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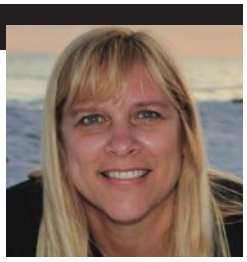

It Can't Be Stressed Enough

BY JOY FINNEGAN
EDITOR-IN-CHIEF

In the closing days of August, a tragedy happened at one of the premier MROs in the world, Delta TechOps. Two people were killed, and another seriously injured, during what should have been a routine procedure in a wheel and brake shop.

Mirko Marweg, 58, of Stone Mountain, Georgia, and Luis Aldarondo, 37, of Newnan, Georgia, were the Delta employees who died. Another employee was injured but not identified. Delta didn't directly state what happened in the incident. But the company did say in a statement, it was "working with local authorities and conducting a full investigation to determine what happened."

A report from Atlanta Fire Rescue contained a written narrative from workers who were there when the situation unfolded. "I heard an explosion behind me and saw my co-workers running away from the direction of the explosion. I realized they were running to get help," the eyewitness report stated. Additionally, the witness reported seeing a body with blood, according to the report.

According to reports, Marweg and Aldarondo were killed just after 5 a.m. while working with wheel components that were being disassembled for maintenance. This work was being done off the aircraft, not on the aircraft. However, a report from Atlanta Fire Rescue listed a narrative from a worker who was there when the situation unfolded. In the report, AFR also said they responded to a "tire explosion."

While this kind of accident is rare, it is important to remember that it can happen any time, to anyone. Even with safety management systems in place, things can go awry quickly. One thing is certain, this event will be thoroughly investigated to determine exactly what happened, where the chain of events broke down and how it can be avoided in the future.

It must have been devastating for all who work there and certainly for those who knew the mechanics who were killed and injured. A Delta spokesperson said counseling will be made available.

Marweg was known in his family as a "Mr. Fix-It" and a loving man who helped all. Marweg's son, Andre Coleman, said in local news reports that he could not believe that this happened to his father and that he would no longer have him by his side. "I'm in a state of shock," Coleman said. "I wanted to view the body because I didn't believe it was true. Neither did my mom." However, when they tried to view the body, the Clayton County Medical Examiner said Marweg's body was "unrecognizable," and they couldn't. It is reported that they identified him by tattoos and the Mississippi State lanyard around his neck. "My dad was an amazing guy, wonderful father, wonderful husband. I just saw him Sunday after I told him I needed an oil change. That's the kind of dad he was. He was always there," Coleman said.

Delta Air Lines said in a statement that the accident involved "aircraft wheel components." It also stated it is investigating. OSHA confirmed it is investigating as well.

Former National Transportation Safety Board member and former airline mechanic John Goglia said in a news interview that he believes the incident could only happen one of two ways: "Either proper procedures failed to be followed, or the tire had weakened from repeated landings and cracked and burst." Goglia said the latter is a "very rare event." "So it's more likely that the procedures were not followed, and a very catastrophic event occurred," Goglia said in the 11Alive news report.

"With at least 200 pounds of nitrogen in that tire, any failure to the wheel halves, it's going to disintegrate rapidly, and it's going to shatter," Goglia said. "So that means small pieces traveling at a pretty good rate of speed, and that's typically the cause of most of the injuries."

Goglia also called airline maintenance a "risky business," and said that the "people that write workers compensation once told me it's among the riskiest jobs that they insure."

John Laughter, president of Delta TechOps, E.V.P. and chief of operations, said this in a letter released to all Delta employees: "I'm deeply saddened to share that three TechOps team members were involved in an accident that took place early this morning in Atlanta TOC 3, Dept. 391 - Wheel & Brake Shop. Tragically, two of our team members involved passed away and one other team member was seriously injured. We are extending our full support to their families at this difficult time and conducting an investigation to determine what happened … Please know your safety and wellbeing comes first — always, and that your leaders are here for you. Please continue to take good care of yourself and one another. We're all in this together, and we'll get through this by supporting each other."

Soon we'll be able to review reports about this incident. A likely contributing factor will be failure to follow procedures (FFP) which is one of the most pervasive human factor issues in aviation maintenance, contributing to a majority of all accidents/incidents, according to the FAA. If you would like to review some information on procedural compliance with your teams, the *FAA.gov* website has some great resources. You can find them at *https://www.faa.gov/about/initiatives/maintenance_hf/procedural_non-compliance* AVM


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to the greatest team in aviation.
Together, you make CFM extraordinary;
the future is in very good hands.
Gaël Méheust
President & CEO, CFM International

Pegasus Airlines Selects Lufthansa Technik for A320 Base Maintenance Services

Pegasus Airlines has chosen Lufthansa Technik to provide comprehensive base maintenance services for its growing Airbus A320 family fleet. The recently signed three-year agreement includes more than 60 checks on A320ceo, A320neo and A321neo aircraft of Türkiye's second largest airline. All contracted services will be performed within a dedicated overhaul line at Lufthansa Technik Sofia.

"The newly concluded contract and thus the long-term intensification of our cooperation with Lufthansa Technik gives us flexibility and at the same time guarantees our high quality standards," said Serife Akın, senior purchasing director at Pegasus Airlines. "With our dedicated overhaul line at Lufthansa Technik Sofia, we are now optimally positioned for the coming years. It supports our goal to be one of the leading low-cost airlines in the industry, streamlining air travel and offering affordable fares to our valued customers."

Marcus Motschenbacher, vice president and chief commercial officer Aircraft Maintenance Services at Lufthansa Technik, added, "We are pleased to offer our customers a top-quality service and to make a valuable contribution to ensuring the stability of their flight operations with reliable overhauls. We already have a close and trustful collaboration with Pegasus Airlines, which enables us to respond individually to their needs, and we are honored to expand our successful business relationship."

The new contract now marks the first ever multi-year agreement between the two partners. Pegasus Airlines also uses solutions from Lufthansa Technik's AVIATAR digital platform for the targeted optimization of its technical operations.

Vittadini Appointed Chairwoman of Lufthansa Technik's Board

At its meeting on September 12, 2024, the Lufthansa Technik Supervisory Board appointed Grazia Vittadini as its new chairwoman. The aviation technology expert takes over from Dr. Detlef Kayser whose term of office ended.

Since July 1, 2024, Grazia Vittadini has served as chief technology officer (CTO) of Lufthansa Group with responsibility for the group's fleet and technology, IT & innovation division and sustainability. Vittadini has made a stellar career in aviation holding several senior positions including CTO of Airbus Group and Rolls-Royce.

"This new role is a privilege for me and I am grateful for the trust. We have big plans for Lufthansa Technik, and I am very much looking forward to working with the executive board and the many thousands of employees to support implementing the 'Ambition 2030' growth strategy and continue the company's success," said Vittadini.

The trained engineer came to Lufthansa Group from Rolls-Royce, London, where she has served as chief technology officer and a member of the executive team. Nearly 20 years, from 2002 to 2021, Vittadini held various positions in a range of locations at Airbus Group. Her duties also ranged from design engineer to production to audit. In 2017 she was appointed executive vice president, head of engineering and a member of the executive committee of Airbus Defense and Space. She was appointed chief technology officer and a member of the Airbus executive committee in the year 2018.

Prior to her Airbus Group career, Vittadini served as a stress and design engineer at Fairchild Dornier in Oberpfaffenhofen and as a focal point for the Eurofighter role equipment program at AEREA Aircraft Equipment of Milan. She began her career in 1998 as head of the technical department at Marves (Milan).

An Italian and German dual national, she holds a master's degree in aerospace engineering, specializing in aerodynamics, from the Politecnico di Milano (Polytechnic University of Milan). She further holds an honorary doctorate in engineering and technology from Cranfield University (U.K.).

AFI KLM E&M Announces Key Leadership Appointments

Air France Industries KLM Engineering & Maintenance (AFI KLM E&M) announced several strategic leadership appointments designed to further enhance the group's organization.

Effective September 1, 2024, Michael Grootenboer has been appointed as SVP procurement for the Air France-KLM Group, after six years as SVP group engine product at AFI KLM E&M. He is succeeded by Jean-Louis Forest, who was serving on the role of

SVP engines at Air France Industries.

Bruno Tricoire, recently SVP group components product, replaced Jean-Louis Forest. Tricoire's strong background in component and airframe maintenance, including his tenure as CEO at iGO, will be instrumental as he returns to the engine domain, where he previously contributed as product sales director.

In parallel, Derk Nieuwenhuijze has been appointed as VP technical sales and commercial performance as part of the E&M Commercial Organization (EMCO). In this role, he will oversee AFI KLM E&M's department responsible for creating proposals and contracts with customers worldwide, as well as further developing their commercial organization.

"These strategic appointments reflect our commitment to leveraging internal expertise and experience to drive our organization forward. We are confident that Michael, Jean-Louis, Bruno and Derk will excel in their new roles and contribute significantly to our ongoing success. Our focus remains on maintaining our leadership position in the MRO industry and ensure excellent service to our clients despite difficult challenges in the market," said Anne Brachet, EVP Air France-KLM engineering & maintenance.

Two Killed in Delta TechOps Accident

The Atlanta-based wheel and brake shop of Delta TechOps experienced a tragedy in late August when two workers were killed and a third was seriously injured during a maintenance procedure.

The accident happened at the Delta TechOps maintenance facility near the international terminal at the Atlanta Hartsfield-Jackson Intl. Airport, in the early hours of Tuesday morning, August 27, 2024. Atlanta Fire & Rescue, as well as police, came to the scene just after 5 a.m.

Reports say the incident involved components of an aircraft wheel in the shop. The wheel was not attached to an aircraft, Delta said. The company released very few details. But the two people who were killed were reported to be Mirko Marweg, 58, and Luis Aldarondo, 37, according to the Clayton County Medical Examiner's office.

In a memo to workers after the accident, John Laughter, president of TechOps said, "We are extending our full support to their families at this difficult time and conducting an investigation to determine what happened." Delta said it is working with OSHA and the FAA to investigate. "We are committed to sharing and addressing any significant findings to prevent an incident like this from ever happening again," Laughter said.

Mirko Marweg was a man of exceptional technical abilities who could fix almost anything, according to his son, Andre Coleman. Coleman said he lovingly restored a '64 Chevy Impala and enjoyed do-it-yourself improvement projects around his home. Marweg was helping out on his day off when the incident occurred. Normally he worked in the paint shop. Marweg was a U.S. Air Force veteran and is survived by four children and his wife of 28 years, Scottie Ann.

Luis Aldarondo, who also died in the incident in August, was memorialized on his home island of Puerto Rico.

IS&S Gains FAA Approval for EICAS for its Flat Panel Display System

Innovative Solutions & Support (IS&S) now offers an FAA certified digital Engine-Indicating and Crew-Alerting System (EICAS) Display System as an enhancement for its B757/B767 Flat Panel Display System (FPDS). IS&S says the EICAS upgrade simplifies the flight deck, resolves ongoing CRT obsolescence issues, reduces weight by an additional 40 pounds, improving fuel savings and power consumption and is easily installed with minimum downtime due to its design approach. Installations have begun with launch customers.

The IS&S EICAS Display System adds a center 10.4-inch LCD that is the same part number as the displays in the FPDS and two (2) scan converter modules that plug directly into the existing CRT connectors. Rapid installation is ensured by a modified center cockpit panel and an EICAS display mounting plate. There are minimum training differences as the new single IS&S display will provide the current CRT EICAS information with additional display space in the forward field of view for customized warning annunciations. The IS&S EICAS Display system also provides a reversionary display on the navigation display of the FPDS.

"As the trend of reconfiguring B757/B767 aircraft for cargo operations continues, these planes offer a cost-effective solution for both legacy carriers and newer operators expanding their air cargo platforms. The addition of an EICAS display to the IS&S system enhances the FPDS, delivering improved economy, safety benefits, and unmatched reliability," stated Larry Riddle, vice president of commercial sales and marketing.

Jozic Publishes Book on Avionics in the Golden Years

Avionics expert Marijan Jozic has published a book called "In Aviation Engineering: Navigating Through the Golden Years," in which he candidly shares his journey through the world of avionics. The book covers the 40-year period between 1980 and 2020 and he discusses his experiences, observations, challenges faced, obstacles overcome and the lessons learned throughout that time, as he led his teams through the ever-changing environment of avionics in the aviation industry.

Jozic has worked in avionics engineering and maintenance for more than 40 years. He began his career with KLM Royal Dutch Airlines in 1980 and held the positions of project manager for several avionics fleet-wide projects, program manager for fleet-wide avionics projects and all modification programs for the KLM fleet. Jozic was awarded the Volare Award at the Avionics Maintenance Conference (AMC) in 2004. At KLM, Jozic and his avionics engineering group received the Total Quality Performance award for the Avionics Master Plan Project. Jozic served as chairman of the AMC for seven years. In 2017, Jozic received the Roger S. Goldberg Award for endless passion for avionics maintenance. Jozic also received the "Man of the Decade Award," in recognition for his contributions to air transport industry. The award was presented at the 70th Annual Avionics Maintenance Conference in April of 2019.

The insights provided in the book include team building and leadership, and can be beneficial for any stage of any career path. "Who else could be most qualified to write a book about the golden years of aviation than Marijan Jozic? From the bowels of electromechanical instrumentation to the latest flight management computers, from the 'steam gauges' to LCD and Head Up displays, Marijan has seen, designed and managed their implementation. Thus then, who best to lead you in a journey through those golden years," said Randolph Johnstone PhD, former Boeing associate technical fellow.

Currently, Jozic serves as director of European operation at OctonX, an affiliate of SAE ITC, representing SAE ITC in Europe. His book can be purchased on the SAE website: books.sae.org.

Andy Graham Joins Aerogility as Chief Commercial Officer

AI-based digital simulation twin solutions provider, Aerogility, announced the appointment of Andy Graham to its executive leadership team, as chief commercial officer.

In his new role, Graham will focus on expanding Aerogility's global coverage and brand and work with customers to enhance the Aerogility products and value proposition and achieve the company's growth targets for 2025 and beyond.

With a career spanning more than 32 years, Graham brings a wealth of experience, leading teams to achieve commercial goals and drive significant growth for top aviation technology businesses like Mxi/IFS, flydocs, and QOCO Systems.

"I have been following Aerogility's success for several years now, and I have always been impressed with the innovation and quality of the company's products," Graham said. "Many of the world's leading airlines and defense companies work with Aerogility — and together with the high caliber Aerogility team — made it an easy decision to join the company. AI is talked about by many players in the industry, and it is refreshing to see it being implemented for customers and delivering immense value."

Graham's appointment comes at a pivotal time, the company says. The aviation ecosystem faces many challenges and Aerogility says it continues to work with its customers "to innovate, leverage data and deliver deep insights for enhanced asset availability and the management of operational performance."

Gary Vickers, CEO of Aerogility, added, "Andy's extensive experience and leadership in the aerospace sector is a tremendous benefit to us. His deep understanding of the issues and challenges facing our customers and his ability to translate this into strategic opportunities aligns perfectly with our vision for the future growth and success of Aerogility."

AFI KLM E&M and Parker Aerospace Group Deploy SkyThread's Blockchain-Based Aircraft Parts Track and Trace Platform for 787 Fleet

Air France Industries KLM Engineering & Maintenance and Parker Aerospace have achieved the first rollout of a back-to-birth track and trace of aircraft parts using SkyThread for Parts data sharing platform.

This milestone follows last year's announcements that both companies would collaborate with SkyThread to ensure enhanced visibility and a complete event history throughout the life cycle of aircraft parts on and off the aircraft. The first go-live has now been reached on the 787 platform, with hundreds of thousands of parts being actively tracked and traced using the SkyThread data sharing platform.

The aircraft parts track and trace solution from SkyThread enables AFI KLM E&M to have access to the history of each new and repaired Parker aircraft part, from its inception (new) to its installation on and removal from the supported 787 fleet. This will significantly reduce the number of inbound quarantined parts, streamlining the maintenance processes and ensuring uninterrupted operations.

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Similarly, for Parker, this solution ensures that serialized part data are easily accessible and traceable, both on and off aircraft. The company says this enables reductions in repair turnaround and other response times, as well as enhances supply chain performance through better demand planning for spares and repair volumes.

The two companies, together with SkyThread, expect to further grow their coverage and usage of the platform. More entities will join the platform to continuously add part event data leading to additional value for all parties of the community involved.

Both companies have begun loading data for more than two million aircraft part events to the platform — part birth, installation and removal, component repair and logistics.

StandardAero Provides CFM LEAP-1B Support to Leading Turkish and European Boeing 737 Operator Corendon Airlines

StandardAero has signed a non-exclusive agreement with Turkish operator Corendon Airlines to provide CFM International LEAP-1B engine services in support of the carrier's fleet of Boeing 737 MAX 8 aircraft. Corendon joins the growing list of operators to rely on StandardAero's new LEAP-1A and LEAP-1B maintenance, repair and overhaul (MRO) line established at its San Antonio facility in Texas.

StandardAero has already inducted Corendon's first LEAP-1B engine, for a Continued Time Engine Maintenance (CTEM) shop visit. In addition to the LEAP-powered MAX fleet, Corendon also operates Boeing 737-800 jets powered by CFM56-7B engines. This new agreement extends StandardAero's existing relationship with Corendon on the CFM56-7B.

"StandardAero is proud to have been entrusted by Corendon Airlines to provide LEAP-1B MRO services, adding Türkiye to our growing list of LEAP-1A and LEAP-1B customer nations," said Will Pitcher, senior vice president of sales, marketing and customers for StandardAero's Airlines & Fleets division. "We value the confidence shown by Corendon in our San Antonio-based LEAP team, and look forward to meeting the service expectations of Corendon and its passengers for many years to come."

StandardAero recently announced LEAP-1B correlation approval for the first test cell in its San Antonio test complex.

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 industrialized more than 230 component repairs for the LEAP-1A and LEAP-1B.

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Sabena technics Inks Deal With Airbus Defense and Space for Maintenance of French Air Force's Fleet of MRTT Phénix Aircraft

Sabena technics group will operate as a subcontractor to Airbus Defense and Space, on the Istres air base, close to the French Air Force, for a period of 12 years, covering a broad spectrum of services. The proximity to operational staff on-site will guarantee the best availability of this strategic fleet for the Direction de la Maintenance Aéronautique and the French Air Force.

After a brief stint at its Nîmes facility, Sabena technics will be moving to the Mercure hangar at the Jean Sarrail aeronautical center in Istres, closer to the operational staff, to carry out the following maintenance tasks:

- Scheduled maintenance visits every 6 and 12 years, as well as lower-level visits on request.
- Managing unscheduled maintenance work at very short notice and modification work on request.
- Maintenance of medical emergency kits.

Sabena technics will also supply the MRTT at the Aeronautical Technical Support Squadron (Escadron de Soutien Technique Aéronautique MRTT) at Istres Air Force Base 125:

- A one-stop service for the distribution of spare parts and tooling directly to Air Force and Space Force mechanics, up to 24 hours a day, and 7 days a week.
- Tire exchange and battery charging service.
- Support for Air Force and Space Force mechanics in the implementation and maintenance of MRTTs.

Sabena technics will also be able to carry out repairs on demand anywhere in the world.

"We are delighted and proud that Airbus Defense and Space has chosen Sabena technics to maintain the Air Force's strategic MRTT fleet in operational condition. Sabena technics, a long-standing partner of the French Ministry of the Armed Forces, has extensive experience in the maintenance of French Government tanker aircraft. Our teams of experienced specialists, constantly striving for flight safety and operational performance, will be fully committed to providing a service that lives up to the expectations of Airbus Defense and Space, and of the end customer, the French Air Force," says Philippe Rochet, chairman of the Sabena technics group.

Gulfstream Customer Support Completes Savannah Service Center Expansion

Gulfstream Aerospace Corp. announced the official opening of its expanded Customer Support service center at Savannah/Hilton Head International Airport in July. Savannah Service Center East has added more than 200 new jobs and significantly expands Gulfstream's maintenance, repair and overhaul facility capabilities in the region.

To mark the occasion, state and local dignitaries, community partners, and Gulfstream leaders and employees gathered at a ribbon-cutting ceremony to officially dedicate the new space.

"We continue to expand and enhance our service capabilities in support of the continued growth of Gulfstream's next-generation fleet including the recently certified G700," said Derek Zimmerman, president, Gulfstream Customer Support. "The Savannah Service Center East expansion is part of our long-term strategic plan to create the industry's most modern and sustainable service network, while significantly enhancing access and convenience for our customers."

