The transferred material from this transaction is to come with dual or triple release certification (the FAA, EASA and/or the Civil Aviation Administration of China) from Lufthansa Technik and with a 12-month warranty, AvAir said. Most parts were maintained by Lufthansa Technik's

component maintenance, repair and overhaul organization.

"We are thrilled to expand our inventory with such a diverse range of wheels and brakes, enhancing our offering for our customers," said AvAir president Brandon Wesson. "Our partnership with Lufthansa Technik has been invaluable, and we look forward to the new opportunities this acquisition will bring."

The companies established their long-term aftermarket sales agreement in 2020, with AvAir acquiring more than 9,000 line-replaceable units from Lufthansa Technik's global material pool. In 2022, AvAir expanded its inventory by purchasing 9,000 more aircraft components.

Lufthansa Technik is to receive a share of proceeds from resold components under a profit-share arrangement.

*For more information about AvAir, visit [AvAir.aero](http://AvAir.aero).*

## DHL Express Building New Maintenance Base

DHL Express in October began constructing a state-of-the-art facility and expanded aircraft apron in its global hub at the Cincinnati/Northern Kentucky International Airport (KCVG) to improve the express shipper's ability to maintain its Boeing 737, 767 and 777 fleets.

The 305,000-square-foot (28,335-square-meter) facility in Covington, Ohio, will enable more efficient repairs, reducing aircraft downtime and improving service reliability to support

timely customer deliveries, the company said. It is to include a hangar that accommodates two 777s or four 767s. The facility is also to have a ground service equipment staging area, underground foam containment, a loading dock and service entrance, backup generator capability, HAZMAT storage, a large water tank, offices and employee parking.

The expanded apron, covering 50 acres (20.2 hectares), will include eight new aircraft gates and three new maintenance gates. That will allow DHL to accommodate more aircraft and handle a larger volume of shipments.

The \$292-million facility is expected to be fully operational by January 2026.

DHL's KCVG hub currently operates on 194 acres (78.5 hectares) with 67 aircraft parking gates and 6.4 million square feet (594,579 square meters) of ramp area. The heart of DHL Express' Americas network, it handles 117 daily flights and a fleet of 64 aircraft and connects customers from more than 220 countries and territories worldwide to every corner of the U.S. KCVG is one of three DHL global superhubs, with the others in Hong Kong and Leipzig, Germany.

"Over the last several years, we have been enhancing our network capabilities with newer and more fuel-efficient aircraft," said Rob Hyslop, EVP Global Aviation, DHL Express. "This new facility complements those efforts with additional space for more aircraft to be maintained at the same time."

DHL expects to hire 300 more employees to support the new maintenance facility as part of a recently developed joint venture between DHL Express and Kalitta Air, a long-time DHL service partner. Kalitta Air and DHL will jointly oversee the critical aircraft maintenance activity at the new facility. **AM**





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# Securing Defense Information: CMMC 2.0's Impact on Cybersecurity Requirements

By Frank Balonis



**T**he Department of Defense has established a critical one-two regulatory punch for protecting sensitive defense information through its Cybersecurity Maturity Model Certification 2.0 Program. The first component, 32 CFR Part 170, takes effect December 16, 2024, with the second component, 48 CFR Part 204, following in 2025. This coordinated regulatory approach addresses a stark reality: malicious cyber activity costs the U.S. economy between \$57 billion and \$109 billion annually, with the defense industrial base facing persistent targeting from sophisticated threat actors.

The Council of Economic Advisors calculates these attacks could burden the U.S. economy with up to \$1.09 trillion in costs over a decade. To combat this threat, CMMC 2.0 creates new requirements for more than 220,000 defense contractors who process, store, or transmit sensitive defense information. 32 CFR Part 170 establishes the program structure and security standards, while 48 CFR Part 204 implements contractual mechanisms through the Defense Federal Acquisition Regulation Supplement.

