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The World's Largest MROs

January 2019

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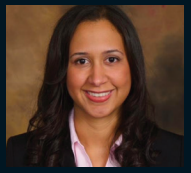

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JANUARY 2019 VOL 37 ISSUE 6

DEPARTMENTS

COVER STORY

In our annual look at the largest MROs in the world, we hear how some of those mammoth companies are setting the pace of change in our industry.

On the cover: AAR, an independent aftermarket services provider, has had double-digit sales growth this year. Shown here is their newest MRO facility located in Rockford, Illinois.

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

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AVIATION MAINTENANCE
avm-mag.com

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

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

Contributing Editors
Charlotte Adams
James Careless
Jason Dickstein
John Goglia
David Jensen
Douglas Nelms
Dale Smith
David Schober

ADVERTISING/ BUSINESS
Publisher/Owner
Adrian Broadbent
abroadbent@aerospace-media.com

East Coast Sales
Paul McPherson,
pmcpherson@aerospace-media.com

West Coast & Classified Sales
Danny Faupel
dfaupel@avm-mag.com

International Sales
Jina Lawrence
jinalawrence@avm-mag.com

DESIGN/PRODUCTION
Lisa Garrison
lgarrison@avm-mag.com

SUBSCRIPTIONS
Paula Calderon
pcalderon@aerospace-media.com
+34 91 623 7969

CLIENT SERVICES
Administration
Maria Hernanz Reyes
maria@asi-mag.com

LIST RENTAL
Statistics
Jen Felling
felling@statlistics.com

REPRINT PARTNER
The YGS Group
717 505 9701 x100

US Publisher
Paul McPherson
ASI Publications Ltd

US Publishing Office Address:
21362 Sparrow Place
Potomac Falls
Virginia 20165

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ASI Publications Ltd
"Rydal"
1 Coyners Avenue
Southport
PR8 4SZ
UK

abroadbent@aerospace-media.com

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

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Judge Not

(at Least Not Too Soon)

BY JOY FINNEGAN
EDITOR-IN-CHIEF

By now, you have heard much about the Lion Air crash on October 29, 2018. But let's recap. Right after Lion Air Flight 610 crashed after requesting to return to the airport, reports began to be floated about the maintenance of the aircraft. Edward Sirait, the president of the airline, told reporters that the plane had also encountered a technical problem on its previous flight that was subsequently resolved by maintenance technicians. "This aircraft last flew from Denpasar [Bali] to Cengkareng [Jakarta airport] and it was released to fly," he said. "There was a report about a technical problem but we have worked on the technical issue based on the procedure from the aircraft manufacturer."

The previous flight, JT43, also encountered "unreliable airspeed indications." One passenger said the plane dropped suddenly several times during that flight. Another passenger recounted that the aircraft returned to the gate prior to departing. The aircraft was reportedly experiencing unusual engine sounds. Flight JT43 made a distress call and requested to return to the airport as well. The pilot later said the aircraft was flying normally and would not need to return after all.

Shortly after Flight 610 crashed, the Indonesian transport minister suspended Lion Air's technical director and three other officers due to speculation over the airworthiness of the aircraft. The focus was firmly on maintenance.

Once the flight data recorder was found and data downloaded, it was determined that its engines were running, indicating no explosion or inflight break up in the air, shifting focus to operational issues.

Further research by Indonesia's National Transportation Safety Committee into the previous flights of that aircraft revealed it had airspeed indicator problems during its final four flights. Inaccurate airspeed readings continued for three days after analyzing the contents of a flight data recorder that was recovered. Each time the aircraft was cleared for takeoff. Again, the focus turned to maintenance.