Gulfstream has invested more than $150 million in the 367,000-square-foot/34,000-square-meter facility located on the east side of the airport. The new building complements the main Savannah Service Center by adding more hangar space, offices and back shops, all optimized for efficiency. This additional space allows Gulfstream to accommodate up to 26 more aircraft at any given time.

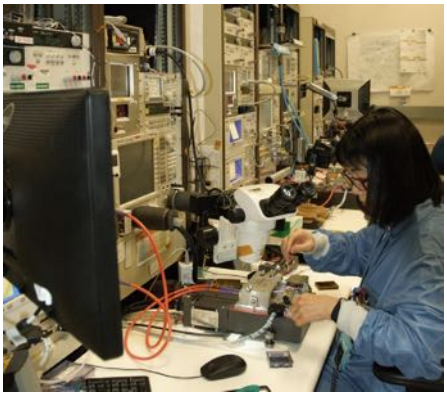
Gulfstream expects Savannah Service Center East to receive U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Silver certification for recycling at least 75% of construction waste and for its sustainable features which include energy-efficient lighting, enhanced control systems for heating and cooling, optimized energy performance, low-emitting building materials, water-saving fixtures, electric vehicle charging stations and preferred parking for low-emission vehicles.

Originally announced in 2018, the multiphase Savannah Service Center East expansion brings Gulfstream's total Savannah service footprint to over 1.1 million sq ft/102,000 sq m. Combined, Gulfstream's Savannah service centers have a total of 10 hangars and the capacity to accommodate more than 85 Gulfstream aircraft at one time.

"Savannah, home to Gulfstream's worldwide headquarters, is now our largest global service center location — this expansion ensures our dedicated team is equipped with the resources needed to further support our customers who are visiting this great city from around the world," said Zimmerman.

Gulfstream Customer Support's modernized service network also includes new facilities in Van Nuys, California; Appleton, Wisconsin; Fort Worth, Texas; Palm Beach, Florida; Farnborough, England; and the upcoming completion of the all-new Mesa, Arizona, service center.

Honeywell Completes Acquisition of CAES



Honeywell completed its acquisition of CAES Systems (CAES) from private equity firm Advent International for approximately $1.9 billion in an all-cash transaction. The acquisition enhances Honeywell's defense technology solutions across land, sea, air and space and is also expected to create favorable tailwinds for growth across Honeywell's Aerospace Technologies business.

CAES expands Honeywell's current defense and space portfolio with scalable offerings that enable Honeywell to both increase production and upgrade positions on critical platforms that include F-35, EA-18G, AMRAAM and GMLRS. Honeywell will also benefit from the ability to introduce its existing offerings on new platforms, such as the Navy Radar (SPY-6) and UAS and C-UAS technologies.

"Honeywell's acquisition of CAES builds on our leading position in defense technologies, while also strengthening and expanding the solutions and capabilities we can offer across multiple critical military platforms," said Jim Currier, Honeywell Aerospace Technologies president and CEO. "Together with CAES, we will continue to set the standard for excellence in the industry and deliver specialized solutions that will keep our customers at the forefront of innovation."

CAES marks the fourth transaction Honeywell has announced this year as part of its disciplined capital deployment strategy. It follows Honeywell's recent completion of its acquisition of Carrier's Global Access Solutions business in June 2024. The company says it is focused on high-return acquisitions that will drive future growth across its portfolio, which is aligned with the three compelling megatrends of automation, the future of aviation and energy transition.

Textron Aviation Earns FAA Approval for SMS in Aircraft Design and Manufacturing

Textron Aviation Inc., a Textron Inc. (NYSE: TXT) company, today announced that the company has received Federal Aviation Administration (FAA) approval of the company's new Safety Management System (SMS) implementation plan to support the design and manufacturing of Cessna and Beechcraft aircraft. This approval builds on the company's previously FAA-accepted and approved SMS program supporting the maintenance and support of iconic Cessna and Beechcraft aircraft, and underscores the company's dedication to maintaining the highest standards of product quality at every level of operations.

"With a long-standing commitment to safety and quality in manufacturing, Textron Aviation has been designing and manufacturing industry-leading Cessna and Beechcraft aircraft for more than 95 years," said Todd McKee, senior vice president, Integrated Supply Chain. "This FAA approval is a testament to our commitment to product safety at every level of operation. Together, we are setting new standards in the aviation industry, ensuring that safety and quality are at the forefront of everything we do."

A Safety Management System is a systematic approach to managing product safety, encompassing organizational structures, accountabilities, policies and procedures. Textron Aviation's new SMS program includes a voluntary reporting tool that allows employees, customers or suppliers to anonymously report aircraft quality risks or hazards directly to the company's SMS committee. This committee evaluates the risk based on the information provided, investigates the causes and plans a response. Based on the findings and solutions, processes and tools are updated, ensuring continuous improvement in safety and quality standards.

"By integrating the insights and expertise of our employees, customers and suppliers into our SMS, we not only enhance our ability to identify and mitigate risks but also strengthen the collaborative continuous improvement of our products and services," said Chris Hearne, senior vice president, Engineering. "This collaborative approach is in line with our mission to empower our collective talent to design and deliver the best aviation experience for customers."

Textron Aviation recognizes the importance of leveraging the diverse perspectives and expertise of its employees and stakeholders to effectively address potential challenges and enhance overall safety and operational performance. By fostering a culture of open communication and teamwork, Textron Aviation encourages all parties to participate actively in identifying risks or hazards and to work together to develop innovative solutions.

SR Technics Appoints Leforestier SVP of Procurement

SR Technics appointed Florent Leforestier to the role of senior vice president of procurement at SR Technics, effective September 1, 2024. He succeeded Fritz Beiner, who left the company.

Leforestier brings 20 years of experience in the aerospace industry, with more than a decade spent at SR Technics supporting the engine MRO activities. During his tenure, he has managed customer services, product development and most recently, led the industrialization of the GTF and LEAP engine programs.

Michael Brunnschweiler, currently VP of programs, will assume the role of VP of New Engines effective September 1, 2024, to continue the successful implementation of the new engine platforms, GTF and LEAP. Michael has been with SR Technics since April 2024 and spent 19 years of service with Pratt & Whitney, most recently as Regional Manager GTF Europe & America.

"Our talent management program and our commitment to our employees has yielded two talented successors from within our own ranks," stated Owen McClave, CEO at SR Technics.

"I am excited to take on this role and eager to build on our current successes, leading strategic initiatives that will further strengthen our supply chain and maximize value," said Leforestier.

E-Z LOK Threaded Inserts and Kits for Metal

E-Z LOK, a leading manufacturer and master distributor of threaded inserts for metal, plastic and wood offers E-Z LOK (Solid Wall) threaded inserts for metal, including both Assortment and Installation kits.

E-Z LOK inserts are ideal for repairing or reinforcing threaded holes in soft metals such as aluminum, magnesium and cast iron. External threads are standard size and pitch, so they can be installed with standard drills and taps. Solid wall threaded inserts are installed with a screwdriver, bolt/jam nut (except IC series) or optional power drive tool.

These inserts will not back out or vibrate loose. The pre-applied, microencapsulated adhesive begins to set immediately upon installation and the newly installed insert is fastener-ready in 3-5

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minutes. Despite their firm hold while in use, E-Z LOK (Solid Wall) threaded inserts for metal can be removed with a bolt extractor, which overcomes the resistance to torque-out produced by the adhesive. They can also be removed by heating the insert to a temperature above 300°F (149°C), at which point the adhesive will release.

E-Z LOK inserts are available in Thin Wall, Standard Wall, Extra Heavy Wall, Screw Locking and Automotive designs. They are available in carbon steel and stainless steel. Stainless steel threaded inserts are perfect for applications requiring additional corrosion resistance, as well as food, beverage and other clean-critical applications.

Assortment kits are equipped with inserts in a variety of sizes. They provide an easy-to-store solution for thread repair, giving maintenance teams added convenience. Installation kits are specifically designed to make threaded insert applications and repairs as simple as possible. These feature a drill, tap and installation tool.

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All Nippon Airways Introduces Their First AeroSHARK Aircraft

All Nippon Airways (ANA), Japan's largest airline and renowned for its "FLYING HONU" turtle-themed Airbus A380s, has welcomed another marine life-inspired aircraft to its fleet — its first Boeing 777 equipped with AeroSHARK. This revolutionary surface technology is inspired by sharkskin, reduces drag and enhances fuel efficiency. ANA is the first individual airline to operate both passenger and freighter variants of the Boeing 777 with this innovation.

The first modified Boeing 777F (JA771F) began scheduled cargo flights in September, with plans to extend the AeroSHARK technology to a passenger aircraft (JA796A) by next spring, furthering ANA's commitment to investment in fuel efficient technologies that reduce emissions.

AeroSHARK, a joint development by Lufthansa Technik and BASF, is a functional surface film inspired by the drag-reducing structure of sharkskin. The film features ribs around 50 micrometers in size, called riblets. Closely guided by Lufthansa Technik, ANA's MRO partner has recently applied several hundreds of square meters of these riblet films to the fuselage of JA771F, which re-entered commercial service today with the first AeroSHARK-optimized flight from Tokyo-Narita to Chicago-O'Hare.

Although the riblet modification is almost invisible, it is expected to deliver significant fuel and emissions savings. The contracted Boeing 777F and 777-300ER aircraft will have nearly the entire fuselage covered with the sharkskin-inspired film, resulting in estimated annual savings of approximately 250 metric tons of fuel and 800 metric tons of CO2 for each aircraft.

"The introduction of AeroSHARK technology on our Boeing 777 aircraft marks a significant milestone in our sustainability strategy, in support of our broader goal of reducing carbon emissions across our fleet," said Kohei Tsuji, member of the board, executive vice president, engineering and maintenance center at ANA. "We are proud to be the first airline in the world to implement this innovative technology to both passenger and freighter version of the Boeing 777, reinforcing our dedication to delivering excellence and reducing our carbon footprint."

As ANA begins operations with two Boeing 777 equipped with riblet films, the airline will validate the effectiveness of this technology in ANA's daily operation, with plans to expand its use across other aircraft of the same type. This initiative is part of the ANA Group's medium- to long-term environmental strategy, which includes the broader "ANA Future Promise" initiative aimed at realizing a sustainable society and promoting ESG management.

"Drawing inspiration from nature is deeply rooted in Japanese arts and culture. Therefore, what airline could be a better fit for our nature-inspired AeroSHARK than the world-famous 'Inspiration of Japan'?" said Dennis Kohr, senior vice president corporate sales Asia Pacific at Lufthansa Technik. "We are delighted to extend our long-lasting and fruitful cooperation with All Nippon Airways onto a proven solution to reduce their carbon footprint. I am confident that AeroSHARK will support ANA in becoming an ever-greener 'Inspiration of Japan'."

Lufthansa Technik currently holds Supplemental Type Certificates (STCs) for the AeroSHARK modification of various types of Boeing 777, which is now being adopted by various airlines across the globe. Approximately 20 long-haul aircraft are already operating with the technology in worldwide service, and this number is growing steadily.

BASF and Lufthansa Technik remain committed to further developing AeroSHARK to help more airlines achieve their sustainability goals. Current efforts include expanding approvals to additional aircraft types and covering larger surface areas. Initial model calculations suggest that sharkskin technology could potentially reduce CO2 emissions by up to three percent in its maximum expansion stage.

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By James Careless

ACS image.

PMA PARTS UPDATE: THE INDUSTRY IS STILL BOOMING!

In mid-2023, Aviation Maintenance published an article entitled, 'PMA Parts Market Booming'. A year has passed since then, leading to this update and this question: Is the PMA (Parts Manufacturer Approval) market — which provides FAA-approved third party parts for Original Equipment Manufacturer (OEM) aircraft made by Airbus, Boeing, and others — still booming today?

Well, according to people in the PMA parts industry, the answer is an unqualified yes!

"Yes, the PMA market continues to boom with no end in sight," said James Brooks, owner of Prime Propulsion, an engine and powerplant DER (Designated Engineering Representative) based in Fort Walton Beach, Florida. "The world has continued to embrace PMA and the benefits they bring."

"The PMA market is still flourishing," agreed Debra Whittaker, chief engineer with First Aviation Services of Westport,

Debra Whittaker,
Chief Engineer,
First Aviation Services

James Brooks,
Owner
Prime Propulsion

John Benscheidt,
President
Jet Parts Engineering

Pat Markham,
Vice President
Heico Parts Group

Rod Martinez,
President
ACS

Connecticut, which has been in the PMA business since the 1970s and designed hundreds of PMA parts. "We have seen non-stop growth for the last 15 years, but the last three years have been truly excellent."

"The PMA market is still strong and growing as more airlines around the world discover the benefits PMAs bring to their maintenance operations," said John Benscheidt, president of Jet Parts Engineering in Seattle, Washington, a PMA parts designer and MRO service provider. "As a general data point, Jet Parts Engineering has almost 100 new customers per year that come to us for our parts."

"The PMA market is indeed thriving," concluded Rod Martinez, president of ACS, a supplier of PMA parts. "We're seeing continued robust growth and a vibrant market environment. The demand for PMA products is stronger than ever, and the trend is expected to continue. We have seen new territories and customers emerge with a clear PMA strategy."

What's Driving Industry Growth

In last year's article, we reported that the lower prices of PMA parts, when compared to their OEM counterparts, was one of many factors driving this industry's sales boom. According to the experts, this fact remains true today.

A case in point: "You reported on some of the supply chain challenges last year. That's still very much with us," said Pat Markham, vice president of technical services at Heico Parts Group, a PMA parts manufacturer and MRO located in Hollywood, Florida. "It's a big driver for new customers coming to the PMA community to provide an approved alternative when an OEM part is unavailable. When customers see how well PMA parts work and it's an easy way to save money, they tend to look for more opportunities to use more PMA parts."

"Right now, part availability is a major factor driving PMA purchasing and new part acceptance," Benscheidt said. "Historically, part cost was the driving factor for PMA, but with the continued supply chain delays from the OEMs, turn times are being negatively affected at the MROs. It's hard to pass up a PMA part that's available now — allowing someone to complete an overhaul and bill the airline or get the plane flying again — when the alternative is to wait an additional 60 days for the OEM part to be in stock."

The fact that OEM parts can be hard to source quickly is motivating 'reluctant operators' — aircraft operators who would prefer to use OEM parts if they could get them — to give PMA parts a shot. "A reluctant operator will often use PMAs for the first time when they are in an AOG situation and the OEM is quoting 180, 365, or 500 days," said Whittaker. "Once this operator discovers that the quality, value and availability of PMA parts are excellent, they don't go back to the OEM the next time."

This being said, the lower cost of PMA parts still matters to airlines; especially now when the industry still hasn't fully recovered from Covid-19. "Airlines have been struggling to balance capacity with demand, which is returning the industry to a world where operational excellence and cost control drive their success against competitors," said Benscheidt. "With maintenance accounting for 10-15% of airline operating costs, PMA parts are helping airlines directly impact their financial results, not to mention the readiness of their fleet with part availability."

"The primary factor is cost savings — many airlines are increasingly turning to PMA parts to reduce operating expenses amidst rising OEM prices and labor costs," Martinez said. But that's not all: "Airlines are extending the life cycle of their aging fleets, which has generated significant demand for older parts necessary for ongoing maintenance and repairs. So this combination of cost efficiency and the need to support older aircraft has been pivotal in fueling the continued growth of the PMA parts market."

There's another factor driving success in the PMA parts industry, and that is better-informed customers. Airlines and MROs now know that PMA parts can match OEM parts on quality and reliability, despite their lower prices and third-party provenance.

"The aviation industry as a whole has become more educated on PMA and replacement parts," Whittaker observed. "For years, there was a common misconception that PMA parts were generic or of inferior quality to OEM parts. But this isn't true, because PMA parts must go through a vigorous testing process and obtain FAA approval with respect to their design and quality system. Fortunately, the aviation industry has become more aware of the scrutiny that a PMA part undergoes and is now more accepting of them."

"Over the last 10 to 12 years, I've seen a shift away from the economics of PMA parts as a driving force, to reliability," agreed Jason Dickstein, president of the Modification and Replacement Parts Association (MARPA). "Today, there are a lot of PMA parts that are being designed to improve upon flaws that have been identified. Typically, the flaws are being identified by operators and they have had problems getting those flaws corrected. So, they've reached out to the PMA community and they've partnered with the PMA community to design a better part. So, while economics might've been the driving force 25 years ago, reliability has been a driving force for at least a decade."

Even without increased customer trust in PMA parts, sales of these items are being boosted by new aircraft delivery delays. Without the new aircraft they'd counted on in their fleets today, airlines are having to keep flying their older aircraft to maintain their flight schedules.

"Delivery delays are another big driver for the PMA industry, since the airlines are not able to get the number of new aircraft they were expecting," Markham said. "As a result, they're having to perform more maintenance on their older aircraft. More maintenance means more PMA parts sales, so it's a good, positive problem for us."

The bottom line: The combined factors of OEM supply chain delays, lower PMA parts prices, FAA-certified quality and reliability, better informed customers, and new aircraft delivery

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Jet Parts Engineering says it is leveraging improvements in 3D scanning technology to help their engineering and quality teams speed up their process. Jet Parts Engineering image.

delays are keeping the PMA parts boom going and will likely do so for the foreseeable future.

Challenges Still Exist

Even with so many factors coming together to drive the PMA parts markets, challenges still exist for companies in this market.

Ironically, one of these obstacles is the PMA parts industry's current level of success. "The toughest challenge is unexpected demand," said Markham. "When there are problems with the OEM delivery/supply chain, that becomes an unforecasted demand for us, which naturally stresses our supply chain. To address this, we continue to try to work with our partner customers to make sure we have the most up-to-date forecast as possible and to try to get as much insight as we can in terms of what their future needs are going to be."

A second challenge confronting the PMA parts industry is delays in these parts being approved for use by individual airlines, due to their own constrained resources. "These constraints slow the implementation of parts introduced into the airlines' systems and delay the cost savings they seek," Benscheidt said. "Similarly, understaffing at the FAA for PMA application reviews and acceptance is a challenge. The FAA is having a hard time keeping their certification offices staffed and producing at levels needed by the industry, so there are many PMA companies stuck in a bottleneck at the end of their development processes."

As well, leasing firms have tended to restrict the use of PMA parts on their aircraft, in a bid to maintain their assets' marketability and residual value. However, these restrictions are loosening as fleets age and the anticipated resale market narrows, said Benscheidt. "In fact, some lessors are now finding opportunities to leverage PMA parts to provide lower cost options for their customers who are already using them."

"Some customers continue to have reservations about adopting PMA parts due to concerns over warranty coverage and compatibility with existing leases," Martinez agreed. "To address these issues, our industry is working diligently with the FAA to streamline regulatory processes and enhance collaboration with authorities to expedite approvals. We've also invested in supply chain improvements and diversifying sources to mitigate disruptions. In the past six months, we've seen part availability playing more of an important factor for buyers."

Finally — like the OEMs — PMA parts manufacturers are facing their own supply chain issues. The good news? According to Dickstein, "Because PMA parts companies tend to be smaller than OEMs, when they have supply chain issues, they simply have the ability to be more nimble. For instance, a large OEM might have to go through a months-long process to bring on a new supplier, whereas a smaller PMA parts company oftentimes can be much quicker in shifting to other suppliers without compromising on quality. They simply have less bureaucracy slowing them down in trying to correct their supply chain issues."

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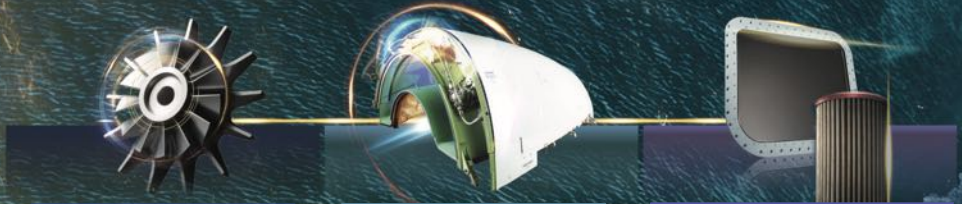

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Where Future Growth Will Come From

For the boom times to continue, the PMA parts industry will have to keep growing in terms of its sales and profits. So where are the growth areas for the PMA parts industry going forward? Is it in newer aircraft, providing more parts for older aircraft, or both?