## Three-Year, Four-Phase Implementation for Defense Contractors

CMMC 2.0 establishes three distinct control levels based on information sensitivity. Level 1 requires 15 basic cybersecurity controls from FAR 52.204-21 for protecting Federal Contract Information, focusing on fundamental practices like access control and basic system security. Level 2 mandates all 110 security requirements from NIST SP 800-171 Rev 2 for protecting Controlled Unclassified Information, encompassing comprehensive controls across 14 domains including access control, incident response, security assessment, and system integrity. Organizations must achieve a minimum score of 88 out of 110 points. Level 3 builds upon Level 2 by requiring a perfect score of 110 on NIST SP 800-171 Rev 2 controls plus 24 additional enhanced security requirements from NIST SP 800-172, including advanced threat monitoring, 24/7 security operations center capabilities, and cyber incident response teams that can deploy within 24 hours.

The DoD's implementation strategy spans four distinct phases over three years:

- **Phase 1: Initial Implementation**
- Begins at 48 CFR Rule Effective Date.
- Where applicable, solicitations will require Level 1 or 2 Self-Assessment.
- DoD estimates 1,104 small businesses will participate in this initial

phase, allowing organizations to adapt to new requirements while limiting broader impact.

- **Phase 2**
- Begins 12 months after Phase 1 start.
- Where applicable, solicitations will require Level 2 Certification with assessments conducted by CMMC Third Party Assessment Organizations (C3PAOs).
- Projected 673 C3PAO certifications during this phase, enabling the assessment ecosystem to mature methodically.
- **Phase 3**
- Begins 24 months after Phase 1 start.
- Where applicable, solicitations will require Level 3 Certification.
- During this phase, DoD projects completion of 2,252 C3PAO certification assessments.
- **Phase 4: Full Implementation**
- Begins 36 months after Phase 1 start.
- All solicitations and contracts will include applicable CMMC Level requirements as a condition of contract award.
- Annual C3PAO assessments will reach 4,452, covering approximately 20,395 small entities and 9,148 large entities.

## Understanding the CMMC 2.0 Certification Verification Process

CMMC certification scoring varies by level, with each tier requiring progressively more rigorous verification by C3PAOs. Level 1 employs a straightforward met/not-met scoring system for its 15 basic safeguarding requirements from FAR 52.204-21. For Level 2, organizations must achieve a minimum score of 88 out of 110 possible points based on NIST SP 800-171 Rev 2 security requirements, while Level 3 demands a perfect Level 2 score plus successful implementation of 24 additional enhanced security requirements from NIST SP 800-172.

C3PAOs, accredited by the CMMC Accreditation Body, serve as the primary assessors for Level 2 certifications, conducting comprehensive evaluations that have replaced the previous self-attestation model. During assessments, C3PAOs examine both technical implementations and organizational processes, including detailed reviews of system configurations, security policies, operational procedures, and control implementations. The assessment process includes documentation review, system testing,

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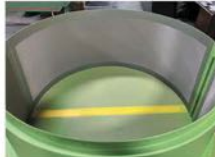
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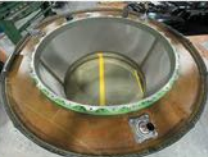
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personnel interviews, and direct observation of security practices.

The CMMC Accreditation Body maintains oversight of C3PAOs by establishing assessment standards, monitoring performance, and ensuring consistent evaluation methodologies. Additionally, the Defense Industrial Base Cybersecurity Assessment Center provides another layer of quality control by conducting regular evaluations of C3PAO capabilities and performing high-priority assessments. Organizations seeking certification must submit assessment results and maintain current status in the Supplier Performance Risk System, with a senior company official required to affirm continued compliance annually or when security changes occur. If deficiencies are identified during assessment, organizations may achieve conditional certification through Plans of Action and Milestones (POA&Ms), which must address permitted gaps within 180 days.