Then, based on FDR data, it was announced that the anti-stall system engaged after takeoff from Jakarta with the nose being pushed down repeatedly. Quickly after that, Boeing issued a safety warning about flight-control software that might cause pilots problems and could lead to a steep descent of the 737 MAX 8. The FAA added their own directive quickly after. The investigation then started to focus on a software issue that could lead to misinterpretation in the cockpit. The automatic anti-stall system appeared to engage due to erroneous readings from a sensor, the angle of attack indicator, that may have triggered it. The angle of attack sensor measures the position of the wings relative to the flow of air and provides information about a potential stall. In that situation, the 737 MAX has a system that automatically pushes the nose down to prevent a stall.

Maintenance workers, they said, had failed to repair the sensor despite pilots' reports from a flight the previous day that suggest the anti-stall system engaged improperly on that flight too. The ball was now lobbed back into the maintenance side of the court. The pilot flying the jet the day before the crash, shut down the plane's anti-stall system, and continued on.

Meanwhile, two pilot unions (and later a third) put forth that the risks of the new safety feature, the Maneuvering Characteristics Augmentation System (MCAS) system, were not sufficiently explained in their manuals or training. Boeing executives quickly met with the pilot unions at American and Southwest Airlines to allay their concerns about the system.

The initial Indonesian National Transportation Safety Committee report said the aircraft's "flight computers received false AOA readings that may have triggered MCAS—which would have pushed the nose of the aircraft down and continued to do so as long as the system was active." MCAS is not part of previous 737 designs, the Boeing memo released shortly after the accident said. The system also was not covered in MAX flight crew operations manual (FCOM) or difference training for 737NG pilots. In that memo from Boeing, it says an erroneous AOA could trigger automatic nose-down pitch-trim. The Boeing memo referred operators to a procedure for runaway pitch trim that includes switching the system off as the proper response.

Maintenance logs show the angle-of-attack sensor was replaced October 27. After penultimate flight, where the pilots flew the plane manually and continued on, maintenance workers reportedly "flushed the left pitot air data module and the static air data module, and cleaned the electrical connector plug for a computer that transmits elevator feel to the control column. The angle-of-attack sensor was not reported to have been examined," according to a *Forbes* report. But the issue continued to occur. "At this stage, we cannot determine if [the actions were] correct or not," Nurcahyo Utomo, head of Indonesia's national transport safety committee, said at a news conference.

It is never a good idea to second guess an investigation in progress. But some clear problems have already been uncovered. Many things must go wrong to result in an event of this magnitude. Mistakes were made. However, if the system had been fully explained to the crew, if they had been trained on its implications and recovery in a malfunctioning scenario, and if the maintenance crews had been able to troubleshoot the angle of attack sensor problem the first time the discrepancy was written up, this tragedy could have been avoided. AVM

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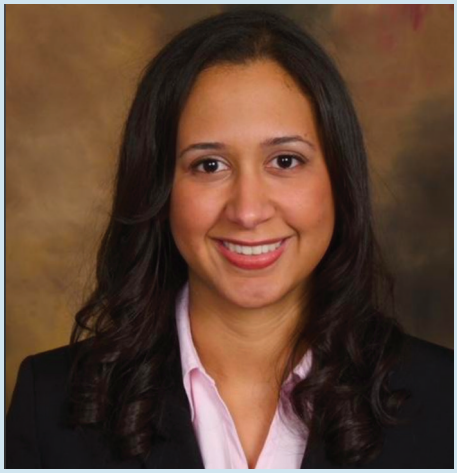
American Chooses Woman for DOM Position

On Nov. 13, Evita "Evie" Garces, managing director of Maintenance Operations Control at American Airlines, was named the company's new FAA-certificated director of maintenance (DOM). American is making history by selecting Garces to be the first female and the first Latina team member to occupy the position.

As the new DOM, Garces is responsible for ensuring that all work on the airline's aircraft is performed in accordance with Federal Aviation Regulations (FARs); staying up to date on, and maintaining access to, all FARs; and serving as the main maintenance liaison between the FAA and American. She and her team also oversee the day-to-day technical operations of American, which includes oversight of aircraft maintenance, vendor operations in more than 150 cities, ownership of the aircraft maintenance deferral process and the management of out-of-service aircraft. The role was previously occupied by Steve Bobzin, who recently announced his retirement effective at the end of the year.