"Both," replied Whittaker. "On the one hand, legacy aircraft are troubled with parts obsolescence when the OEM simply quits making spare parts. This means lots of opportunities for the PMA parts industry when the OEM no longer supports a fleet. On the other hand, newer aircraft that are still in production can experience back orders because the OEMs often don't plan for inventory to support both new and existing fleet. So, if there is a limited supply of a certain part and the OEM needs it for production of new aircraft, they are going to take what they need first before selling spare parts to everyone else."

"Both new and older aircraft are growth areas," Benscheidt agreed. "New production aircraft delivery backlogs will keep demand for PMA parts strong, while the durability issues on some of the newer platforms are keeping legacy aircraft flying longer and thus needing parts too. As well, airlines' fleets of older aircraft aren't disappearing anytime soon, so as the OEMs shift focus and capacity to the newer generation equipment, it opens further opportunities to grow PMA product acceptance for legacy aircraft. In addition, some of the new generation aircraft have high system commonality with their predecessors (A320ceo and A320neo as an example) so that bolsters the market even further. And eventually, newer generation aircraft will take market share and replace the older aircraft, so there's a lot of white space for new PMAs on these new platforms as well."

"It's going to be both," said Markham. "Aircraft delivery delays are definitely creating more maintenance for older aircraft, which drives additional PMA growth. In addition, as new aircraft get field exposure, they need to be serviced. This will lead to new PMA parts development."

As for Innovations That Will Further Drive The Pma Parts Industry's Future Growth?

"Artificial intelligence is a hot topic, and it is playing a role in PMA as well," Benscheidt replied. "We're not seeing AI in PMA parts design quite yet — the limitations still put it 10+ years away from what some might think of automating development — but AI is serving as an assistant alongside design and certification using generative AI models to search large amounts of data for summaries or using it for more targeted research given specialized parameters."

AI could also aid the PMA parts industry in handling the pressures of high product demand and supply chain delays. At Heico Parts Group, "we are looking to see if we can leverage AI to better manage some of that unforecasted demand, or get better forecasts, as well as looking more deeply into our supply chain," said Markham. "At the same time, we definitely live in a 'trust but verify' world, so we want to make sure that we understand and can rely on what AI is giving us."

Over at First Aviation, the company is looking to expand its capabilities, including finding better ways to manufacture PMA parts. To this end, "we are incorporating lean manufacturing principles to expedite the creation and approval of PMAs," Whittaker said. "We are also keeping a close eye on the market to anticipate when certain fleets are due for overhaul, to ensure that we have the parts and manpower in place to meet our customer's demand."

Meanwhile, Jet Parts Engineering is leveraging improvements in 3D scanning technology to help their engineering and quality teams speed up their process, while at the same time gathering and analyzing more data than ever using more traditional tools. "Doing both allows us to ensure our PMA parts are of the highest degree of quality and maintain tighter control of our production without sacrificing additional time or cost," said Benscheidt.

In general, "the future of the PMA parts industry is set to be shaped by a wave of innovations focused on expanding service offerings and integrating diverse solutions for customers," Martinez said. "At our company, we're dedicated to broadening our range of services and parts to meet the evolving needs of the market. Across the industry, we anticipate that successful PMA companies will increasingly invest in diverse business ventures and strategic partnerships. By acquiring businesses that complement their existing capabilities and forming alliances with key players, companies will be able to offer a wider array of services while maintaining competitive costs. These strategic moves will be crucial for keeping pace with OEM offerings and ensuring that PMA parts remain a viable and attractive option for airlines."

Will the Boom Continue?

Last year, the PMA parts market was booming. This year, the boom continues. So, what about next year: Will the good times continue to roll?

"Absolutely," Whittaker replied. "The demand for PMA

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solutions is extremely high and is showing no signs of slowing down. Competition in the aviation industry is relentless and both operators and maintenance organizations are looking for ways to cut costs and to reduce ground time. Buying safe, reliable PMA parts at a discounted price, and with quicker delivery dates, is one way they can stay ahead of their competitors."

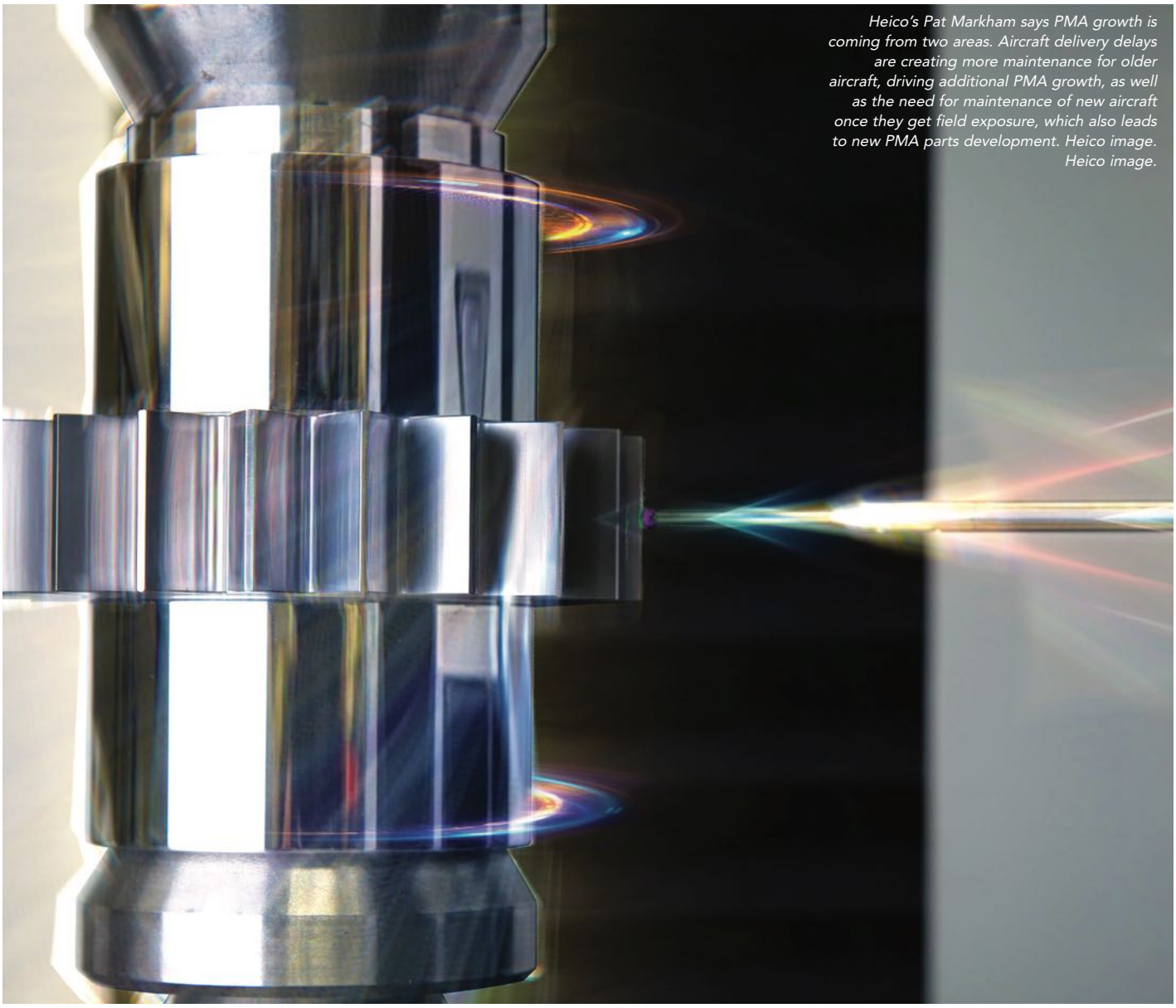
"Yes," said Brooks. "Airlines continue to request additional parts at an increased rate to support their fleet while reducing costs."

"Absolutely," Dickstein said. "Whenever there are problems in the airline industry, the PMA industry has persistently stepped up to be an effective partner for the air carriers and the repair stations. And every time that has happened, the PMA business and its market share has increased. I've talked to a number of vice presidents of maintenance at air carriers that have expressed disappointment with the support that they've gotten from type certificate and production certificate holders. And in the very next breath, they'll start to praise the PMA companies that have helped keep the aircraft in the air."

Given all of these considerations, the boom in the PMA parts market seems destined to continue. "Beyond all the reasons why that we've talked about so far, airlines want to make sure that they have robust supply chains — and PMA provides an already approved second source of supply," said Markham. "So, my expectation would be that the PMA parts market will continue to meet those demands and continue to grow in the years ahead."

"We expect the vended PMA market to grow more than 9% CAGR over the next five years," Benscheidt predicted. "Moreover, as lessor acceptance of PMA parts relaxes, this will further the adoption of PMA parts and increase the market size. Ultimately, airlines are the driving force behind the PMA parts industry; they seek a competitive market to keep OEMs in check while ensuring availability, safety and reliability. This is why PMA parts will remain a key strategy for airlines to achieve these goals and why the PMA parts market will continue to be strong for many years ahead."

The bottom line: "The PMA parts market is well-positioned to continue its growth in the years ahead," concluded Martinez. "The ongoing need for cost-effective maintenance solutions, coupled with safety, advancements in technology and regulatory support, will drive the market forward. As the aviation industry evolves, PMA parts will remain a vital and sustainable component of the maintenance ecosystem." AVM



Heico's Pat Markham says PMA growth is coming from two areas. Aircraft delivery delays are creating more maintenance for older aircraft, driving additional PMA growth, as well as the need for maintenance of new aircraft once they get field exposure, which also leads to new PMA parts development. Heico image. Heico image.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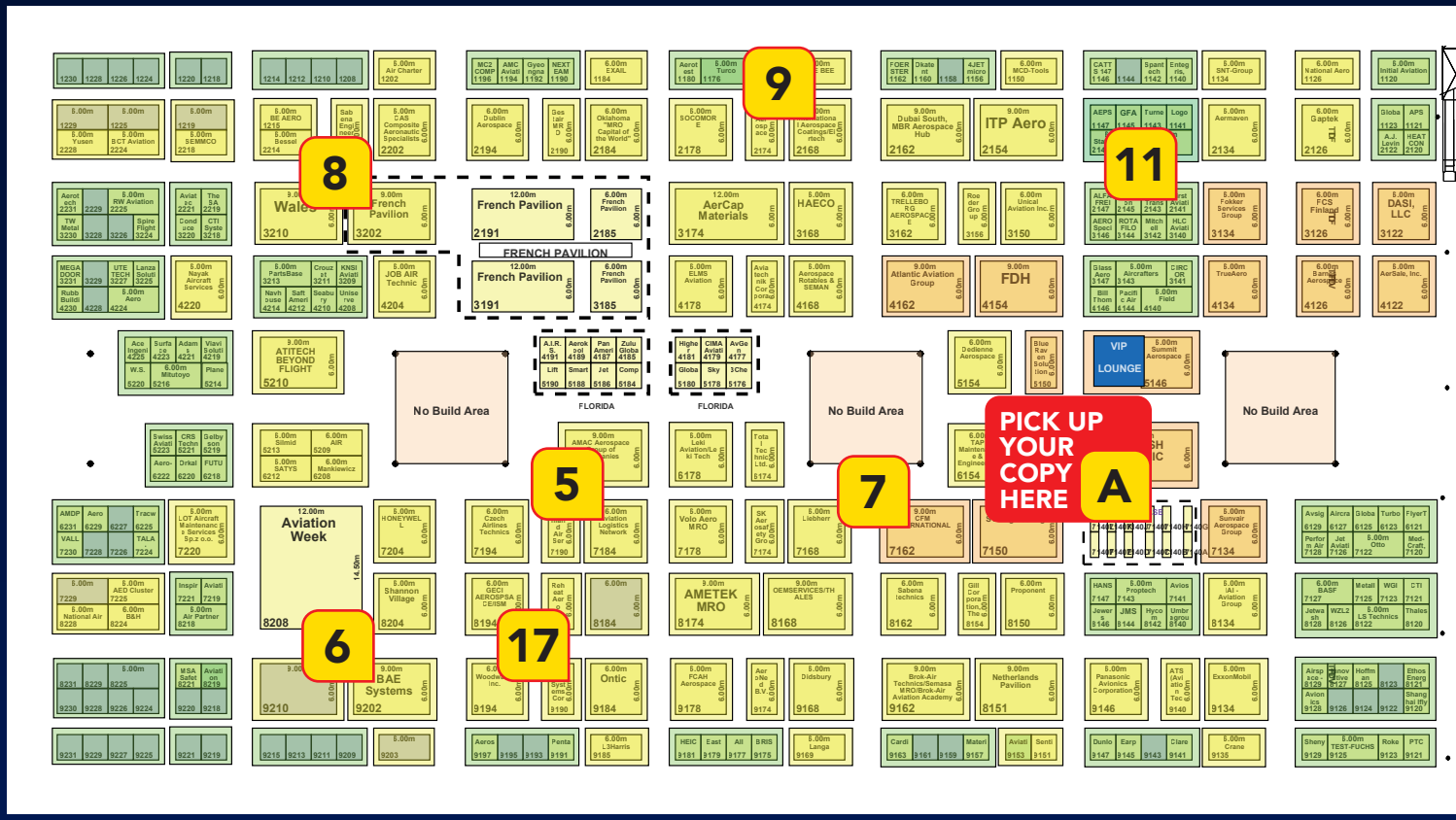

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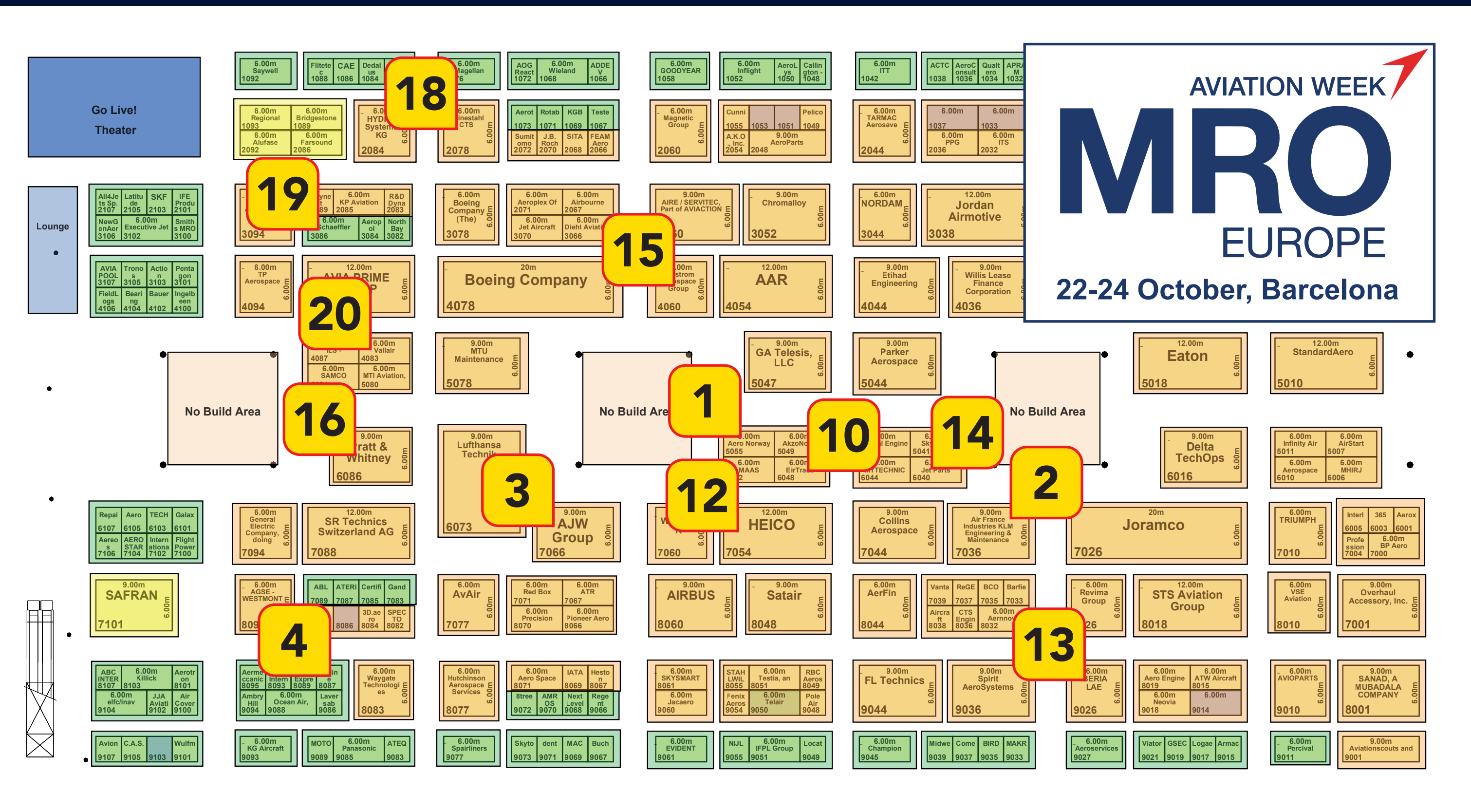

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Aviation Logistics Network
Booth: 7184

The Aviation Logistics Network are a worldwide alliance of leading independent logistics providers and offer a fully integrated platform of services to the airline/aerospace industry. The Aviation Logistics Network have the expertise to move AOG, routine or critical components, aircraft engines, landing gears or arrange full/part charters via our dedicated charter partner. Our services are tailored to the specific needs of our clients and include coverage 24/7/365, AOG Toll Free service (008000 AOG TEAM) Return & Repair, Exchange Programs, PO Management, Door to Door Services & Airside Access. ALN are ISO 9001:2015, 14001:2015 & ASA accredited.

BAE Systems
Booth: 9202

BAE Systems is a world leader in providing innovative aftermarket support across the commercial and military domains. We offer support that keeps our customer's fleets airworthy by ensuring the safety and reliability of flight-critical systems. We have strategically located global service centers to comprehensively meet our customers' requirements at all operational levels, supporting more than 600 operators and 20,000 aircraft worldwide.

CFM INTERNATIONAL
Booth: 7162

CFM: The Power of Flight CFM International (CFM) is a 50/50 joint company between GE Aerospace and Safran Aircraft Engines. Since the first engine entered revenue service in 1982, CFM has delivered more than 40.000 CFM56 and LEAP engines to some 600+ operators worldwide. Since the first LEAP engines entered revenue service in August 2016, the fleet has logged more than 60 million engine flight hours, while delivering a 15 to 20+ percent improvement in fuel efficiency compared to previous generation engines. The CFM Services organization focuses on providing world-class aftermarket products and programs, working with customers to meet their unique, evolving needs from entry-into-service to mid-life through maturity and retirement.

DONECLE
Booth: 3202

Donecle reshapes inspections with its fully automated drone solution, powered by advanced image analysis and cloud-based digital history. This technology inspects aircraft exteriors of all sizes, from nose to tail. It can also be used on off-wing engines & landing gear. A wide range of applications is available for aircraft: lightning, GVI, dents, paint marking, and quality control. For engines and landing gears: input/output comparison, top quality escape, configuration control. In addition to being up to 10x faster the solution provides insightful reports to improve traceability and maintenance history. Our A320 AMM listed drones are used worldwide by top players such as United, Airbus, Safran, Regional Jet Center, LATAM, VivaAerobus, AAR.

Eirtech Aviation Services
Booth: 2168

Eirtech Aviation Services (EAS) is a world-leading specialist aviation services company providing bespoke engineering services, asset management and aviation solutions ensuring regulatory compliance. Together with our sister company IAC, we service a wide range of international airlines, private operators, military aircraft, and aviation leasing companies across the globe. Eirtech's engineering and technical services combined with IAC's painting and coatings capabilities create a "one-stop shop" of aviation services. EAS HQ is based in Shannon Airport, Co. Clare, Ireland. Across the group's 10 locations worldwide, we complete 800+ Eirtech engineering, CAMO & technical service projects per year and 700+ IAC painting events per year.