## 180-Day Conditional Certification Pathway for Addressing Security Gaps

CMMC 2.0 permits limited use of Plans of Action and Milestones (POA&Ms) for Level 2 and 3 certifications. Organizations meeting minimum scoring requirements can achieve conditional certification by addressing permitted deficiencies within 180 days. This flexibility supports transition while maintaining security standards. POA&Ms must address specific remediation timelines, resource requirements, and technical solutions for each identified gap.

## Governance and Supply Chain Obligations

The regulations establish clear contractual implications through 48 CFR Part 204, expected to be published in 2025. Contractors must achieve their required CMMC level before contract award. Contracting officers cannot award contracts, exercise options, or extend performance periods without verification of current certification. Prime contractors must validate subcontractor compliance based on the sensitivity of information in the supply chain, ensuring security requirements flow down appropriately.

The certification ecosystem includes several oversight components. The CMMC Accreditation Body establishes assessment standards and monitors C3PAO performance. The Cybersecurity Assessor and Instructor Certification Organization manages training programs and maintains certification standards. The Defense Industrial Base Cybersecurity Assessment Center conducts high-priority assessments and validates C3PAO capabilities through regular evaluations.

## Oversight Framework

Organizations must submit assessment results and maintain current status in the Supplier Performance Risk System. A senior company official must affirm continued compliance annually or when security changes occur. The DoD requires current certification or self-assessment results for each contractor information system processing sensitive defense information, with specific documentation requirements for system boundaries and security implementations.

CMMC 2.0's dual regulatory framework creates comprehensive cybersecurity enhancement across the defense industrial base. The phased implementation balances security imperatives with practical considerations about industry readiness and assessment capacity. As both regulations take full effect, they establish increasingly robust protection for sensitive defense information while maintaining supply chain vitality. Organizations must prepare now for these mandatory requirements, understanding that certification

will soon determine their ability to compete for defense contracts involving protected information. [AVM](#)

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## 10 Compliance Essentials for Cybersecurity and Data Protection

*In today's complex regulatory environment, organizations must keep pace with diverse, often stringent security and privacy requirements. Here are 10 key compliance areas companies should prioritize to bolster defenses and reduce regulatory risks:*

- 1. Navigate Complex Regulations:** Regulatory landscapes, including GDPR and HIPAA, demand strict data protections tailored by industry and region, requiring continuous monitoring and adaptation.
- 2. Create a Data Inventory and Classification System:** Establishing a detailed inventory helps identify and categorize sensitive data, allowing for targeted protections across data life cycles.
- 3. Adopt Strong Data Protection Practices:** Implement technologies like encryption and access controls to secure data during storage and transfer, essential for compliance and security.
- 4. Manage Third-Party Risks:** Mitigate vulnerabilities introduced by vendors through thorough due diligence, routine security audits, and compliance monitoring.
- 5. Develop Incident Response Plans:** Ensure rapid response to data breaches, with protocols for regulatory notification, containment, and recovery in line with GDPR's 72-hour rule and other timelines.
- 6. Follow Data Retention and Deletion Guidelines:** Set policies for retaining data only as long as necessary and securely deleting outdated information to reduce exposure and meet legal requirements.
- 7. Promote Cybersecurity and Privacy Awareness:** Regular training sessions raise awareness among employees, emphasizing the importance of protecting sensitive data and following compliance best practices.
- 8. Enhance Cyber Resilience:** Develop business continuity and disaster recovery plans to sustain operations during cyber incidents, incorporating regular drills to test and improve resilience.
- 9. Maintain Governance Through Audits and Reporting:** Routine audits and transparent reporting practices bolster governance, helping organizations demonstrate compliance and refine security protocols.
- 10. Follow a Comprehensive Compliance Checklist:** Use a regulatory checklist to stay proactive, addressing specific regulations like CMMC 2.0, ensuring continuous improvement in compliance and security readiness.



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