Garces started her career on the aircraft maintenance track, earning her Airframe and Powerplant (A&P) license and continued to work her way up within the company, serving in various positions, including manager of Aircraft Maintenance and managing director of Line Maintenance. Prior to her current position, she served as the managing director of Maintenance Planning — Base and Strategic. It was in this position that she led the efforts around Base Maintenance operations, including the launch of several successful initiatives such as domestic satellite Wi-Fi modifications and Boeing 737 cabin retrofits.

With the support of her parents, who are originally from the Dominican Republic, Garces's love for airplanes was nurtured at a young age. She was fascinated with aviation and started down the path of a career in the industry as early as high school when she attended Aviation High School in New York City. She continued to expand her knowledge at the College of Aeronautics in Flushing, New York, and later went on to obtain her Master of Business Administration from Northwestern University.



American Airlines DOM Evita Garces

There are five key positions essential for any airline to operate as required by the Federal Aviation Administration's Code of Federal Regulations: chief pilot, director of operations, director of safety, chief inspector and director of maintenance. Now, American says Garces is recognized as the designated team member to move the company's maintenance strategy forward, ultimately helping to improve the airline's operations.

Pratt & Whitney Inaugurates New Aerospace Engineering Center in Puerto Rico

Pratt & Whitney inaugurated the Pratt & Whitney Puerto Rico Aguadilla Engineering Center in Aguadilla, Puerto Rico in December 2018. The celebration also included a $500,000 donation by Pratt & Whitney to the University of Puerto Rico at Mayaguez. Puerto Rico Governor Ricardo Rosselló and representatives from the Puerto Rico Industrial Development Company (PRIDCO) attended the ceremony alongside several Pratt & Whitney and UTC executives.

The renovated $14M facility, made possible through a collaboration with PRIDCO, is 104,000 square feet and houses more than 800 Pratt & Whitney Puerto Rico employees with the capacity for 400 more. The facility is on track for LEED Silver certification with multiple features designed with sustainability in mind. It also has an open-concept floorplan to support communication and collaboration.

Pratt & Whitney Puerto Rico, Inc., formerly Infotech Aerospace Services, Inc. (IAS), is an aerospace engineering center that designs, evaluates and supports Pratt & Whitney's commercial and military gas turbine engines, including the Geared Turbofan engine.

"We brought IAS into the Pratt & Whitney family because we recognized the tremendous potential the business offered us — in particular, the talented engineers and employees," said Geoff Hunt, senior vice president of Engineering, Pratt & Whitney. "I want to thank PRIDCO for their support in making this beautifully renovated facility possible. This is something we can all come together to celebrate, especially in light of the devastation of Hurricane Maria."

Pratt & Whitney says that since Hurricane Maria in September 2017, their employees around the world have been committed to relief efforts through a combination of financial contributions, donation events and volunteerism. Local employees have helped more than 600 families in eight towns by distributing food and personal items and by volunteering to repair damaged homes.

As part of its commitment to Puerto Rico and its people, Pratt & Whitney also presented a donation of $500,000 to the University of Puerto Rico at Mayaguez to fund an aerospace teaching laboratory designed to train the next generation of mechanical and electrical engineers in the propulsion design and development.

JAA Training's First Classroom-Based Training Package Approved by ICAO

Ceyrine Pellikaan, Joint Aviation Authorities Senior Course Developer

The Joint Aviation Authorities Training Organization (JAA TO) has had its first classroom-based Standardized Training Package (STP) approved by the International Civil Aviation Organization (ICAO) in November. The "Safety Management for Approved Maintenance Organizations under ICAO/EASA Rules" training course was delivered for the first time in October 2018, in Hoofddorp, the Netherlands. The session was observed and validated by Mostafa Hummady, senior validator; Paula Vieira de Almeida, JAA TO's director, as OJT Validator; JAA TO's senior ICAO qualified course developer, Ceyrine Pellikaan; and her assistant Carolyn Mayes.