EirTrade Aviation
Booth: 6048

EirTrade Aviation is a global aviation asset management & trading company headquartered in Dublin with offices worldwide. Dedicated to the support of MROs, operators & lessors, EirTrade offers a comprehensive range of services: end-of-life asset management, engine & aircraft parts trading, disassembly, consignments, technical storage & services. Ireland's only aircraft disassembly facility is located at our AFRA accredited premises in Ireland West Airport, Knock. It provides streamlined disassembly of all aircraft types. EirTrade's engine disassembly facility for CFM56-3/5A/5B/7B/7BE offers engine module disassembly & removal, pre-purchase inspection, QEC/LRU inventory check, engine stand swaps & storage. Please visit *eirtradeaviation.com*

First Aviation Services, Inc
Booth: 2141

First Aviation Services Inc. is a leading provider of aircraft parts manufacturing,

component repair and overhaul to the aviation industry worldwide. Piedmont Propulsion Systems, LLC (PPS), a subsidiary of First Aviation Services Inc., is a world leader in propeller MRO for regional, corporate, and military aircraft. PPS holds FAA & EASA Propeller Class 1 and Class 2 Propeller Repair Station ratings for all Dowty, Hamilton, Hartzell and McCauley propellers. PPS is the only facility in the world with FAA/EASA certification to overhaul all ATR and Dash 8 / Q400 propeller types, including the Hamilton 568F and Dowty R408 propeller. More information about FAvS and PPS may be found on the company's website *www.firstaviation.com.*

HEICO

Booth: 7054

HEICO Aerospace Corporation is a successful and growing technology-driven aerospace, industrial, defense and electronics company. HEICO provides customers with innovative and cost-saving products and services. HEICO's products are found on large commercial, regional, business and military aircraft, along with a large variety of industrial turbines, targeting systems, missiles and electro-optical devices. HEICO Parts Group (HPG) is the largest independent supplier of FAA-PMA-approved engine and component parts. HEICO Repair Group (HRG) supplies flight-critical repair and overhaul services. HEICO Distribution Group (HDG) is a leading provider of FAA-approved component parts, and a leader in distribution for OEM replacement parts.

IBERIA LAE

Booth: 9026

Iberia Maintenance is a leading provider of MRO services to worldwide airlines including all IAG OpCos, OEMs and the wider industry. Iberia Maintenance delivers premium MRO services for A320ceo/neo family and A330. All operators can benefit from our component repair and overhaul expertise covering a wide service spectrum of components assembled in these fleets. The Engine Shop is specialized in the V2500, CFM56 and RB211, but also power generation systems, associated accessories and thrust reversers. Last year, Iberia Maintenance obtained the license from Pratt & Whitney to service the GTF PW1100G-JM and received the first engine in the last quarter of the year. In addition, the company is working to introduce the LEAP platform capability.

Jet Parts Engineering

Booth: 6040

As a recognized and awarded leader in the development of FAA-approved PMA parts and engineered repairs, Jet Parts Engineering is devoted to providing spare parts solutions to our global network of airline and MRO partners. We help our customers battle their increasing costs of component, airframe, and engine maintenance with our competitive pricing, reduced lead times, and major/minor repairs. Our ecommerce portal gives immediate access to pricing, availability, technical information, and the ease of order placement and tracking. Jet Parts Engineering's staff is comprised of some of the best and brightest in the industry — our people are the best part. Visit *www.jetpartsengineering.com* to learn more.

Kellstrom Aerospace Group

Booth: 4060

Kellstrom Aerospace Group, is a leading aviation lifecycle partner, offering cost-saving solutions and value-added services at each phase of the aircraft's lifecycle through Kellstrom Aerospace, Vortex Aviation, & The Aircraft Group. These divisions can be integrated or leveraged independently to support aircraft owners, operators, and MROs globally. Kellstrom Aerospace's portfolio includes OEM parts distribution, USM, and technical services alongside AOG, JIT, consignment, and repair oversight offerings. Vortex Aviation specializes in engine maintenance & repair, AOG and teardown services. The Aircraft Group provides consulting services, covering various technical aspects of aircraft acquisition, sale, leasing and records management.

Pratt & Whitney

Booth: 6086

Pratt & Whitney, a division of Raytheon Technologies Corporation (NYSE: RTX), is a world leader in design, manufacture and service of aircraft engines and auxiliary power units. Committed to powering sustainable aviation, Pratt & Whitney is focused on advancing smarter propulsion technologies such as our GTF™ engine, enabling a transition toward cleaner fuels, and implementing greener and more efficient manufacturing and MRO operations. Pratt & Whitney EngineWise® solutions represent our commitment to optimizing engine performance. Tailorable to address customers' evolving business needs, Pratt & Whitney's portfolio of smart, straight-forward solutions helps passenger and cargo operators get the most from their engines.

Ramco Systems Corp

Booth: 9190

Ramco Systems stands as the gold standard in the realm of aviation software, revolutionizing the market with its cutting-edge multi-tenant cloud and mobile-based enterprise solutions. Harnessing the power of AI and ML, Ramco enhances its solutions with predictive analytics, intelligent automation, and data-driven insights. Ramco solution is architected to be flexible & responsive towards dynamically changing business scenarios and can significantly enhance the decision-making process across various functions like MRO, M&E, supply chain, reliability, flight operations, and financial control. Some of our global clients across various domains are KAL, PHI, Bristow, L3 Harris, Philippine Airlines, Cobham, Air Transport Canada among others.

Rhinestahl CTS

Booth: 2078

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

Schaeffler Aerospace Germany GmbH & Co. KG

Booth: 3086

Schaeffler Aerospace is a major supplier for mainshaft engine bearings of all well-known engine manufacturers. Being an FAA, CAAC, EASA and TCCA approved supplier, Schaeffler is known for its wide range of OEM / DER / DOA repair approvals which allows us to help you to significantly reduce your engine maintenance cost without compromising system reliability. Schaeffler also offers individual visual inspection training on engine bearings to help your in-house inspectors detect and judge damages and indications on aircraft bearings.

Vallair

Booth: 4083

Vallair is an aviation company headquartered in Luxembourg with facilities in Chateauroux, Montpellier, and Vatry, France. It provides integrated support for mature aircraft, engines and major components, with business units founded upon engineering excellence that include trading & leasing, project management, material management, aircraft MRO, engines, aero-structures & painting, and aircraft disassembly. These offer aircraft operators and owners worldwide cost-effective solutions to extend the life of their assets or 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. To learn more *www.vallair.aero*

USED SERVICEABLE MATERIAL HELPING SOLVE MATERIAL SUPPLY CHAIN CHALLENGES

WITH THE INDUSTRY STILL SUFFERING AFTERSHOCKS FROM COVID, USED SERVICEABLE MATERIAL IS PROVIDING A VALUABLE RESOURCE FOR AIRLINES AND MROS AND AIRLINES ALIKE. IAN HARBISON SPOKE TO THREE OF THE LEADING PLAYERS.

Staff shortages and material supply problems are still lingering after the pandemic, resulting in increased turnaround times for overhauls and repairs. Companies are taking different approaches in resolving the situation.

Vallair

Armando Filho, director of trading and material management at Vallair, says the market has changed a lot after Covid, with growth in demand for used serviceable material (USM) and green time material. This has been caused by the OEMs suffering lots of constraints due to supply chain problems with material availability. They, and airlines, are even looking, in a limited way, at PMA parts, despite reservations about them by leasing companies, and designated engineering representative (DER) repairs. In addition, staff shortages remain and companies are setting up their own training schools, as Vallair has done with the Aircraft Academy at its French MRO facilities at Châteauroux and Montpellier.

Another change has been increased cooperation between companies. Where, before, they would only deal with the OEMs, MROs or trading companies like Vallair, they have had to accept

Vallair dismantles A330 for Danish spare components specialist, CORAX in Châteauroux, France. Vallair image.

that brokers and distributors now have a role to play by buying and selling surplus material. However, he cautions that, for safety reasons, the parts need full traceability.

He says that the market was talking about a couple of years to have solutions for supply chain and staff problems. That is not the reality, he says; he believes it is a long-term problem that might take 7-8 years or more to be stable. While the component OEM production rates will recover, the increase will not be enough to meet demand, which means aircraft dismantling is here to stay. And PMA/DER solutions are likely to stay at a low level to resolve crises that cannot be solved in a conventional way.


Armando Filho

An aircraft teardown can produce 700-1,000 parts removals, he says, which can be repaired or refurbished for reuse, while high value and scarce items like landing gear, nacelles, APUs, wheels and brakes are good for green time use, getting an aircraft to the next overhaul when, hopefully, newer replacements will be available and can be installed. More aircraft are being purchased for part out and he expects that trend to continue for the next few years. This is because flying hours are back to normal and growing, including on Airbus A350 and Boeing 777, which were expected to be used less after Covid, so there is an increased need for maintenance. This has had an effect on availability for freighter conversions — the company was an early mover on Airbus A321, delivering the first aircraft to Qantas in 2020 — and the market has become more stable.

The company's latest teardown, at Châteauroux in July, was a 23-year-old Airbus A330 previously operated by Hongkong Airlines, with over 1,500 parts removed as USM for Danish spare components specialist CORAX: the Vallair logistics team is responsible for processing, listing, and packing all parts for assessment prior to repair by CORAX. While A318/319 part outs can help A320/321 operators because of good commonality, he notes that A330/340 commonality is much lower.

The company's worldwide activities are split between North America (48%), Europe (42%) and Asia Pacific (10%), although, he says, Asia Pacific needs more consideration as it is such a huge market, especially China and India.

VAS

VAS Aero Services is celebrating 45 years of aircraft transition management, used serviceable materials (USM) parts supply

and aviation aftermarket services. Founded in 1979 as the AGES Group, the company was acquired by Volvo Aero in 1999, eventually becoming VAS Aero Services. In 2022, it became part of the Airbus Group when the company was acquired by Airbus's Satair USA subsidiary. Today, VAS is a wholly owned, independently operated subsidiary of Satair, with locations in North America, the U.K., Europe, southeast Asia and Australia.

Its most recent activities have included the acquisition in July of seven Airbus A330 aircraft that had been operated by China Southern Airlines. The airframes will be designated for placement or possible teardown.

The Pratt & Whitney PW4170 engines will be made available for lease, as well as harvested for in-demand USM parts. They will also become part of VAS's long-term supply program agreement with SR Technics. That agreement was extended in June for the PW4000-100" variant, which allows VAS to position engines at SR Technics' facilities for teardown and whole asset leasing. It guarantees the availability of spare engines to SR Technics customers while their engines are undergoing maintenance as well as a minimum stock level of serviceable spare parts, enabling a lower material cost and quick turnaround service for those customers.

Also in July, it acquired 17 Airbus A320 airframes for teardown and USM parts redistribution, following the acquisition of six aircraft in the previous six months. VAS will manage the teardown of the North America-based aircraft at various U.S. locations over the next 12 to 18 months.

In April, it was given the task of breaking down four Airbus A380s owned by Dr Peters Group. Three will be dismantled at Tarmac Aerosave in Tarbes, France, the fourth by Asia Pacific Aircraft Storage in Alice Springs, Australia. It had previously dismantled another four A380s for the Dortmund-based investment fund management firm and lessor with assets in aviation, real estate and shipping.

Dale LeClair, vice president programs at VAS Aero Services, says narrowbody commercial aircraft will continue to be the most popular for teardown due to MRO activity on both the airframe and engines. The CFM56-5B/7B engine parts are in high demand for spare serviceable material for use in engine shop visits, so customers are turning to VAS to satisfy this need. Widebody aircraft are starting to have more demand post-Covid as well.

In addition to the usual high value items that are recovered, there are some parts that airlines have a need for that have a long lead time from the manufacturer. Often, though, these parts need repair so VAS will work with some of the repair vendors to restore the parts to airworthiness.

Post-Covid staff shortages meant OEM production was slow while MRO shops had increased turnaround times for the same reason. She says this is being resolved very slowly. The MRO turn times are coming down but they are still significantly higher than pre-Covid turn times. Shop delays due to raw material shortages continue as well.

She says the customer base remains stable for VAS. Airlines with MROs tend to retire and cannibalize their legacy aircraft but, after those parts have been harvested, they are back in the USM market looking for affordable spares for their fleet. Loans and exchanges are an


Dale LeClair

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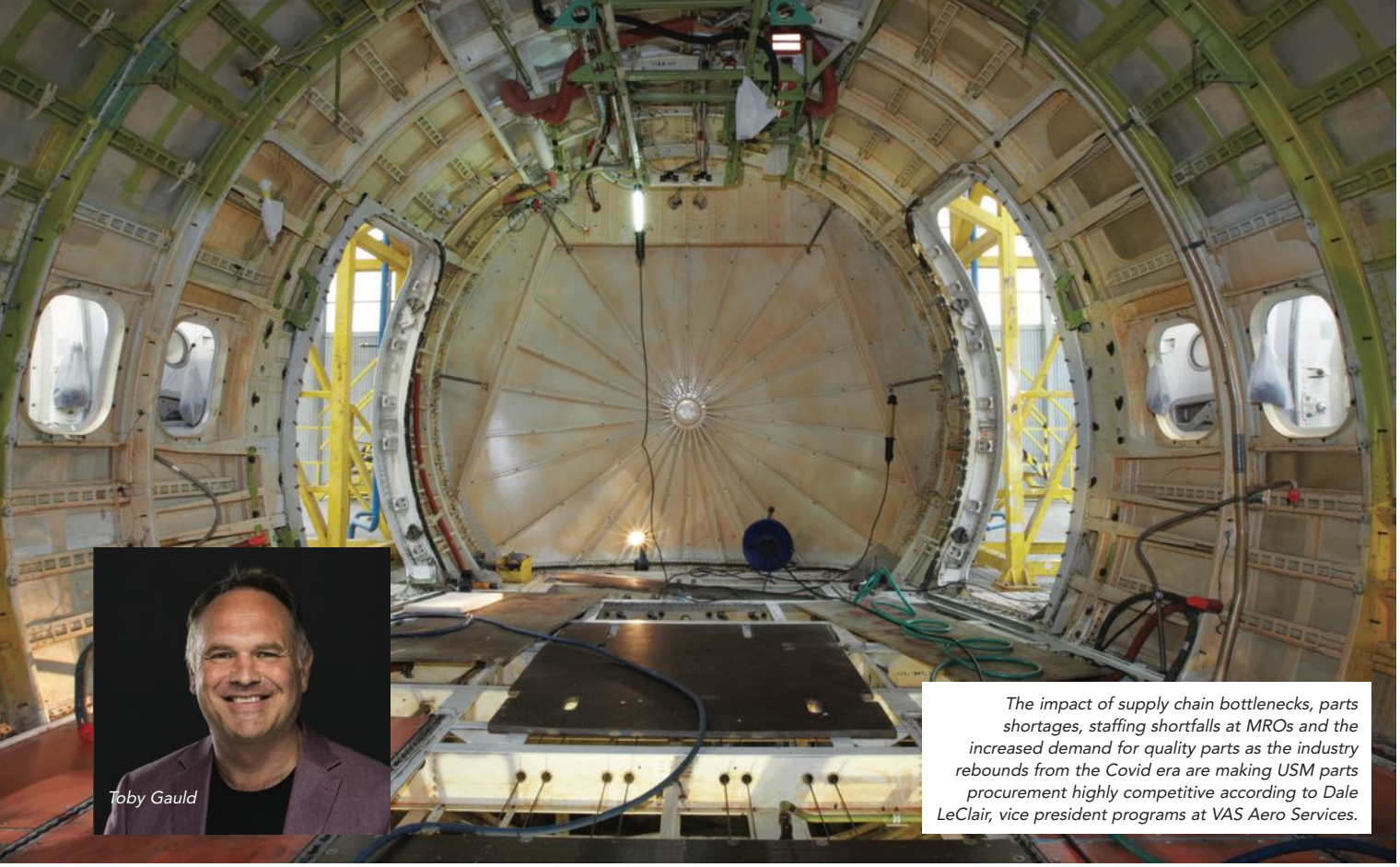

The impact of supply chain bottlenecks, parts shortages, staffing shortfalls at MROs and the increased demand for quality parts as the industry rebounds from the Covid era are making USM parts procurement highly competitive according to Dale LeClair, vice president programs at VAS Aero Services.

increasingly important alternative that gives operators affordable, reliable options during periods of high demand for parts. Working with a supply partner who has parts at the ready is both an efficient and economical means of keeping aircraft flying.

Prices for whole assets (aircraft and engines) are competitive and demand sensitive. Prices on USM parts are also competitive and are constantly under pressure from operators in need of quality replacement parts and spares. During periods of pricing volatility such as this, having a long-term parts supply partner can make the difference between extended AOG and generating revenue.

She adds that competition has increased. The impact of supply chain bottlenecks, parts shortages, staffing shortfalls at MROs and the increased demand for quality parts as the industry rebounds from the Covid era are making USM parts procurement highly competitive. "Thankfully, after 45 years in the business, VAS has deep industry relationships that provide us access to end-of-service aircraft and the transition management expertise to turn those end-of-life assets into a source of certified USM parts supply for the global aviation

industry."


Anouk Wawrzyniak

Optima

Disassembly of helicopters is rarely discussed but, says Toby Gauld, president and founder of Optima Aero, there are probably more mechanical parts in a helicopter than in some fixed wing aircraft. The company has three dismantling facilities.

Optima Aero Canada headquarters in Beloeil, Quebec, Canada, is where the company was founded in 2010 (and carries out engine maintenance and engine part out); Optima Aero Europe, in Anglet, France, which opened in 2022; and Optima Aero USA in Grand Prairie, TX, established in 2023 with the purchase of the assets of Uniflight Global, which also carries out airframe maintenance.

He believes the company is the only one carrying out dismantling and maintenance on an international basis, including Airbus Helicopters, Bell, Leonardo and Sikorsky.

The market for USM is growing as the supply chain becomes tighter for the most popular OEMs — Airbus Helicopters and Leonardo — as well as the components being cheaper and greener as they are essentially being recycled. He notes both OEMs are also customers, so it has become more of a partnership. Besides, they have no need to worry because USM only accounts for about 2% of the market — "we're not there to take away their lunch".

Toby Gauld, founder and president of Optima Aero, says there are four value adds from the company's activities: cost effective parts; availability; cash flow solutions by buying from customers who can invest in their companies, as well as providing financing and assignments; and carbon footprint reduction.

He says there are four value adds from the company's activities:

- Cost effective parts
- Availability
- Cash flow solutions by buying from customers who can invest in their companies, as well as providing financing and assignments
- Carbon footprint reduction.

For the latter, Anouk Wawrzyniak, director, growth and marketing, has been working for the last two years with Le Centre International de Référence SUR L'Analyse du Cycle de Vie et la Transition Durable (International Reference Center for Life Cycle Assessment and Sustainable Transition, CIRAIG) in Montreal. Common sense tells you that it is more ecological to reuse rather than produce something, she says, but Optima is the first, to her knowledge, to have carried out a widespread study across aerospace to exactly define the value.

This has established that used helicopter (or aircraft) parts, by weight, can have an average CO2 reduction of up to 600 times that of a new part. Manufacturing includes acquiring the raw materials in the first place, transport, machining and distribution. For used parts, factors include the type of material that is being reused, distance travelled (or not) and the repair process.

These have all been modelled and continuously refined and the study has been validated by CIRAIG.

Another study of a Pratt & Whitney component repair shop in Montreal showed that repaired parts against new shows equivalent CO2 savings of about 22,000 tons annually, or about 110 helicopters operating for a full year. In fact, the engine sector offers the greatest opportunities for savings because of the materials and processes used — an average CO2 reduction of up to 1,000 times.