"As part of my responsibilities, I oversee development of new courses and ensure that our existing portfolio is continuously updated according to JAA TO's high-quality training standards," says Pellikaan, who holds a Master's Degree in Cognitive Sciences, coordinated the project with her team. "As an ICAO Regional Training Center of Excellence (RTCE), JAA TO is also responsible for the development of ICAO-harmonized training packages, according to the TRAINAIR Plus methodology," she explains.

The new course is focused on the implementation of SMS in Approved Maintenance Organizations (AMOs). SMS for AMOs is a core ICAO-Annex 19 requirement. The European Aviation Safety Agency (EASA) is planning to introduce SMS requirements for PART-M/CAMO and PART-145 continuing airworthiness organizations. In accordance with the new rules, SMS should be implemented by 2021 for PART-M/CAMO and by 2023 for PART-145 organizations.

Having an STP approved by ICAO is a complex process. JAA TO says it is honored to contribute to the mission of ICAO and EASA, providing the industry with high-quality competency-based training courses. Through this STP, trainees gain the necessary knowledge, skills and attitudes to enable them to implement EASA and ICAO Management System requirements within AMOs the group says.

The TRAINAIR Plus methodology consists of three phases: 1) preliminary analysis of the problem the prospective course wishes to solve; 2) design of the course tools based on what the trainees should be able to do, rather than to simply know; and 3) validation phase with a group of participants acting as a sample target-audience. In the last phase, participants play a crucial role in sharing opinions, comments and feedback on where to improve, and expert validators report progresses back to ICAO.

As an ICAO RTCE, JAA TO has a responsibility to both lead the aviation training industry as well as to, in coordination with ICAO, develop, improve and provide training courses according to the excellent TRAINAIR Plus methodology; thereby assisting ICAO in further disseminating the SARPs and recognized best practices for safety. The development of this and future STP courses contributes in a real sense to the accomplishment of these responsibilities.

More information about the training course "Safety Management for Approved Maintenance Organizations under ICAO/EASA Rules" can be found at: www.jaato.com.

FL Technics Opens New Warehouse in Asia

FL Technics has further expanded in the Asia region by opening a new warehouse in Singapore. The operations opened at the beginning of November 2018. "The decision to add a warehouse location in Asia enables the company to scale up with customers who are facing increasing time pressure for parts and material delivery fueled by the booming aviation industry and fierce competition in the region," said Zilvinas Lapinskas, CEO FL Technics.

Recently, FL Technics together with CALC (China Aircraft Leasing Group Holdings Limited) and ARI (Aircraft Recycling International Limited) launched a Joint Venture with focus on aircraft base maintenance in Harbin, China, to provide MRO services for aircraft targeting Asia and Europe regions. Earlier this year, FL Technics Indonesia, based in Jakarta, received the FAA Repair station 145 certificate, which allows providing MRO services to aircraft registered in the United States.

about people

West Star Goede GM of Chattanooga Location

Goede

West Star Aviation announced Steve Goede has been named as the general manager of the company's Chattanooga (CHA) facility. In his new position Goede will provide leadership for the site including operations, planning and project management, quality control and building maintenance. Previously, Goede was instrumental in developing West Star's Landing Gear Overhaul and Accessory programs at the ALN, GJT and CHA locations. Tom Hilboldt, who was previously managing the location, will now be director of maintenance - CHA.

Alton Adds Rynott as a MD

Rynott

Alton Aviation Consultancy has hired Brian Rynott as a Managing Director. Based in New York, he will contribute across all of the firm's advisory practices, with an emphasis on aircraft financing and leasing, airline advisory and restructuring and strategy and management consulting engagements. Prior to joining Alton, Rynott held the position of CIO with Intrepid Aviation, a commercial aircraft lessor, where his primary responsibilities included implementing, managing and directing the company's risk and portfolio management groups. He began his career with American Airlines in a variety of revenue management roles before joining American Express' Enterprise Risk Management and Airline Center of Excellence teams.

Avionica Names Rios COO

Rios

Avionica announced that vice president of sales Anthony Rios has been promoted to Chief Operating Officer (COO). As COO, Rios is charged with driving strategic prioritization and accountability for Avionica. "Tony is a seasoned and trusted leader who consistently delivers results for Avionica," said Raul D. Segredo, president of Avionica. "I have

about people

complete confidence in Tony's ability to drive Avionica's world-class product offerings with industry-leading operational practices that will extend Avionica's innovation, growth, and market leadership." Rios will assume responsibility for engineering, marketing, operations and corporate alignments, as well as direct and prioritize the company's investments. In his previous role as sales leader for Avionica, Rios oversaw the company's global sales in the United States, Europe, Asia, Middle East, Africa, Australia and South America. He will continue to report to Segredo in his new role.

SR Technics Appoints New Head of Engine Services

SR Technics, has appointed Owen McClave as senior vice president Engine Services, effective as of January 1, 2019 and reporting directly to Jean-Marc Lenz, COO. He will succeed Roberto Furlan, who has decided to step down. McClave is a senior level executive and for three decades has worked with OEMs, independent MROs and leasing companies, mainly on engine and component business. He has also served as a member on numerous boards and as an active member on several executive committees. He is a Fellow of the Chartered Institute of Management Accountants and holds a BS Management and Master's degrees from Trinity College, Dublin. "I am very pleased to welcome Owen in our senior management leadership team," Jean-Marc Lenz, COO at SR Technics, said. "He is well versed in lean thinking and methods and his broad experience will enable us to drive operational excellence in Engine Services."

Dallas Airmotive Adds Hagen to Rotorcraft Engine Sales

Dallas Airmotive announced Charles "Chuck" Hagen has joined the company as the Rotorcraft Regional Engine manager for the southwest U. S. and Alaska region. Hagen is an A&P licensed technician and brings more than 25 years of engine maintenance experience to the role, including over 20 years of tenure at AeroMaritime. He is also the 2018 HAI Salute to Excellence Rolls-Royce Excellence in Helicopter Maintenance Award Recipient honored for his accomplishments and service in managing and supporting helicopter maintenance operators around the world. "We are thrilled to add Chuck to the rotorcraft sales team," Mark Stubbs, CCO of Global Engine Services said.

Albastar, MFTA and WZL2 Select Commsoft's OASES

Albastar has chosen to support its airline operations with OASES, Commsoft's MRO IT system. Albastar is a privately-owned Spanish airline, founded in 2010 by Italian and British entrepreneurs from the tourism and transport sectors to provide on-demand flight services in collaboration with major Spanish, Italian and other European tour operators. Based in Palma de Mallorca, Albastar operates mainly charter flights from its principal basis of Palma de Mallorca, Milan Malpensa and Milan Bergamo as well as seasonal services from Lourdes. The fleet to be supported by OASES will initially include four Boeing 737-800 aircraft.

OASES is structured in a modular format to provide maximum flexibility and scalability and Albastar has opted for the core, airworthiness, materials, planning and production modules with an option to add the Line Maintenance Control module at a later date. All modules will be accessed through Commsoft's Private Cloud service, avoiding any need for the airline to invest in new hardware.

Commsoft also signed a contract with the recently launched Emirates Flight Training Academy ('EFTA'), located at custom-built premises at Al Maktoum International Airport in Dubai for OASES. OASES has been supporting the flight training academy which began operations in Dubai South in November 2017. The contract covers five key modules of the OASES system: core, airworthiness, planning, inventory and production. These have been implemented on Commsoft's private cloud for optimum security and customer care.

EFTA recently received its CAR M Subpart G continuing airworthiness management organization and CAR 145 maintenance organisation approvals (ref CAMO/0007/18 & UAE.145.0073) from the UAE General Civil Aviation Authority which allows EFTA to manage and carry out the maintenance on the aircrafts in-house.