There is strong interest from Airbus Helicopters but also from Leonardo and Pratt & Whitney. She notes that Europe seems to have more of a desire to change than the rest of the world at the moment. While the project started as a way to understand the Optima Aero business model, there is a possibility that it could become a commercial product to help other companies develop a greener approach. AVM

LOCK-N-CLIMB

Ergonomic Safety Ladders for Easier Aircraft Maintenance

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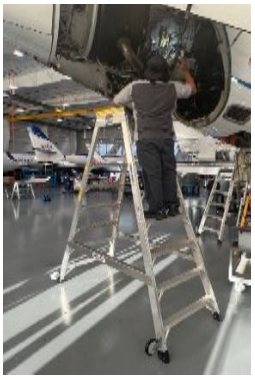
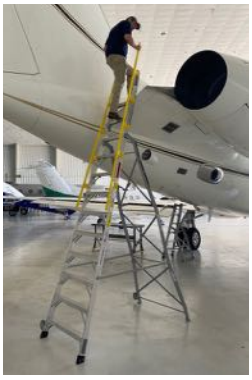


Aframes 3′ to 12′

Fiberglass extension



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GPU cord ladders

Cargo bay ladders

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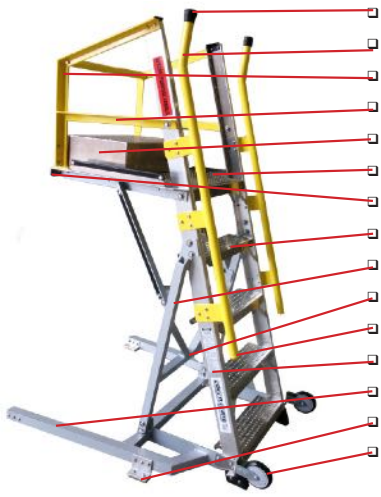
Tall specialty

Interior cabin



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By James Careless

MROs are a key factor in overall flight safety. SMS will help these organizations mitigate risk before it manifested at the operations level. Image by Joy Finnegan.

HOW MRO IT SYSTEMS ENSURE COMPLIANCE WITH SMS AND OTHER REQUIRED PROGRAMS

AN EXCLUSIVE AVIATION MAINTENANCE VIRTUAL ROUNDTABLE

Now more than ever, airlines and MROs need to ensure that their operations are complying with government regulations concerning safety management systems (SMS) and other relevant aviation policies. The trouble is that doing this manually is practically impossible in this data-saturated age. To ensure that they are complying with the rules at all times — and can prove it — airlines and MROs need to harness the power of their MRO IT (information technology) platforms on an ongoing basis.

To gain insights on how MRO IT systems can fill this gap, Aviation Maintenance spoke with two industry experts. They are Debi Carpenter, executive director of the Air Charter Safety Foundation, and Jason R. Starke, vice president of safety and standards with Baldwin Safety and Compliance. Here is what they told us, as compiled in this Aviation Maintenance virtual roundtable.

Aviation Maintenance: Let's begin with you telling us about your SMS and compliance IT platforms for MROs.

Debi Carpenter: At ACSF, we are committed to advancing safety and compliance across the aviation industry, including charter, business, corporate, and advanced air mobility (AAM) operations. Our tools, such as the safety management system (SMS), ASAP, and the recently launched IAS Lite — a streamlined version of our Industry Audit Standard — help operators of all sizes manage safety risks and meet regulatory requirements like FAA Part 5 and ICAO Annex 19. These platforms integrate risk management, incident reporting and performance monitoring, providing a comprehensive yet accessible solution for continuous safety improvement.

As a non-profit, we offer these solutions at affordable pricing, acting as an extension of our members' safety teams. In addition to our technology-driven tools, our Member Assistance Program (MAP) provides expert guidance to help organizations navigate compliance and safety challenges.

Jason R. Starke: The Baldwin Safety and Compliance platform is a comprehensive, ICAO and Part 5 compliant safety management system (SMS) software solution. The application allows users to customize workflows enabling the software to scale to the organization's SMS. All SMS components and elements are addressed by our platform.

Aviation Maintenance: What are the main requirements that your IT products are addressing for SMS and compliance systems for MROs?

Jason R. Starke: Our software not only complies with 14 CFR 5 requirements but has a very robust quality assurance function

Above: Debi Carpenter
Air Charter Safety Foundation

Below: Jason R. Starke
Baldwin Safety and Compliance

incorporated as part of safety assurance. MROs can utilize this function to schedule and execute audits, track recurring defects, and maintain other quality assurance forms.

Debi Carpenter: Our programs address several key requirements for SMS and compliance systems. In bullet form, they include the following:

- Risk Management: Enabling MROs to identify, assess, and mitigate safety risks within their operations.
- Regulatory Compliance: Currently, our approach to regulatory compliance is integrated within our SMS tools. These tools are designed to help operators and MROs manage safety risks and maintain compliance with regulatory requirements by providing a structured framework for safety practices and documentation.

In addition to our SMS tools, we offer a Member Assistance Program (MAP) that provides access to experienced coaches or contract auditors. These experts guide members through the compliance process, helping them understand and meet FAA, and other relevant regulatory requirements. This personalized support ensures that our members can achieve and maintain compliance effectively, even in the absence of a dedicated IT platform.

This approach allows us to offer both technology-driven solutions and expert human support, ensuring comprehensive compliance assistance for our members. Our MAP includes:

- Incident Reporting and Analysis: Facilitating the reporting, analysis, and follow-up on incidents to prevent recurrences.
- Data Management and Reporting: Standardizing data collection and providing robust reporting capabilities for continuous safety monitoring and improvement.

Aviation Maintenance: Why is it important to fulfill these requirements for MROs?

Jason R. Starke: Regarding SMS, while 14 CFR 145 organizations were not included in this last mandate, it is speculated that they will be included in the next. MROs are a key factor in overall flight safety, therefore an SMS would help these organizations mitigate risk before it manifested at the operations level.

Debi Carpenter: Fulfilling these requirements is important for several reasons:

- Safety Assurance: Properly addressing safety risks through a well-implemented SMS is essential to prevent incidents and accidents in operations.
- Operational Efficiency: Efficient data management and compliance processes reduce operational disruptions, allowing MROs to focus on providing high-quality service.
- Market Competitiveness and Company Culture: MROs that demonstrate strong safety and compliance practices not only gain a competitive advantage by attracting and retaining clients, but they also foster a positive company culture. By prioritizing safety and compliance, organizations reinforce their commitment to the well-being of their employees and the integrity of their operations, ultimately contributing to a more cohesive and motivated workforce.

Aviation Maintenance: What are the challenges of creating such products and keeping them up to date? How do you do this?

Jason R. Starke: Safety management systems need to be able to be scaled to an organization's size and complexity. However, many SMS solutions do not allow for scaling and ultimately force the organization to conform to the software requirements rather than their own. Our solution was created to allow the needed flexibility and configurability for organizations to create workflows that match their complexity.

Debi Carpenter: Creating and maintaining SMS and compliance technology platforms involves several challenges. To once again explain this using bullet points, they include:

- Evolving Regulations: Aviation regulations change, it requires updates to the platform to ensure ongoing compliance. We address this by maintaining close communication with regulatory bodies and incorporating updates as they are issued.
- Customization Needs: Different organizations have varying operational requirements, so our platforms need to be flexible enough to accommodate these differences. We achieve this through customizable features that allow users to tailor the platform to specific needs.
- Data Security: Ensuring the security of sensitive data is critical, and we invest in advanced measures to protect our clients' information.
- Integration with Existing Systems: Many MROs use multiple IT systems, so our platform must integrate seamlessly with these systems. We work closely with our clients to ensure smooth integration with minimal disruption.

Aviation Maintenance: What are the trends in SMS and compliance software, in terms of what MROs are asking for and what you are providing?

Jason R. Starke: The trend for SMS software is better data analytics and the incorporation of AI/ML. Our platform is working to incorporate both to create a solution that stays on the cutting edge of safety management applications.

Debi Carpenter: The trends we are seeing are as follows:

- Automation: There is an increasing demand for automated compliance processes, reducing manual effort and

minimizing errors.

- Advanced Analytics: Software that offers powerful data analytics capabilities to predict and prevent safety issues proactively.
- Mobile Accessibility: With a more mobile workforce, there is a growing need for platforms that are accessible from any device, allowing staff to input data and access reports on the go.
- Integration: Solutions that integrate well with existing enterprise systems, ensuring a seamless flow of data across operations.
- Customizability: With diverse operations, there is a demand for software that can be tailored to meet specific needs and preferences.

Aviation Maintenance: How well is the airline/MRO market receiving your products?

Jason R. Starke: While we do have a relatively small number (compared to flight operations) of MRO clients, we are seeing more interest as the FAA's focus is turning towards this group to implement SMS. Those that have incorporated our product have stated that it is highly configurable and intuitive.

Debi Carpenter: While we currently do not have sole MRO members, we do serve operators that have MRO divisions. Feedback from clients indicates that our platforms have improved their safety and compliance management, resulting in better operational efficiency and enhanced safety outcomes. Many of our members appreciate the flexibility and comprehensiveness of our solutions, which have helped them meet regulatory requirements and improve overall performance. As we continue to refine our offerings based on user feedback, we are committed to expanding our reach and anticipate broader adoption across the industry.

Aviation Maintenance: Finally, what advances do you see coming to the MRO IT segment, in terms of product capabilities, in the future?

Jason R. Starke: I believe we will see more AI/ML in terms of advancement. These will be used to help make sense of the increasing quantity of data that is captured as well as to help support decisions made from the data.

My company will be there to incorporate these advances in our systems. This is because Baldwin Safety and Compliance has been a leader in safety management solutions for the last 20 years. Our team of safety experts, in-house developers, and 24/7 customer service that is passionate about serving has helped us to continually grow and serve the aviation industry.

Debi Carpenter: Looking ahead, we anticipate several key advances in SMS and compliance software. They include:

- AI and Machine Learning: The integration of AI and machine learning will enable predictive analytics, allowing MROs to anticipate potential safety issues before they occur and take preventive measures.
- Enhanced Data Visualization: More advanced data visualization tools will allow MROs to gain deeper insights into safety trends and make data-driven decisions with greater accuracy.
- Increased Interoperability: As the aviation industry becomes more interconnected, we expect to see increased interoperability between different systems and platforms, enabling seamless data exchange and collaboration.
- Real-Time Monitoring: Advances in IoT and sensor technologies will allow for real-time monitoring of aircraft and maintenance activities, providing instant feedback and enabling more responsive safety management. AVM

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By Mark Robins

AVIATION WIRING, CONNECTORS AND INTERCONNECTS

TYING EVERYTHING TOGETHER BY HELPING ELECTRICAL AND ELECTRONIC SYSTEMS COMMUNICATE AMONG DIFFERENT DEVICES.

Aviation wiring, connectors and interconnects seamlessly transmit power and data to connect electronic and mechanical systems, including everything up to mission-critical systems and flight controls. These components form an electrical wiring interconnect system (EWIS) rather than a conglomeration or assembly of individual components. This system can be likened to an aircraft's central nervous system — making sure the correct information is received at the right place at the right time.

Jeff Behlendorf, director of product management at Amphenol-CIT, Franklin, Wis., says it's the wiring that ties diverse aircraft systems together. "That wiring comes in a wide range of forms specifically designed for aviation use and tested to assure reliability, safety and signal integrity."

Wiring is selected and sized to transmit power or data while maintaining safe operating conditions (below maximum rated temperature, operate within verified voltage limits, etc.) and minimizing signal loss. Chris Wollbrink, engineer at Lectromec, Chantilly, Va., explains that wiring serves a similar purpose to the central nervous system (signal wires) and cardiovascular system (power transmission). "Signal wires transmit data and tell operators and equipment about the aircraft condition, while power transmission wires respond to inputs from the pilots and computers. This is analogous to our nervous systems communicating with our brains and our muscles responding to stimulus or commands."

Lectromec's Chris Wollbrink compares aircraft wiring to the central nervous system (signal wires) and cardiovascular system (power transmission) of humans. Lectromec image.

Connectors provide an interface between the wiring and the system components, such as fans, relays, actuators, computers, radios and displays. "Connectors are generally designed to be connected and disconnected easily to allow service and replacement of these system components. Interconnects often provide a similar function, but are often semi-permanent connections and not designed for regular disconnection," Behlendorf says. Connectors and interconnects can even provide environmental protection from moisture and aviation fluids.

Wollbrink says connectors and interconnects serve as terminations in the wiring to maintain harnesses and minimize the amount of wiring that must be replaced during inspections. "Connectors are enclosed devices that serve to protect pins from the environment and unwanted pin contact. Interconnects are a more general overarching term, of which connectors are a part of. Interconnects include, but are not limited to, terminal blocks, bus bars, and structure bonding."

Maintaining and Repairing

Maintenance and repair of aircraft wiring and associated components require skilled technicians and the right tools. But Christopher Ericksen, global product specialist at W. L. Gore & Associates, Inc. Newark, Del., says the first line of defense is a good offense, meaning that products "should be designed with potential failure modes in mind and preventative features such that the need for maintenance or repair is minimized or eliminated altogether. If it cannot be designed in, due to various other requirements (including weight), then the next option would be to train installers and maintainers in best practices. For repairing, designing systems with field-replaceable components or sacrificial components in areas that are most susceptible to damage. Service

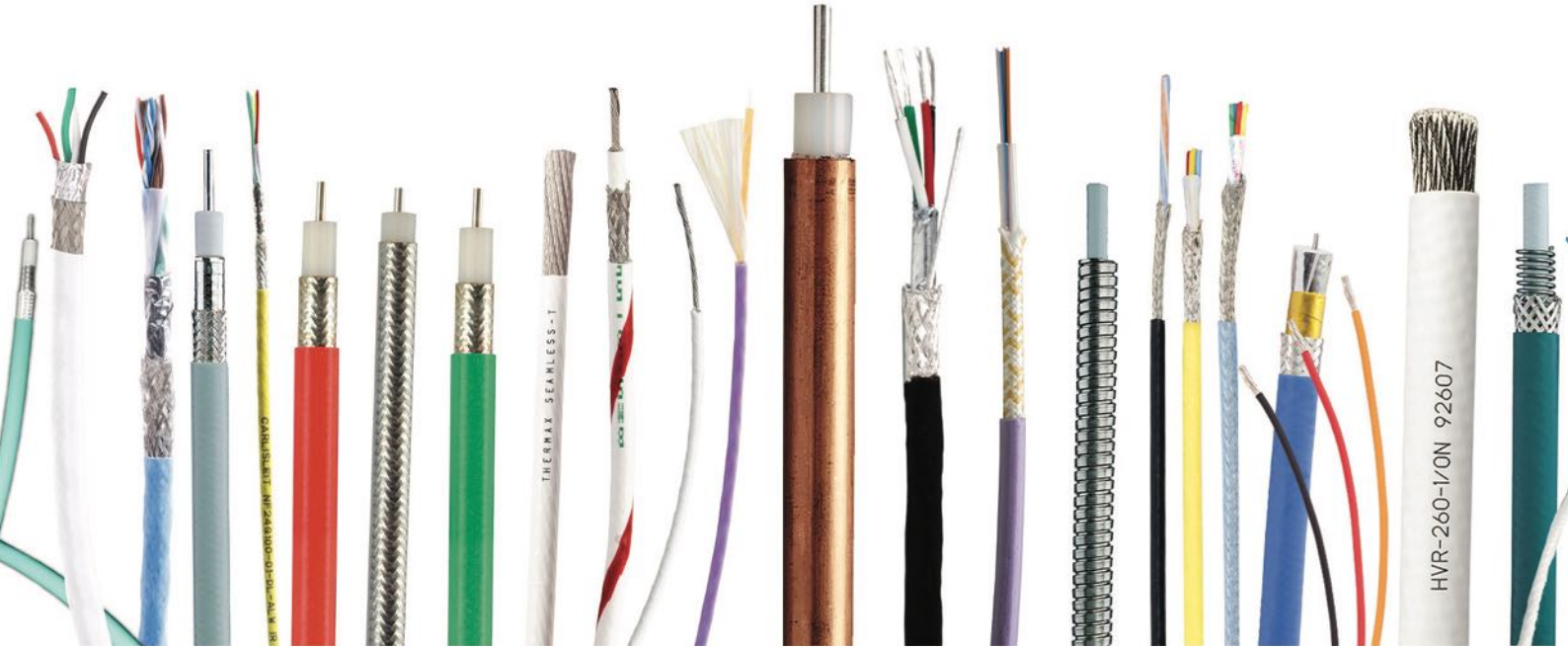
loops can be used to make sure there is additional length in order to re-terminate connectors onto the cable."

For wiring and connectors/interconnects acting as one solution or a cable assembly, maintenance usually means removing the assembly from the aircraft when end of life is reached and replacing it with a new assembly. However, if field repair is necessary, certain manufacturing techniques for cable assemblies like wiring service loops and signal/wiring redundancy can be applied to the connectors/interconnects.

For example, Matthew McAlonis, engineering fellow, Aerospace TE Connectivity, Berwyn, Pa., explains a wire service loop adds extra length at the rear of the connectors. "If the connector's contacts are damaged and need re-termination, the wire service loop's extra length will accommodate this repair while also allowing the cable assembly's intended overall length to be maintained. Another example is if the connector is connected and disconnected at a high cycle rate (500 cycles), wear and tear on connector threads and contacts can occur. To overcome this, a connector saver can be used. Connector savers are easy to replace and save on the cost of rework."

Shown here are Gore's wires, cables, and cable assemblies for aerospace applications. W. L. Gore image.

To repair connectors, often they have to be disassembled, pins extracted and terminations replaced to troubleshoot wiring problems. Most aircraft wiring uses crimp termination methods, which can be done with hand tools and the correct dies to match the contacts.



Amphenol makes a variety of aviation wires as shown here. Knowing the right tools for the connectors and wires you are maintaining will make the job much easier and the finished work more trouble free, says Jeff Behlendorf, director of product management at Amphenol-CIT.

"Some specialized terminations, such as Ethernet cables, require careful attention to make sure the wire twist is preserved and the relative wire lengths are consistent between pairs," Behlendorf says. "Coaxial cables for antennas on the aircraft have complex multi-layer strip requirements, which may be assisted by specialized stripping equipment to assure no damage to the wiring when removing jackets and shields. Be sure to know what the right tools are for the connectors and wires you are maintaining and the job will be much easier and the finished work more trouble free."

For part 25 aircraft, all EWIS components are subject to regular inspection. At the OEM level, Wollbrink believes the best solution for maintaining EWIS is by designing a system with high accessibility and that accessibility coupled with selecting the correct EWIS components for the application are critical. "To minimize the aircraft downtime to service EWIS components, accelerated aging techniques can be used to determine the reliable service life of candidate components; these aging tests generate data to determine how well the components will fare in the harsh environments that EWIS components experience. Basic electrical thresholds must be maintained based on specifications and standards as well."

Wollbrink adds that for maintainers, repairing the EWIS following accepted industry guidance, such as ASTM F2799 and/or the manufacturer's guidance is the best approach. "For inspection, guidance from FAA AC 25.27A and MIL-HDBK-522 provide a great basis for what should be caught during routine inspections."

EWIS Special Factors

A complete aviation solution should have robust wiring, connectors and interconnects that can withstand harsh and hostile high-altitude operating environments. Additionally, the end application can drive specific requirements for performance at demanding high/low temperatures, mechanical strength in high-vibration environments, meet military specifications, etc. Materials and constructions are selected and tested to make sure wire connections remain reliable even as parts freeze, thaw, bake, expand, contract and shake during a flight. "Commercial aircraft require flight controls with the most rugged and durable connectors to perform within extreme temperature fluctuations of +50°C while on a hot tarmac to –60°C while at in-flight altitudes,"

TE Connectivity says they are focused on reliability, durability and sustainability. TE Connectivity image.

says can bu. "Components must also withstand repetitive high use in commercial applications."

Vibration, chemical exposure, salt fog, sand/dust/dirt contaminates and other factors are well documented in the MIL-STD-81490 for Airframe Cabling. FAA regulation 25.1703 dictates wiring, connectors and interconnects shall be qualified to the installation environment and must operate appropriately in that environment. However, Wollbrink explains with the advent of EVTOLs, which, right now, do not fall under part 25 regulations, definitions have become problematic. "The current generation of EVTOLs operate at higher voltages (currently between 600-1000 Volts), which has been a topic of much discussion among the certification authorities and standards organizations."

Reduced Size and Weight

Aviation parts manufacturers are always looking to find ways to make their solutions lighter and smaller. Material set selection is critical to reducing the size and weight of interconnects while not sacrificing electrical or mechanical integrity and robustness.

For example, Grant Lawton, application engineer at W. L. Gore & Associates, Inc., says that by choosing an optimized insulative material one can decrease conductor size without compromising

HEICO

HEICO designs, manufactures, and distributes wiring harnesses, connectors, cables, and other interconnect-related components for niche uses, such as high-voltage, high-current, mil-spec and commercial aerospace, and various rugged environments.





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Shown here is TE Connectivity's CeeLok FAS-T Connector. TE Connectivity image.

performance. "When down-gauging conductors, special attention must be paid to mechanical strength and performance over temperature. Robust testing and qualification are important to evaluate that performance has not been compromised as we reduce size and weight. High-strength material sets have driven size and weight decreases while meeting or exceeding aerospace industry requirements. System driven increases in bandwidth and frequency range have driven the need for higher performance interconnects that not only must function 'out of the box', but after installation, and over time."

Wollbrink says a common change that he has witnessed is the incorporation of aluminum conductors and smaller connectors. "These components must undergo much of the same testing as existing components to ensure that they will be able to handle the environments that they will be installed in. Aluminum conductors have become more prevalent in aircraft despite their lower conductance and malleability when compared to copper. Techniques to increase flexibility via smaller strand thickness and braiding techniques have allowed aluminum conductors to be more resilient and competitive to their copper counterparts."

Carbon-nano tubes have made significant progress in the last decade, which could contribute to saving weight as well. Wollbrink notes that carbon nanotubes will need further testing to become applicable for high performance electrical cables but will reduce the weight currently occupied by copper and aluminum.

EWIS Evolution

High data and power management has created EWIS needs. Modern aircraft use five times as much electrical power as it did just a few decades ago. McAlonis says that makes power switching systems with embedded sensors and electrical monitoring equipment more vital than ever to improve efficiency and load balancing. "Fiber optics and nano miniature connectors in navigation and communication systems also allow faster data transfer."

The industry has continued to push for higher data rates, higher voltages and higher operating temperatures as aircraft manufacturers increase the sophistication and performance of their new aircraft designs. Behlendorf says this has created "material innovations like composite connector bodies, ceramic insulators, electroplated polymer shields and a wide range of advanced flouropolymers used in components. Environmental regulation has also driven some innovation, evolving fire retardants, platings and base metals used in components."

Improved EWIS Signal Integrity

Signal integrity has continued to improve having received increased attention through enhanced performance requirements. Patrick Jemmi, application engineer at W. L. Gore & Associates, Inc., believes "The more we test, the more we learn and improve. The prevalence of sensors, increased data rates/frequencies, and overall information has empowered AI decision-making capabilities. That data flows through the interconnects. Maintaining the interconnect signal integrity is critical to AI making the correct decisions. Typical electrical parameters such as power, loss, shielding effectiveness, crosstalk, and phase matching/tracking all contribute and are important to evaluate. Fiber optics can help system performance, versus copper, by minimizing loss, eliminating shielding effectiveness concerns, and having extensive bandwidth while significantly reducing size and weight."

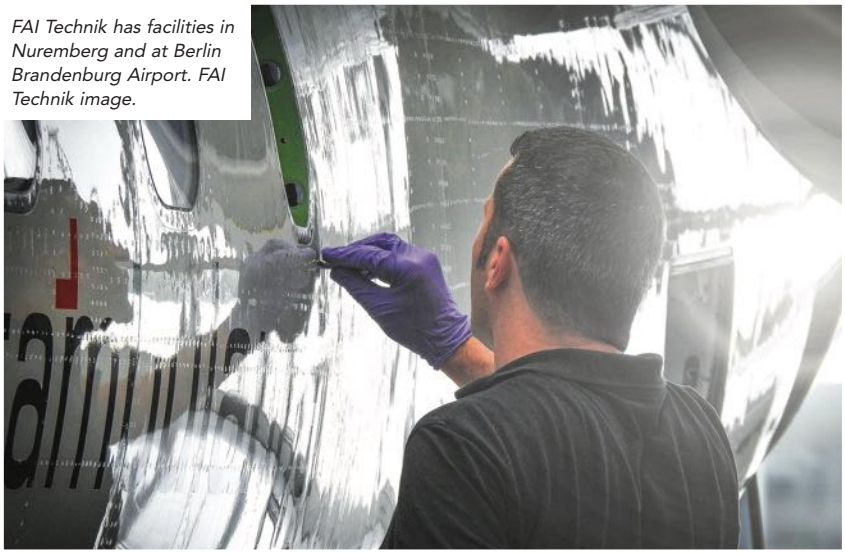
Because EWIS quality and reliability is so critically important to flight system management, Behlendorf believes the industry has tightened manufacturing tolerances to achieve higher data rates in the challenging aircraft environment. "This includes adapting fiber optic technology to the aviation market as well. Aviation fiber is very different from telecom fiber and uses a unique jacketing and termination system in order to tolerate the changing temperatures, pressures and vibration on board an aircraft."

In addition to its smaller size, signal integrity and weight advantages, fiber is inherently immune to EMI and crosstalk issues, has massive bandwidth over significant distance compared to copper, and typically weighs much less. Cables are typically smaller because they do not need the electrical shield layers that add to both weight and cable diameter. AVM

High Voltage

More Electric Aircraft (MEA) and All Electric Aircraft (AEA) have created new application opportunities for high voltage power and electrical distribution systems. There are many potential benefits of high voltage power, but the opportunity carries with it safety concerns. The wire/cable insulation should be selected that can withstand the system's high voltage for the entire vehicle life, even when considering the long term electrical and environmental stresses. Further, the installation must undergo greater scrutiny to ensure the separation distances from critical systems and/or structure are maintained throughout the vehicle.
Chris Wollbrink, engineer at Lectromec, Chantilly, Va.

FAI TECHNIK WANTS TO BE A FLEXIBLE, EFFICIENT MAINTENANCE PROVIDER, PARTNERS WITH MUMTALAKAT



FAI Technik has facilities in Nuremberg and at Berlin Brandenburg Airport. FAI Technik image.

FAI Technik is a 100% subsidiary of FAI Aviation Group Holding, which has been in business for more than 30 years and, since 2017, has had a partner in Mumtalakat, the sovereign wealth fund of the Kingdom of Bahrain.

The primary aim of the company is to support sister company FAI rent-a-jet which has five Bombardier Global Express and one Challenger 604 for charter work (the largest Bombardier fleet in Germany) and five Bombardier Challenger 604s and four Learjet 60s for air ambulance operations.

At its highest point, the fleet totaled 29 aircraft (including air ambulance) but there has been a switch to longer range operations and a restructuring, including the retirement of nine Learjet 60s. As a result, Global Express operations saw revenue increase by 22.24% in 2023 over the previous year, with the US becoming the top destination country (from number 10 in 2021). Newark and Los Angeles were in the top seven destination cities last year.

Longer flights mean more flight hours, around 11,000 in 2023, accelerating maintenance requirements. These are further boosted by the company's active promotion of aircraft availability. Most flights are one way, so, as soon as a booking is made, details of where and when the aircraft is next available are put online for brokers to see. In this way, 80% of flight time is utilized for carrying passengers, which is higher than some other major charter operators' live utilization. The same method is used for air ambulance flights, also with success.

In fact, the highest utilization still comes from the air ambulance Challenger fleet. As an example, between Auust 6-16, one flew Nuremberg-Al Ain-Bangkok-Tokyo-Anchorage-Toronto-Puebla, Mexico-St John's-Nuremberg, racking up around 46 flight hours and covering 23,389 Great Circle miles, just short of the Earth's circumference at the Equator. This is fairly typical, requiring flight crew and medical crew changes en route as duty times expire.

Facilities

FAI Technik has a 14,000 m² carbon-neutral operation with 70 people in three hangars in Nuremberg and a further 30 people in over 3,400 m² of hangar space and another 1,300 m² of workshops, stores and offices at Berlin Brandenburg Airport.

Nuremberg can carry out heavy checks on all types of aircraft. About 50% of the work is for third party, helping towards expected 2024 revenue of €30 million, with VistaJet Malta being a frequent customer, while also being a competitor on the spot charter market.

In fact, it recently carried out a 7,800-landings check on a Challenger 604, one of the most extensive for the type. This involves removal of most of the main aircraft parts and components, including engines, APU, thrust reversers, interior, forward and aft fuselage fuel tanks and the majority of flight controls, much of which is not involved in the 48-and 96-month

Project Pearl was a recent FAI cabin reconfiguration, avionics upgrade and a new and dramatic exterior paint scheme on a Global Express. FAI Technik images.

checks. Non-destructive tests (NDT) such as X-ray, ultrasonic, eddy current and magnetic, comprise up to 30% of the inspection tasks.

Engine overhauls are subcontracted to Lufthansa Technik Aero Alzey and Pratt & Whitney in Germany and to other overhaul facilities in the U.S.

The Berlin facility opened in February 2023, operating from Beechcraft Berlin Aviation's former base which filed for insolvency in spring 2022. Over 90% of the former workforce was reemployed by FAI. It offers line and base maintenance for Hawker HS125 series, Beechcraft Premier 1/1A and King Air series aircraft as well as line maintenance checks up to 1C for Gulfstream models including G280, G450, G500, G550, G650 and G650ER (although demand is very low at the moment). Additionally, there is an AOG-team for Learjet and Bombardier to support FAI´s own fleet.

Design Projects

The company also undertakes its own design projects but uses a network of specialist partners with Part 21G/J production/ design approvals to turn its concepts into a certifiable reality. Two frequently used Part 21J partners are S4A in Spain and QCM in Switzerland. A similar network is used for material and equipment suppliers for cabin reconfigurations.

One of those cabin reconfigurations was Project Pearl, a nine month project in 2020 that also included 60-, 120- and 240-month maintenance inspections on a Global Express. It was led by German designer Tim Callies, who is well known for Airbus ACJ, Boeing BBJ and Bombardier Global Express interiors. It introduced the Collins Aerospace Venue cabin management system and Honeywell Ka-band Ultra High Speed Internet. A 12-seat cabin featured two tone-leather seating, with two three-seat sofas covered in fabric from Armani. Additional modifications and upgrades included new cabinetry, cobalt black metal plating, granite tabletops, a wine cooler, coffee maker and oven in the galley and heated stone floors in the galley and toilet area. This was complemented by a dramatic exterior paint scheme.

On the air ambulance side, the Challenger 604 presents a significant challenge for crews when loading and unloading a patient due to the height of the door sill. Without suitable loading aids, this process also involves various risks for the patient.

Before the COVID-19 pandemic, FAI had a stairlift for all Challenger 604s, which was carried as needed. With the increased use of Portable Medical Isolation Units (PMIU) during the pandemic, it became necessary to have a fixed loading aid on each aircraft. However, procuring additional stairlifts was not possible due to the lack of availability on the market.

This prompted FAI, in collaboration with a metalworker, to quickly design and manufacture an aluminium loading ramp. Within just two weeks, the first prototype was adapted and optimized for the Challenger 604. Two weeks later, the first operational version was available and in use. Subsequently, three more loading ramps were acquired. A ramp is now deployed on every Challenger mission. This is important as there are occasions when a patient is transferred to another aircraft to continue their journey, what the company calls a "wing to wing."

The ramps, with a total length of 600 cm and a width of 60 cm, consist of four individual parts that are assembled before use. They offer a number of advantages:

- Smooth transfer of patients from the ambulance to the air ambulance (and vice versa) using a stretcher, without unnecessary movement or lifting of the patient.
- The stable construction and non-slip surface ensure maximum safety for patients and medical staff.
- Flexible use due to easy assembly and disassembly thanks to the modular design.
- In addition to patient transfer, the ramp also facilitates the safe loading and unloading of medical equipment or PMIU.

Once on board the aircraft, the patient is moved to a Spectrum Medical Module 2800-XXX Med Base for the flight. Depending on their condition, they will need a range of medical support devices. These are mounted on another FAI design, the Med-Wall, which was developed over a period of almost two years, once again in collaboration with a metalworker. During this phase, several prototypes were created, tested, and continuously refined.

The focus was on various aspects:

- Lightweight construction.

FAI designed their Med-Wall, for medical transports. The wall was developed over a period of two years in collaboration with a metalworker and provides safe and secure access to a range of medical support devices. FAI Technik image.

- Universal applicability across all aircraft types.
- Secure and practical mounting of medical devices.
- Effective illumination of the treatment area.
- Functional use of infusion systems (including infusion holders).
- Safe storage of oxygen bottles with direct access.
- Optional mounting of non-standard equipment.
- Sufficient power supply.

The final prototype was approved for all aircraft types via a minor change and all FAI air ambulance aircraft have been equipped with a uniform setup that ensures the highest standards of safety and functionality.

Challenges

Siegfried Axtmann, FAI's chairman and founder, says much lower business aircraft production rates, compared to those of commercial aircraft, is one of the biggest challenges to finding spares, further hindered by equipment suppliers tending to stop production soon after the OEM stops. Small numbers also lead to delays as the suppliers wait until they have an economical batch size to start repairs. In the case of windscreens (which have seen a 100% increase in price) and lavatories, this has even led to aircraft being temporarily grounded.

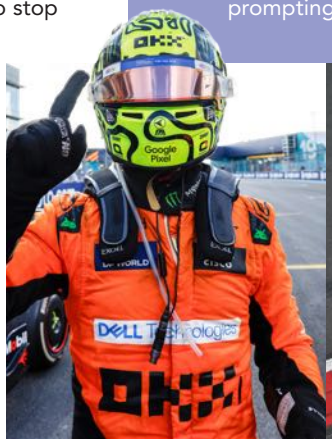
As a result, to ensure stock availability, FAI started to tear down aircraft a few years ago. At present, it has 2.5 Learjet 60s, two Challenger 604s and a Global Express disassembled in stock. This also provides another revenue stream, as it can sell parts and lease engines and APUs to other operators.

Another challenge, he adds, is finding personnel to expand, as every MRO is looking for engineers at present. The company is reaching out to schools and universities to attract new recruits. AVM

Boosting Business

An unusual boost to the charter business has come from the McLaren Formula 1 team, which is part of the McLaren Group, owned by Mumtalakat. The FAI logo has appeared on the car since 2020, this year being found just in front of the rear wheels and front center of the helmet of driver Lando Norris and, recently, also on the helmet of second driver, Oscar Piastri.

McLaren Racing CEO Zak Brown, Norris and Piastri all use FAI to travel between races, with 46 flights last year, so the company's aircraft have been showing up on the Netflix series 'Drive to Survive' and the drivers' social media, prompting increased interest and demand.



McLaren Racing images.

By Rick Scarborough

NAVIGATING THE LANDSCAPE OF A CORPORATE AVIATION CABIN REFURB

Duncan Aviation image.

Par Avion says customer relationships must be actively managed and emphasizes they try to meet the needs of the individual or corporate investor by being readily accessible and by bringing value-added support to the customer. Par Avion image.

Have you ever wondered how it would be to fly like a king? One lucky person had a chance to find out. On January 8, 2023, an anonymous bidder ponied up $260,000 for a 1962 Lockheed 1329 JetStar. This was not just any JetStar. This treasure once belonged to the King of Rock & Roll, Elvis Presley. One peek inside is like being sucked into a 1970s vortex of opulence and luxury. Elvis spared no expense when speccing out the cabin of his last private jet. Red velvet chairs enveloped passengers as they ran their toes across matching red shag carpet. Guests could plug into headphone ports with audio controls and dispense their cigar ash into gold-plated ashtrays. Someone turns on the wall-mounted television and drinks are served from the galley, which also has a Kenmore microwave.

The Lockheed JetStar introduced the world to the corporate jet in 1957. Presley's '62 model likely began flying upper managers back and forth to meetings and treating executives to golf outings on the weekend. They relaxed in tan leather seats and drank scotch from crystal glasses. While visiting airports with my dad in the 1970s and '80s, all the private jets carried the same aesthetic: non-descript white fuselage, analog cockpits and tan interiors. The King was not having it. As new owners tend to do, Elvis put his stamp on this airplane.

All right, maintainers, listen up; this is for you. At some point in your career, a corporate jet owner will approach you in the hangar and say, "You know, NOU812 is going down for a gear replacement in June. I have been thinking about upgrading the cabin, and this looks like a good time to accomplish that. Get me some estimates, and I will think about it." Congratulations, life just threw you a curve ball. Don't sweat it, though; we have people who can help. I have scoured the country looking for some of the best and brightest to formulate a plan and for the new technology available now, which is mind-blowing. Let's get into it.

Plan of Attack

Before we begin, you need to understand the magnitude of business aircraft interior refurbishment. Why is this important? Let's break down the numbers with Fortune Business Insights, which recently stated that "the global business jet market size is anticipated to grow from $45.9 billion in 2024 to $66.97 billion by 2032, at a CAGR of 5.4%." Concerning the aftermarket, Fortune highlights that "fleet modernization programs by developed and emerging economies are anticipated to improve fleet capabilities and generate demand for new charter services with enhanced cabin interiors." Cabin interiors are big business.

You will need a plan. Start with the client in mind. Remember that the jet owner and guests spend most of their time here. Sure, they will take a cursory look at the engines and may glance at the new flat-screen avionics in the cockpit, but the cabin is how they connect with their airplane. What do they want? I recently caught up with Janine Iannarelli, owner of Par Avion Ltd., an international aircraft marketing firm specializing in representing and acquiring pre-owned business jets. We discussed what aircraft owners today expect of their cabin layouts and amenities. She states that "updated cabin management systems [CMS] are a game changer. Especially among legacy aircraft, when entertainment systems become antiquated, it is not as simple as a plug-and-play solution for monitors, etc. Compatibility is the problem and migration to a newer generation

Elliott's Meghan Welch says giving their clients an overview of the entire refurbishment process helps them understand the level of detail that is involved in designing, planning and fabricating a successful and functional aircraft interior. Elliott Aviation images.

CMS is more and more becoming the only solution."

Sounds easy, huh? With a solid game plan, sufficient resources and maybe a little luck, you can satisfy the owner and not break the bank. Steve Martinez owns Aircraft Custom Interiors (ACI) in Dallas, Texas. Three miles west of Love Field (DAL). He and I recently connected and I asked him about managing an aircraft interior business. "Everything starts with an idea," Martinez says. "Our job is to capture the owner's idea and form that into a workable plan." This typically begins about six months before the first panel is popped off the sidewall.

Meghan Welch, director of paint and interior sales at Elliott Aviation, echoes that sentiment. "Everything centers on the client relationship." This week, she and I spoke for a few minutes about the customer experience, and she offered the following insight: "At Elliott Aviation, we go the extra mile to please the customer. I like to have them visit the Moline, Illinois, facility and get to the heart of their wants and needs." In fact, she was hosting a client onsite the day after our meeting.

Third-party options are great, but only one source will do for some: the factory.

Textron has OEM solutions for overhauling your cabin. When asked about their offerings, Textron replied, "Our company-owned service centers offer factory-designed and engineered interior refurbishments and retrofits to meet the needs of our customers. Popular modifications include custom seating arrangements tailored to the owner's preferences and LED lighting enhancements that create the perfect ambiance or ensure easy reading. These updates are often seamlessly integrated during major inspections or comprehensive avionics upgrades like the G5000 or Fusion installation." With cabin MRO options, money and time, nothing is impossible.

Emerging Trends

Corporate aviation is constantly evolving. One of the most important advancements in emerging trends is connectivity. When I spoke with Textron, here is what they had to say: "Cabin connectivity. We understand the importance of staying connected to keep your business moving and turn the sky into your office. In today's digital age, keeping devices charged is also essential. That's why we have incorporated high-power USB charging ports into our aircraft and refurbishment options. Productivity and availability are at the forefront when you tap into the air-to-ground capability of Wi-Fi and satellite upgrades from our experts."

Here are just a few of the connectivity upgrades Textron offers:

- Gogo AVANCE
- SmartSky Flagship
- Airtext+ Cabin Connectivity

At altitude, much of what happens in the cabin is dictated by equipment mounted outside on the aircraft fuselage, and that space is also evolving. Let's just say there are new tools that allow E.T. to phone home and get a clearer signal. Dave Mellin is the director of public relations and communications for Gogo Business Aviation. Mellin was kind enough to chat with me and bring me up to speed on the latest aircraft connectivity. This is the tale of two

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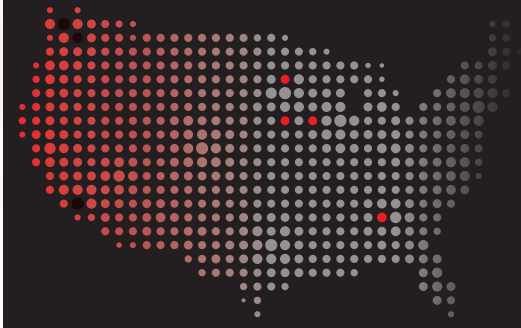

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satellite systems, old school geostationary (GEO) versus the new kid on the block low earth orbit (LEO).

GEO networks rely on satellites orbiting between 22K and 25K miles. Connecting to the network involves expensive heavy equipment traditionally found on the bigger corporate jets. It is limited by distance and is prone to latency and delay.