Polish MRO organisation, WZL2 (Wojskowe Zakłady Lotnicze Nr 2 S.A.), has also chosen OASES. WZL2 is now taking civil aviation customers with Bombardier Q400, ATR 42 and ATR72 turboprop airliners, Embraer E-Jet airliners and ultimately Boeing 737NG aircraft.

WZL2 has selected the core, airworthiness, planning, materials, production, commercial and warranty modules which will be implemented initially through Commsoft's Private Cloud service.

"We have signed multiple new OASES contracts in 2018 and we look forward to ensuring successful implementations for all," says Nick Godwin, managing director, Commsoft.

JSSI Upgrades Airframe Programs to Include Standard Wi-Fi Coverage

Jet Support Services, Inc. (JSSI) has announced that Wi-Fi coverage is now included as a standard feature on all new airframe programs. Previously an add-on option, the company says customers seeking airframe protection for their aircraft will now automatically benefit from Wi-Fi equipment and related component coverage at no additional cost.

"This latest upgrade reflects the changes in technology and advanced avionics we are increasingly seeing onboard modern business jets. We continually evaluate and evolve the coverage we offer. This ensures our clients have peace of mind knowing that even the state-of-the-art equipment on their aircraft is covered by the most innovative airframe program on the market," explains Jim Stovall, JSSI vice president, pricing and program development.

"Wi-Fi used to be a rare item on business jets but is increasingly everywhere we go and is now a feature most of our clients expect to see onboard. Whether clients choose to enroll on our Tip-to-Tail, Term, Parts-Only or Check-to-Check Airframe Programs, the Wi-Fi equipment components installed on their aircraft will now be included at the time of enrollment, covering all scheduled, unscheduled and routine maintenance," he adds.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Shell, World Energy and SkyNRG, KLM, SAS and Finnair Work to Reduce Carbon Emissions at SFO

Shell Aviation and SkyNRG have commenced the supply of sustainable aviation fuel (SAF) to international airlines KLM, SAS and Finnair at San Francisco Airport (SFO). The fuel is produced by World Energy, currently the only SAF refinery worldwide. The initial phase of the arrangement aims to pave the way for longer term, more resilient supply chains for sustainable aviation fuels and reduce the carbon emissions of flights from SFO and other airports. Following May's agreement, Shell Aviation is the first major fuel supplier to support SFO in its ambition to expand the use of sustainable aviation fuel in its operations.

"With our focus on achieving zero net energy, carbon neutrality and zero waste, we are setting bold goals for our airport, and our industry," said SFO Airport director Ivar C. Satero. "Shell Aviation, World Energy, SkyNRG, KLM, SAS and Finnair have partnered to take an important first step towards this goal. We thank this entire team for leading the way in reducing carbon emissions in air transportation and at SFO."

This initiative responds to the aviation industry's ambitious targets, including the cap on net aviation CO2 emissions from 2020 and is a clear sign of commitment by those involved. "The aviation industry faces a formidable challenge; how to grow safely and responsibly given the expected doubling of passenger numbers by 2037," says Anne Anderson, vice-president Shell Aviation. "At Shell Aviation we are proud to be leading the response. The supply of SAF to San Francisco airport brings together all parts of the sustainable aviation fuel value chain and embodies the spirit of collaboration that is essential to delivering a low carbon future for the industry."

The SAF sourced by SkyNRG from World Energy's Paramount refinery in Los Angeles is made from used cooking oil, resulting in a fuel that has significantly lower lifecycle carbon emissions than conventional jet fuel. In general, sustainable aviation fuel has a reduction potential of 60-80%, compared to conventional jet fuel. The SAF is supplied through the existing SFO refuelling infrastructure and can be used by airlines without requiring technical modification to their current fleets.

"In the transition towards a sustainable aviation industry it is the partnerships and cooperation that make a difference," Jurriaan de Jonge, director of Fuel Supply & Risk Management from KLM says. "KLM, SkyNRG and World Energy have been doing that successfully for years at LAX. We look forward to seeing the developments at SFO and supporting Shell and SkyNRG in their efforts."