LEO systems operate 500 to 750 miles from Earth, which helps minimize the delay. Aircraft can deploy a smaller antenna and operate with smaller systems. The solid-state antenna has no moving parts. Until now, if you wanted in-flight connectivity, you had to compromise based on the aircraft size.

OEM Textron Aviation says their service centers offer modifications including custom seating arrangements tailored to the owner's preferences and LED lighting enhancements that can be seamlessly integrated during major inspections or comprehensive avionics upgrades. Textron Aviation image.

Gogo's LEO global broadband experience uses the OneWeb satellite network and is designed specifically for business aviation. AVANCE is Gogo's in-flight connectivity system. The website states: "Gogo AVANCE is not a traditional LRU. It's a platform. An easy way to understand AVANCE is to think of it like you do Apple. Like Apple and its iOS: the value of the AVANCE platform comes not only from its features, but from its ability to be the central technology that connects to and grows with other tools, innovations, products, and services." To sum it up, Mellin says the "AVANCE platform future-proofs your aircraft."

Starlink is an emerging technology that delivers high-speed, low-latency internet access to passengers in flight. They are expanding their supported airframes and going to market through authorized dealers. Starlink's Laser Mesh Network provides continuous service in areas far from SpaceX ground stations, including polar regions and the open ocean.

One of Starlink's dealers is Duncan Aviation, the world's largest privately owned business jet service provider. I fondly recall doing business with Duncan during my stint as a Rotable Exchange Coordinator at Professional Aviation Associates and then as a business owner at Aviation Enterprises, LLC. Last month, Duncan reported installing the company's first Starlink in-flight internet connectivity system. Work on the Bombardier GL-XRS went smoothly; the Starlink fired right up, and the client "streamed three movies simultaneously and Facetimed with his wife." The team accomplished the STC job in less than three weeks.

Corporate jet travel is an experience. In the decades since the events of September 11, 2001, commercial air travel has become a bit circus-like. Those with a substantial net worth are immune from such craziness, and rightfully so. Corporations use business jets to move executives, clients, and guests smoothly and efficiently. Time is money, and an hour lost standing in the TSA line is an hour lost closing a big deal. While corporate travel is a step above commercial, truly elite travel is on another level altogether. In this world, luxury is a way of life. Some of you have clients at this level and know precisely what I'm referring to.

Mindy Elizalde is the marketing director of luxury interior specialist Primadonna. Headquartered in Tucson, Arizona, Primadonna is an approved vendor for Gulfstream, allowing clients to upgrade mattress and bedding options. Primadonna's recent acquisition of SJ Lipkins enables the company to offer a more robust product offering, and the Lipkins cabinet solutions integrate with Primadonna's flatware and fine china. Lipkins' signature line is its Cloudstone countertops. The company states they are "lightweight yet durable, solid yet flexible."

F. LIST (F/LIST) from Thomasberg in Lower Austria, is a global interior supplier for business and private jets. They are expanding the horizon for interior spaces, including dynamic designs using sustainable materials. CEO Katharina List-Nagl recently stated, "For F/LIST, sustainability is at the heart of everything we do as a company, be it in terms of our processes, people, or the products themselves. It is almost impossible to think about a new product or service without considering sustainability." In late 2023, Pilatus Aircraft Ltd. presented the first use of the bio-based material F/LAB Aenigma in the cabin of a business aircraft. A portion of the F/LIST press release states, "Inspired by F/LIST Shapeshifter, the F/LAB Aenigma opens a new chapter in aerospace materials, presenting an ingenious blend of cutting-edge technology and environmental responsibility." Innovative companies like Pilatus Aircraft and F/LIST continue to push the industry forward.

Best Practices

Many elements drive the decision to gut the cabin of a corporate jet completely. One such element is a major maintenance event. Maintenance crews often need access to control cables, tubing, or components under the cabin floor or the sidewall. Wiring bundles, torque tubes, and all sorts of mechanical shenanigans are going on, safely tucked away from passengers and crew. When one of those components needs attention, everything in its way is coming out. Now seems a good time to update the cabin. The aircraft is down regardless, and the major maintenance covers most of the labor. Much like the advice I gave my engine shop customers during a sudden stoppage inspection, consider bumping up to an overhaul while insurance covers the labor if your engine has significant time on it.

Let's head back to Lincoln and talk to Duncan Aviation again. It takes a team to navigate today's business challenges, and one only gets there by deploying the best practices gleaned from years of effort. I had the pleasure of connecting with two of their

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Austrian company F. LIST showcases their dynamic designs and commitment to sustainability in their elegant design facility that they refer to as futurelab or F/LAB. Their design hub is a place for creative thinking, collaboration and experimentation. "It is a place of disruption where we visualize our customers' world and transform alternative concepts into reality," the company says. F/LIST image.

refurbishment team, Steve Elofson and George Bajo, to discuss those challenges and how to overcome them. We learned that aircraft connectivity is at the top of many owners' want lists when planning their new cabin design. Understanding how clients use their aircraft and tailoring a solution to fit that need is mission-critical.

When discussing building the service order, Elofson offered the following:

1. Ask the client where they wish to operate the aircraft. Is their intention to travel outside of the USA? Gogo is now using an air-to-ground (ATG) system, which is very cost-competitive and has good coverage in Canada and Alaska as well.
2. Determine what the client's operating budget is. Duncan will quote a price for the physical hardware and installation labor, but the client must deal directly with the service providers for the monthly coverage. Each is different and has its pros and cons, such as satellite or unlimited data.
3. Cabin management systems (CMS) upgrades are typically tied to maintenance events, such as heavy checks, engine work, or avionics upgrades. If the crew has to access under the floor or sidewall, the interior seats, panels, and components are coming out anyway.

Once maintenance is in motion, it is imperative to remember that documentation and communication drive facilitation. I asked Bajo about how Duncan best manages this process. He stated that everything downstream is managed by a change order. If the maintenance technicians discover an issue, they document the squawk immediately. This applies to both airworthy and unairworthy conditions. These issues could be minor, like a cosmetic blemish that requires the owner's attention or as serious as a crack in an aluminum structural component. These findings are posted on findings on the myDuncan website. There, clients may gain additional intel, view photographs of the affected area, and even approve the quote to keep maintenance in motion. This is invaluable as without approval to proceed, some maintenance activity halts. This could impact the lead time on delivering the aircraft. I would oftentimes have to remind my clients at the engine shop that the lead time begins and the time of approval is not the quote date. Duncan has an advantage because of its extensive capabilities; most needed solutions are in-house. Additionally, they deploy a vast arsenal of TSO, STC, PMA, and DER repairs for compliance. This is critical to remember, as deployment can be immediate for off-the-shelf products with approvals in place. If the client requires a custom solution that has yet to be approved, there will be an additional lead time until that happens. Even coffee pots carry FAA PMA approval.

Some aircraft owners are plugged into the latest bleeding-edge technology for their specific platform. Again, I recall my engine

Duncan Aviation is the largest privately owned business jet service provider in the world and offers complete MRO services it says are designed to help business aircraft operators get the most value from their aircraft ownership. Shown here is Duncan's Jevon Payne finishing seats with high-end leather upholstery. Duncan Aviation image.

shop days when owners would hit me with new whizbang gadgets they read about on a blog post and want me to quote them on working that into their engine overhaul. Unfortunately, I had to break it to them, saying that their engine would lose its certified status unless new technology had FAA approval. Steve and I talked about this as well. He offered the following thoughts. You have to educate yourself to talk with the client about upgrade options. We spoke earlier about emerging technologies, like cabin power. Power outlets at seat locations can now accommodate USB, USBC, and MagSafe wireless charging. Lighting elements can set the mood for the cabin, cool vs warm. 4K display is now a reality. Passengers can consume content stored on their devices or stream it via apps on their devices. The newer technology allows for the use of cabin controls via an iPad with minimal lag.

Bajo and I finished up the conversation with the single most important factor to remember for maintenance providers when managing a cabin interior refurbishment project. He called it: "Get ahead of the jet." With aerospace supply chain lead times as they are, staying ahead of the game is essential. DOMs track aircraft times and cycles like their life depends on it because it does! It is imperative to know what is coming down the line. Engines, landing gear, and other aircraft components require service at specific flights/times/cycles. By working ahead of the jet, you can advise the owner of when would be an excellent time to set the aircraft down for refurbishment. The time to pick out seat color and material is NOT when they are pulling the seats out. Settle that well in advance.

I closed my research with James Logue, the director of maintenance for Latitude 33 Aviation in Carlsbad, California. We reminisced about the days when business jets were limited to basic Falcon 20s with tan interiors. When the private owner or corporation finished with them, they went to other countries or spent the rest of their days hauling checks. "Things are different these days," Logue began. "A few years ago, a 15+ year old aircraft would probably finish its life out with the interior it currently had. There was not an ROI to support a full interior refurbishment." Now that private travel is on the rise, and there is insufficient inventory to meet those needs, older aircraft are holding their value longer. "And now, it makes sense to refresh the cabin," Logue continues, "and with much of the older factory installed components obsolete, it is necessary to bring the cabin current." When asked about the decision-making process, Logue says, "The aircraft mission drives the decision." It is critical to understand how the client will use the airplane and plan accordingly. If you want a deeper dive, check out the Lattitude 33 Aviation article 'A Guide to Aircraft Interior Refurbishment.' AVM

Duncan team members Erin Schleicher and Marsha Kuhlman work on interior components in one of Duncan's specialty shops. Duncan Aviation image.

By Jeff Guzzetti

MIS-RIGGING MISHAP: FLIGHT 5481 IN CHARLOTTE

Former NTSB and FAA investigator Jeff Guzzetti explains how shortcutting the procedure to rig the elevators of a commuter plane led to a tragic accident shortly after takeoff.

As a former aircraft accident investigator, I can attest to the fact that the incorrect rigging of flight controls has led to numerous in-flight emergencies, accidents, and even deaths. Maintenance personnel who serviced or checked the controls did not recognize that the surfaces were moving in the wrong direction. In some cases, the mechanics who performed this work were highly experienced. Anyone can make mistakes, but these mistakes usually lead to tragic circumstances.

Perhaps the most notorious of these types of events occurred on January 8, 2003, when Air Midwest — doing business as US Airways Express flight 5481 — crashed shortly after takeoff from Charlotte, North Carolina. The two pilots and all 19 passengers on board the Beech 1900D turboprop commuter were killed. The National Transportation Safety Board (NTSB) investigation into this crash was intense, complex and comprehensive, and it yielded many lessons learned for airline maintenance professionals.

At the time of the accident, I had recently been promoted out of the NTSB's Major Investigation Division, so I missed the opportunity to lead the "go-team" in Charlotte. However, in my new role as the head of all NTSB field offices, I closely monitored the investigation and supervised the investigation of a second Beech 1900D mis-rigging event that occurred nine months later.

The Investigation

The NTSB arrived at the Charlotte crash site a few hours after the accident, and their first order of business was to retrieve the "black boxes." An initial audition of the cockpit voice recorder (CVR) revealed trouble as soon as the landing gear was raised upon liftoff. For the next 26 seconds, the airplane pitched up, stalled, and descended into the side of a hangar, igniting a massive fireball (see graphics 1 and 2).

The final word recorded on the CVR was from someone in the passenger cabin who yelled "Daddy" — a stark and emotional indication of the potential consequences of improper maintenance.

Graphic 1: A plume of smoke rises above the site where Flight 5481 impacted the tarmac shortly after takeoff.

Graphic 2: Close up view of the accident site.

Information from the flight data recorder (FDR) showed that the airplane was rotating nose-up after takeoff, even though the flight crew was pushing the control column fully forward and trimming the airplane in the nose-down direction. This prompted investigators to focus on the pitch control system of the Beech 1900D, which consisted of cables, pulleys and bellcranks connecting the cockpit control columns at the front of the airplane to the elevator surfaces at its tail (see graphic 3).

The pitch control system also included two turnbuckles that allowed mechanics to adjust the position and cable tension of the system (see graphic 4). Examination of the turnbuckles as found in the wreckage revealed that the nose-down turnbuckle, which measured 7.30 inches in length, was extended 1.76 inches more than the nose-up turnbuckle, which measured 5.54 inches in length (see graphics 5). By quickly conducting a survey of its fleet of 42 Beech 1900D airplanes, the airline discovered that these measurements were not normal. The survey results indicated that the nose-down turnbuckle was extended, on average, only 0.04 inch less than the nose-up turnbuckle, rather than the 1.76-inch difference noted in the wreckage.

Investigators quickly learned that the airplane had undergone a "Detail Six" or D6 maintenance check two days prior to the accident at Air Midwest's West Virginia maintenance station (see graphics 6). FDR data, ground test results, and aerodynamic analysis showed that, before the D6 check, the airplane's full range of downward elevator travel was available. However, after the D6 check, the downward elevator travel was limited to about seven degrees rather than the 14-15 degrees specified in the Beech 1900D Airliner Maintenance Manual (AMM).

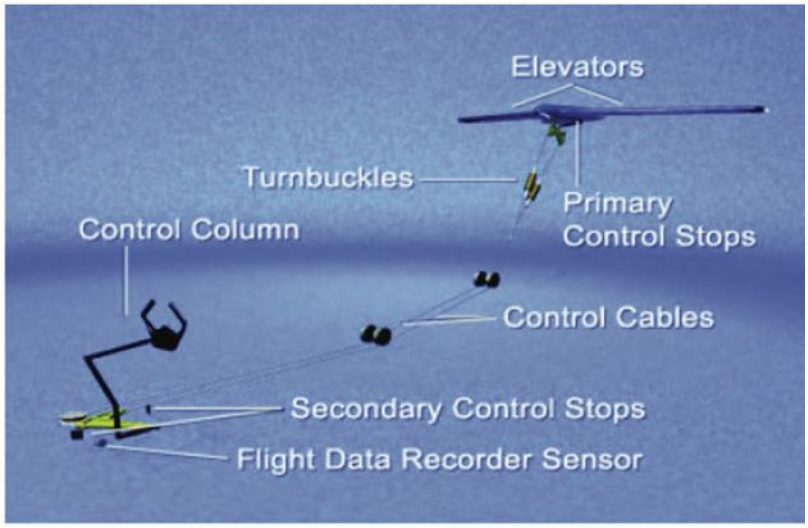
Part of the D6 check involved checking the tension of the elevator control system cables and adjusting the tension if necessary. The mechanic who performed this work had not previously performed it on a Beech 1900D. As a result, he was receiving on-the-job training (OJT) from a quality assurance (QA) inspector for the tasks associated with that part of the D6 check.

The mechanic determined that the airplane's cables needed to be adjusted because their average tension was too low. He stated that he adjusted the cables and performed some, but not all, of the steps of the elevator rigging procedure. However, whenever cable tension adjustments are made, the entire elevator control system rigging procedure needs to be performed — not just those steps that apply to cable tensioning.

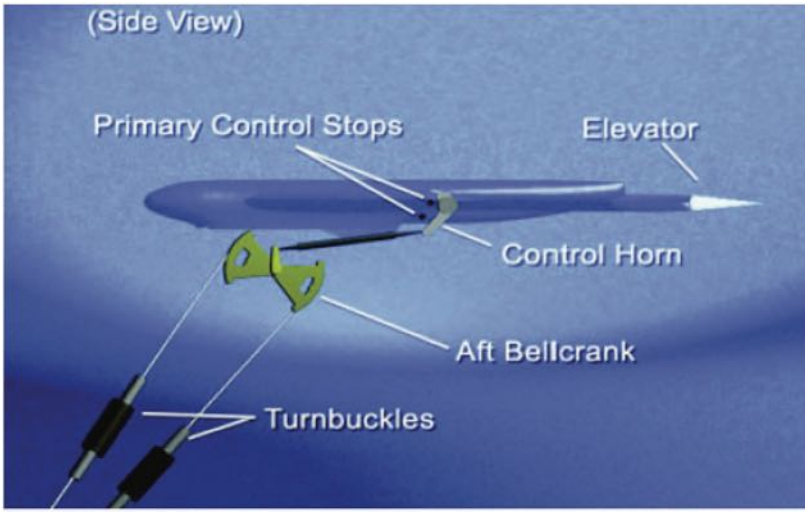
While NTSB could not precisely determine the changes that were made to the elevator control system during the D6 check to restrict the elevator travel, they discovered during ground testing a scenario that was consistent with FDR data from the accident airplane and the physical measurements of the turnbuckles. Specifically, when the rig pin for the aft bellcrank was not removed and the cable tension was released, and then the rig pin for the forward bellcrank was installed aft of the bellcrank arm, adjustments to the turnbuckles resulted in a nose-up turnbuckle length of 5.12 inches and a nose-down turnbuckle length of 7.70 inches. After the aft rig pin was removed, the test airplane's elevator moved to 7.7 deg. nose-down.

Skipped Steps and Inadequate OJT

Five of the six mechanics who were on duty on the night of the D6 check had worked at the West Virginia facility for less than eight weeks, and none of them had completed training for the D6 check. The mechanic assigned by the foreman to perform the elevator control cable check was selected for the task because he had previously accomplished flight control rigging work on another type of airplane (DeHavilland DHC-8). The QA inspector, who was providing the mechanic's OJT, stated that he did not think he needed to closely supervise the mechanic because of his previous flight control rigging experience.



Graphic 3: Schematic illustration showing the Beech 1900D pitch control system.



Graphic 4: Schematic illustration depicting the two turnbuckles used in the Beech 1900D pitch control system.

The mechanic stated that, before he inspected the elevator control system, the foreman helped him locate the access panel for the forward bellcrank rig pin and the elevator cable turnbuckles. The mechanic also stated that he and the QA inspector discussed the low cable tensions, the need to adjust the tensions, and the steps that could be skipped. The QA inspector then left to attend to other duties, and another mechanic held the turnbuckles while he adjusted them. The QA inspector returned after the rigging work was completed to observe the final check of the elevator control system.

The QA inspector stated that, after he verified that the forward bellcrank rig pin had been inserted, he left the mechanic unsupervised during the elevator control cable inspections and turnbuckle adjustments. The QA inspector indicated that he had to provide OJT to another mechanic and also perform a borescope inspection on an engine.

The Beech 1900D elevator control system rigging procedure did not include provisions for adjusting cable tension as an isolated task. However, the mechanic decided to adjust the cables as an isolated task and, as a result, did not follow each step included in the rigging procedure. The QA inspector was aware that the mechanic was selectively performing steps from the rigging procedure and that he was only adjusting cable tension. In fact, the inspector stated that he did not think the manufacturer intended for mechanics to follow the entire rigging procedure and that the entire procedure had not been followed when past cable tension adjustments were made.

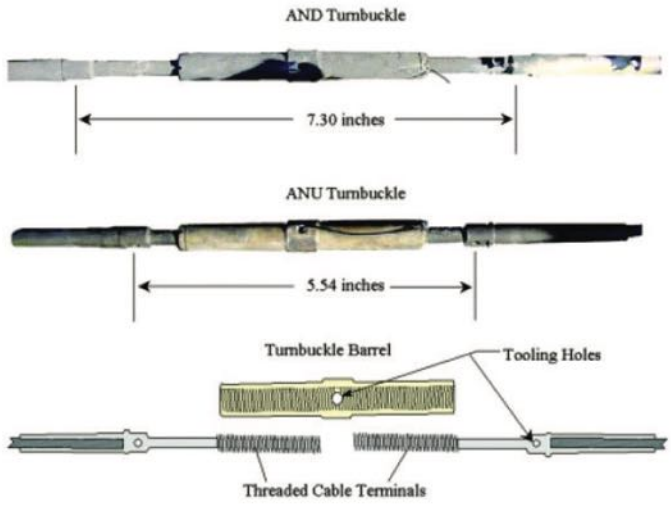
The NTSB opined that the insufficient training and supervision resulted in the mechanic making mistakes that led to the incorrect rigging and the restricted downward elevator travel. If the QA inspector had provided better training and supervision, the likelihood of such errors would have been minimized.

Another Beech 1900D Mis-rigging

Then, on October 16 of that same year, another Beech 1900D was found to have mis-rigged elevator controls. This time, the airplane was operated by CommutAir as Continental Connection flight 8718. As the airplane accelerated for takeoff from Albany, New York, the captain noted that the elevator control was jammed, prompting him to abort the takeoff. Fortunately, no one was hurt, but the Major Investigations Division asked that I dispatch one of my field office investigators to initiate an incident investigation, given the limelight of the fatal Charlotte accident nine months prior.