Meggitt to Supply Turkish Technic with Spares and MRO Services

Meggitt has signed a five-year global agreement with Turkish Technic covering spares and maintenance activities across the whole range of Meggitt products and services from high-performance sensing systems to fire protection and control, pneumatic, fluid control, thermal management and electro-mechanical equipment. The two companies say the agreement reflects the close relationship and supports their growth.

"Meggitt is pleased to be providing a range of products and services to Turkish Technic, building on our existing service and support portfolio,"says Dennis Hutton, president of Customer Services and Support.

"The finalisation of this agreement strengthens the relationship between Turkish Technic and Meggitt and extends our partnership well into the future," O uz Hacısalihoglu, vice president, Purchasing & Logistics, Turkish Technic says. "This agreement will also allow us to provide comprehensive MRO support to our customers along with OEM parts and ensure timely execution of the operations."

Jet Aviation Designs VIP Cabin Concept for the New BBJ 777X

Jet Aviation unveiled Boeing Business Jets' new BBJ 777X at MEBAA 2018 with a VIP cabin concept. The Jet Aviation design dubbed Shaheen, meaning Royal White Falcon, blends modern and classic elements. Boeing Business Jets launched its new BBJ 777X, along with Jet Aviation's interior design, at MEBAA in Dubai in December.

The Jet Aviation Design Studio in Basel partnered with Boeing Business Jets to support the unveiling of the new globe-spanning wide-body BBJ 777X. Renderings of Jet Aviation's stunning VIP cabin design are on display at the Boeing Business Jet MEBAA chalet. The interior is designed to accommodate 43 passengers plus a crew of eleven.

The interior concept takes advantage of the BBJ 777X's size and the company says it features "lounges, a game and cinema area, a stately office, private work spaces, three guest bedrooms and a master suite that

includes its own lounge, luxurious bedroom, spacious dressing/bathroom area and a very large shower and hammam."

"Like many contemporary homes, our design incorporates modern and traditional elements that are contrasted through the use of colors, materials and the general design intent," explains director of Design at the Jet Aviation Basel Completions Center, Elisabeth Harvey. "This is intensified with extremely detailed, very light ceilings and sidewall treatments with patterns and traditional paneling structures, opposing the darker wood floor which replicates the ceiling pattern with fine marquetry inlays. Light sidewall and bulkhead treatments are balanced by minimalistic but colorful furniture with delicate detailing, such as engraving inlays and floral fabric inserts. "

IKHANA Nabs Twin Otter 14,000 lbs. MTOW Upgrade

IKHANA Aircraft Services (IKHANA) has been awarded a Federal Aviation Authority (FAA) STC for their RWMI DHC-6-300HGTM Standard Commuter Category Increased MTOW to 14,000lbs. "The FAA's certification of our RWMI DHC-6-300HGTM upgrade adds significant capabilities for operators to expand their mission role, optimize payload and range, add value to their aircraft, and increase revenues." states John A. Zublin, president and CEO of IKHANA. He adds, "this takes the aircraft well beyond its original capability.

The Standard Commuter Category STC addresses a typical Twin Otter operator's need for as much payload as possible. A Twin Otter can now take 19 passengers with two crew and fly 450-500 Nautical miles. Big picture, it offers increased utility with a rapid return on investment. This has been a long term and intensive engineering effort for IKHANA and we are pleased that this long-awaited enhancement is now approved and available on the market."