Examination of the incident airplane revealed that when the elevator trim wheel in the cockpit was positioned to neutral, the elevator trim was actually in the full nose-down position. The incident flight was the first flight after maintenance the day before, in which the elevator trim wheel was removed and reinstalled. The NTSB discovered that part of the work performed on the airplane included removal and replacement of a throttle pin. To accomplish that procedure, the maintenance technician had removed the elevator trim wheel. However, he did not index the elevator trim

Graphic 5: Measurements of the pitch control system turnbuckles as found in the wreckage.



wheel before removing it, and reinstalled it incorrectly.

To make matters worse, neither the maintenance technician nor the QA inspector performed a functional check of the elevator trim system following the maintenance. Also, NTSB was shocked to learn that AAM had no published procedure regarding the removal and reinstallation of the elevator trim wheel.

Causes, Factors, and Lessons Learned

The NTSB determined the probable cause of the Flight 5481 disaster in Charlotte to be the airplane's loss of pitch control during takeoff that resulted from the incorrect rigging of the elevator system, compounded by the airplane's aft center of gravity, which was substantially aft of the certified aft limit. The NTSB also cited numerous "contributing factors," such as the airline's lack of oversight of the work being performed at the West Virginia maintenance station, and its inadequate maintenance procedures and documentation. They also cited the QA inspector's failure to detect the incorrect rigging of the elevator control system, and the FAA's lack of oversight of the airline's maintenance program and its weight and balance program. The NTSB issued 14 recommendations to the FAA related to air carrier maintenance programs, including one to prohibit inspectors from performing required inspection item inspections on any maintenance task for which the inspector provided on-the-job training to the mechanic who accomplished the task.

The legacy of Flight 5481 is its clarion call to all maintenance personnel to prevent mis-rigging accidents by heeding the following items:

- Become familiar with the normal directional movement of the controls and surfaces before disassembling the systems. It is easier to recognize "abnormal" if you are familiar with what "normal" looks like.
- Carefully follow manufacturers' instructions to ensure that the work is completed as specified. Always refer to up-to-date instructions and manuals — including airworthiness directives — when performing a task.
- Be aware that some maintenance information, especially for older airplanes, may be nonspecific. Ask questions of another qualified person if something is unfamiliar.
- Remember that well-meaning, motivated, experienced technicians can make mistakes: fatigue, distraction, stress, complacency, and pressure to get the job done are some common factors that can lead to human errors. Learn about and adhere to sound risk management practices to help prevent common errors.
- Ensure that the aircraft owner or pilot is thoroughly briefed about the work that has been performed. This may prompt them to thoroughly check the system during preflight or help them successfully troubleshoot if an in-flight problem occurs. AVM

Graphic 6: The "Detail Six" work card that was completed just prior to the accident.

Beechcraft 1900D Maintenance Program Manual DATE: 08/25/00 PAGE: A 1

SIXTH DETAILED INSPECTION PROCEDURES CHECKLIST COPY

#	ZONE	DESCRIPTION	STAMP
		AFT FUSELAGE AND EMPENNAGE	
	SB2564	C/W BEECH SB 2564 AS REVISED (ACFT.UE1-UE113)	Mech N/A / Insp
1	280 281 311 312 330 340 320	SKIN - Inspect skin for condition and loose or missing rivets. If damage is found, check adjacent structure	Mech AM 714 / Insp DI 701
2		STRUCTURE - Check for cracks, loose or missing rivets and concealed damage.	Mech AM 714 / Insp DI 701
3	181 311 312	FLIGHT CONTROL COMPONENTS, CABLES AND PULLEYS - Inspect the control system components (pushrods, turnbuckles, end fittings, castings, etc for bulges, splits, bends or cracks.)	Mech AM 704 / Insp DI 701
		Check control cables, pulleys and associated equipment for condition, attachment, alignment, clearance, and proper operation.	Mech AM 704 / Insp DI 701
		Inspect cables for broken strands or evidence of corrosion per *BE Chapter 20-04-00.	Mech AM 704 / Insp DI 701
		Check cable tension per *BE Chapter 27. Temperature 55 degrees F. 3/16" Elevator Cable Tension: UP 57 DOWN 62 1/16" Elevator Tab Cable Tension: 20 3/16" Rudder Cable Tension: LT 75 RT 75 1/16" Rudder Tab Cable Tension: 20	Mech AM 704 / Insp DI 701
4	311 312	PLUMBING - Inspect plumbing for condition and attachment.	Mech AM 704 / Insp DI 701

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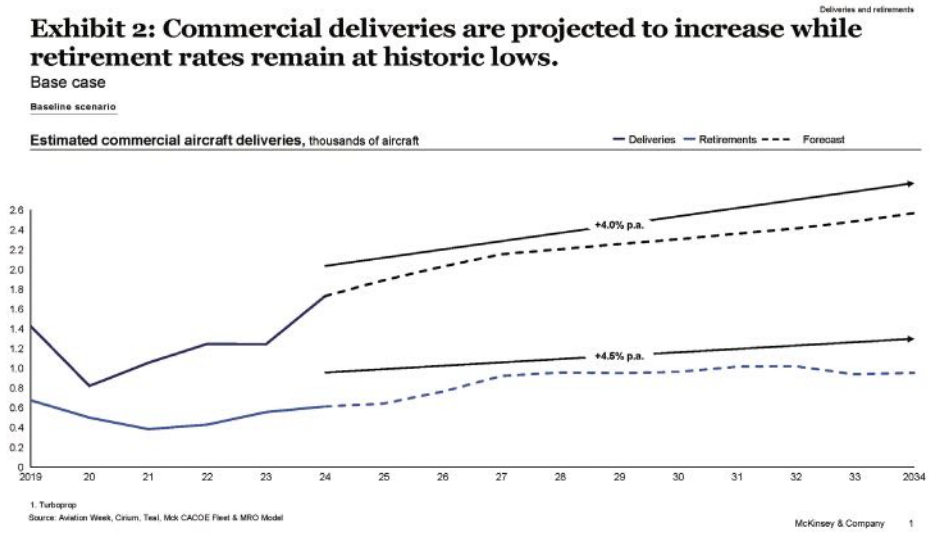
The Aviation Maintenance Sector: Will the Good Times Last?

By Vik Krishnan and Daniel Leblanc

Be careful what you ask for. During the pandemic, aviation industry leaders were desperate for traffic to come back. Now it has. Indeed, revenue passenger kilometers (RPK) are forecast to be 4.2 percent above 2019 levels in 2024 and are likely to keep growing for years after that. Ditto for commercial demand.

But there is a sting in the tail. There are not enough new aircraft to support growing demand, and there is a backlog of more than 16,000 narrow- and widebody aircraft. Challenges with aircraft production rates and new engine technologies have exacerbated the supply shortage.

To cope, there are two major approaches.



The first approach is to keep current aircraft in service; retirement rates are projected to be about 24 percent lower from 2024-26 compared to the decade before the pandemic. Keeping aircraft in the air longer will require more maintenance, repair and overhaul (MRO) services to engines and airframes. These are expensive and getting more so: MRO costs have risen sharply over the last five years.

Moreover, this effort could cause ripple effects throughout the value chain. For example, fewer retirements will limit the availability of the used serviceable materials (USM) that are often used to lower MRO costs. Meanwhile, aircraft lessors are responding by either placing aircraft at significantly higher lease rates or extending at attractive rates while avoiding what would otherwise be financially meaningful remarking and retrofit downtime.

Current market conditions will promote continued MRO growth for the next decade, with spend rising to $135 billion by 2034. During the first few years, growth will likely come primarily from the high demand for maintenance on older fleets. Engine MRO could account for the largest share of MRO spending, with demand expected to be particularly strong in the short term as previous generation engines enter major shop visit cycles.

After that, there will likely be a slight growth dip, due to the impact of lower aircraft production rates and deliveries from 2019 and into the pandemic years. Over the whole period, and beyond, MRO will grow simply because the aviation industry is. But there could be wrinkles.

Specifically, elevated fleet ages and the commensurate increase in maintenance needs for older aircraft are not likely to persist. From 2028 onward, we estimate that aircraft retirement levels will return to historic levels — about 2.7 percent of the fleet per annum

Right: Daniel Leblanc
Left: Vik Krishnan

— bringing down the average fleet age from today's historic high of 13.3 years to 12.3 years by 2034.

In addition, airlines regularly transport cargo in the belly of passenger aircraft. During the pandemic, to keep trade flowing, cargo airlines converted passenger aircraft to freighters, which helped increase MRO revenues for passenger-to-freighter (P2F) specialists. As international belly cargo capacity continues to recover, P2F conversions have started to fall and this is expected to continue.

The second approach to narrow the gap is to build and deliver more planes. This is beginning to happen. The supplychain disruptions that have hindered production are expected to ease over the next two to three years; we expect total deliveries will increase an average of 4 percent a year from 2024-34. Fleet growth will be slightly slower than passenger travel demand, however, because new aircraft being delivered are larger gauge than the ones being retired.

The introduction of next-generation aircraft and engines will likely influence MRO spending. Many deliveries will consist of aircraft with composite airframes or wings, as well as next-generation engines. New engines entering the market are experiencing more frequent maintenance visits because of the technical and production quality issues that are common with innovation. But once these are solved, the engines are expected to have comparable or lower maintenance costs than their predecessors. Moreover, even though fleet size is growing, demand for airframe services will likely remain flat, because the composite structures of next-generation aircraft require less maintenance than their mostly metallic predecessors.

The picture, then, is multifaceted: more aircraft will mean more demand for MRO services, but each aircraft will likely need less.

MRO providers today are focused on servicing aging fleets, which account for the majority of demand for their services. But they must also build capabilities for the future. A forthcoming McKinsey survey, for example, found that few MRO providers had integrated digital and analytics at scale throughout the organization. Partly for regulatory reasons, the industry is surprisingly reliant on paper-based record keeping, which makes collating and analyzing data difficult.

Digital transformations are not easy; indeed, most struggle. Preparing now is the best way to get positioned for long-term success. AVM

Vik Krishnan is a senior partner in McKinsey & Company's San Francisco office. Daniel Leblanc is a partner in McKinsey & Company's Dallas office.

By Jason Dickstein

Protecting the Aircraft Parts Supply Chain

It has now been over a year since AOG Technics hit the news. AOG Technics was a U.K.-based aircraft parts distribution company that was accused of serious fraud concerning aircraft parts documentation that they provided. They were accused of selling used parts under paperwork that falsely suggested they were new. A diligent airline receiving inspector recognized that the physical condition of these "new" parts made them look used. This set off an investigation that revealed an apparent pattern of fraud.

Some of you might be wondering what industry and government bodies have done to make sure this fraud cannot be repeated. If this is your concern, then you should rest easy in the knowledge that detection and prevention mechanisms are being improved to help make a good system, even better.

The industry tends to rely on the Voluntary Industry Distributor Accreditation Program (VIDAP) as a mechanism for mitigating the risk of aircraft parts quality issues, including the sort of fraud alleged in the AOG Technics case. This program began as an advisory circular published by the Federal Aviation Administration (FAA): AC 00-56. Because of this, the VIDAP is often known as the 00-56 program. In addition to being an effective program for mitigating the risks of fraud, it is also a useful vehicle for rapidly introducing quality assurance improvements into the aircraft parts distribution industry.

In the 1990s, the U.S. Department of Transportation Inspector General raised concerns about the integrity of the aircraft parts supply chain. In response to these, the FAA and industry collaborated to produce the VIDAP and its advisory circular. The VIDAP was originally crafted to allow the distribution industry to develop programs designed to prevent serious safety hazards. At the time, the collaboration that produced the voluntary program identified many of the leading elements of a robust quality system.

There are two important features of the VIDAP. The first is the quality assurance system.

A VIDAP quality assurance system is a collection of processes and procedures that meet the list of 18 quality system elements found in the advisory circular, ranging from training to effective receiving inspection, warehousing, and shipping processes. In addition to those requirements, the distributor's quality system must also meet the requirements of a formally recognized quality system (presently, the FAA recognizes ASA-100, ISO 9001, and the AS9100 series of standards).

A distributor that wants to participate must establish a quality system that meets each of the elements. Many of these elements are specifically aimed at ensuring the integrity of the aircraft parts supply chain. Compliance must be confirmed through an audit by a third-party organization authorized to audit to the applicable recognized standard.

The second important feature of the VIDAP is a documentation matrix that sets minimum standards for traceability. Traceability was an immature commercial feature in the United States of the 1990s — the VIDAP was an attempt to standardize traceability concepts. The VIDAP recognizes minimum standards for traceability that the distributor should expect to receive, with different types of documentation expectations based on the nature of the aircraft part. For example, the matrix recognizes that new parts produced under FAA production approval may be documented with an 8130-3 tag; but it also recognizes that they can be identified using other documentation or even with parts markings where the parts markings are regulated by the FAA.

Compliance to the system is audited by a third-party auditor who is required to perform a live audit of the premises to ensure that the manuals (and the implementation of the manuals) meet the requirements.

Companies who pass a compliance audit with an appropriate system are eligible to be listed in the FAA's accreditation database.

The VIDAP program has grown well-beyond its humble roots in the United States to become a global program that is trusted by airlines and MROs around the world. Many parts-buyers will use the AC 00-56 list (which is available online) as the start for their inquiry into a potential partner. Today, the VIDAP is formally recognized in the aviation regulatory systems of the European Union and China. The Chinese system recognizes ASA-100 (one of the FAA-recognized standards).

As it happens, when the AOG Technics issue arose, the Federal Aviation Administration (FAA) had already begun an audit of the VIDAP. This is a regular periodic process that the FAA undertakes. As part of this audit, they inspected each of the quality standard organizations who hold standards recognized under the program. This allowed the FAA to support the international fraud investigations while also acting

proactively and expeditiously to make the distribution system better. This was a separate process from the FAA unapproved parts notice that was issued in response to AOG Technics (EASA, UK CAA and many other aviation authorities issued comparable notices of their own).

The Serious Frauds Office in the United Kingdom investigated AOG Technics. In December 2023 they searched the AOG Technics headquarters (which was also the home of the founder) and they also arrested founder Jose Alejandro Zamora Yrala. By this time, FAA, EASA, UK CAA and numerous other aviation authorities had already issued parts notices calling out the AOG Technics' parts.

This was not the end of government action, though. As part of the FAA's ongoing VIDAP audit process, they audited Transonic Aviation, who held the TAC 2000 standard. This audit revealed that Transonic Aviation was not in compliance with their obligations under AC 00-56 (it is believed that they were not conducting in-person third-party audits in all cases). Following the FAA's audit of Transonic Aviation, the accreditation organization withdrew TAC 2000 from participation in the VIDAP. The FAA announced that it would cease to permit new TAC 2000 facilities into the FAA's accreditation database, and that all TAC 2000 facilities would be purged from the accreditation database by January 24, 2025.

While notices and arrests helped to remedy the immediate AOG Technics situation, the industry wanted to make use of this situation to help the industry improve its own fraud detection processes. As part of this effort, organizations like the Aviation Suppliers Association (ASA) began to investigate what went wrong, and how the possibility of future flaws could be addressed proactively through processes intended to prevent both intentional fraud and inadvertent misrepresentations, too. This led to increased training products being offered to the aviation industry (many of which are free to ASA members). ASA identified changes it could make in its own standard (ASA-100) to improve distribution oversight. It also formed a subcommittee to examine the FAA's advisory circular (AC 00-56B); that subcommittee will be recommending improvements to the advisory circular. Many of the changes have to do with oversight of quality functions that may be performed outside of the main facility — like delegated inspections that are performed when parts are drop-shipped from another location — in order to impose greater rigor in quality assurance. This is intended to improve the ability of distributors to be able to catch aircraft parts problems before they lead to bad parts being installed on good aircraft.

ASA is not the only industry group looking for answers. ASA has advised an ad hoc industry group known as the Aviation Supply Chain Integrity Coalition (ASCIC) on a variety of industry changes that could be implemented to improve safety. ASCIC is made up of large manufacturers and air carriers and they are continuing their own efforts to improve the industry.

Nearly 30 years after its inception, the VIDAP remains an effective program for mitigating hazards associated with aircraft parts distribution. It is a living program that is being constantly improved to reflect the needs of the industry. Recent events have illustrated elements where the VIDAP could be improved and both industry and the FAA have taken advantage of these opportunities to make changes that help to improve the VIDAP's ability to be a positive contributor to aviation safety. AVM

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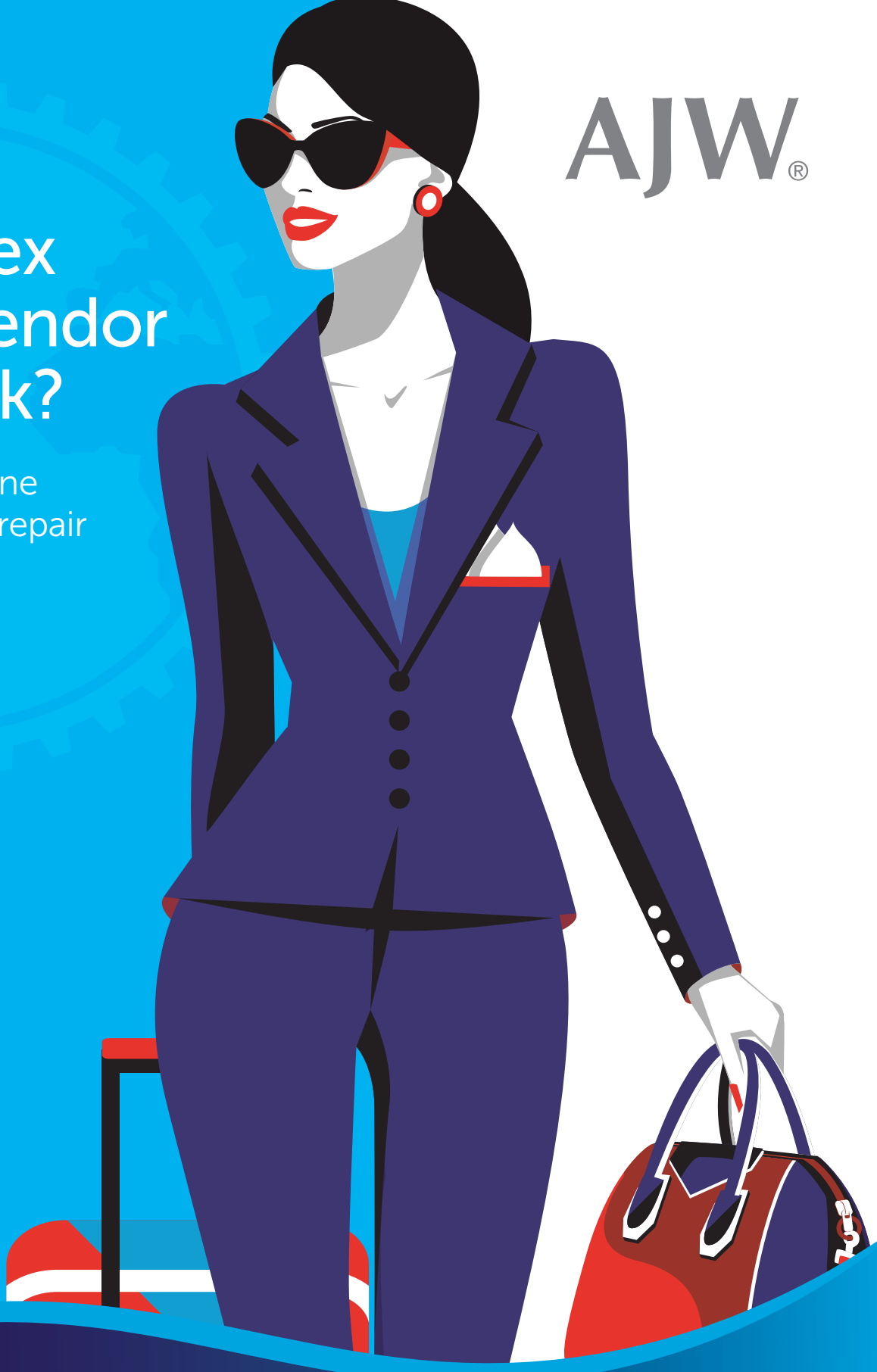

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