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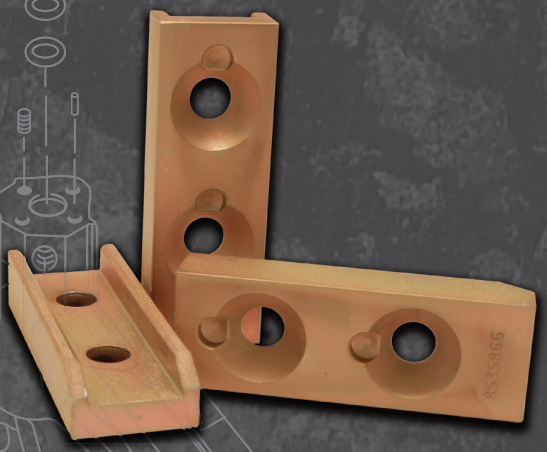

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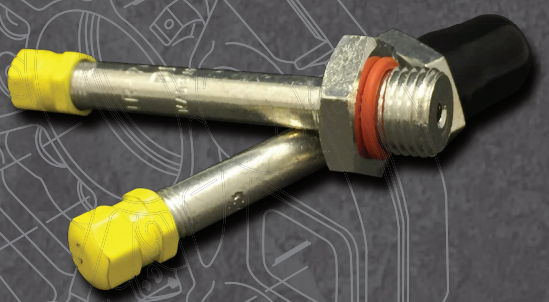

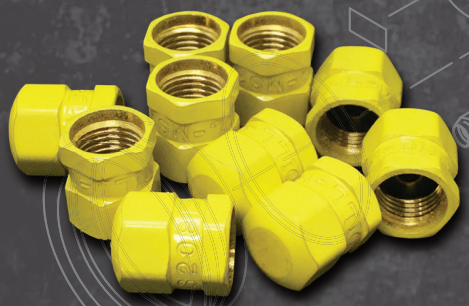

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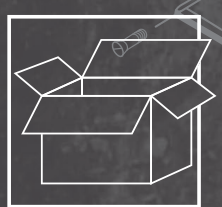

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Big Friendly Giants

The Giants of MRO vie for market share around the world with customer-focused offerings like digitization, customization and proximity.

By Joy Finnegan
Editor-in-Chief

The MRO giants are embracing technological change and finding new ways to efficiently and effectively run their businesses. The challenges are plenty. Material costs are rising, labor costs may be increasing as the mechanic shortage grows and the challenge of managing maintenance for legacy aircraft while welcoming next gen aircraft creates a unique dichotomy.

Growth is still happening in our cyclical industry. Air travel is booming right now, airlines are profitable and emerging markets continue to hold the promise of the golden ring. There is steady growth predicted for the next ten years. Consolidation among players is still happening. Renewed laser focus from behemoths like Boeing are impacting the playing field, too.

During the next ten years, the global air transport MRO market will grow an average of four percent, The Oliver Wyman annual MRO forecast projects. "Total MRO spending expected to rise to $114.7 billion from $77.4 billion in 2018," the report says.

Still, it's a delicate balance with fuel prices, labor prices, demand for air travel and geopolitical nuances all playing a role in how long the streak can last. IAI Bedek agrees that the MRO market is highly sensitive to oil prices and says low oil prices have positively indulged the aviation industry in the last few years and allowed its rapid growth.

Oliver Wyman's report says a gradual changeover to newer aircraft will see airlines retire older, less fuel-efficient models—although at a slightly slower rate than expected last year. Delta Air Lines, for example, is in the process of taking delivery of their new A200s while continuing to fly every last leg possible on its Mad Dogs, the venerable MD-88 workhorse, that has helped their profits soar, before retiring each one.

Meanwhile, to remain a leader among giants, MROs are looking for ways to entice new customers and keep the ones they have. Technology, digitization and niche product offerings are being dangled at every turn. New facilities, joint ventures and collaborations are also playing key roles in building sustainable business growth.

General Consensus

The giants among MROs are in agreement. Most have had an excellent year and some, a record year. MTU Aero Engines says its MTU Maintenance division is breaking records. "In MTU Aero Engines' commercial maintenance business, revenues expressed in U.S. dollars are forecast to increase by mid- to high-teen percentages in 2018. The MRO division has broken records for four consecutive years now and market demand is strong," says Holger Sindemann, executive vice president MRO Operations, MTU Aero Engines. "We are optimistic that we will continue

AAR image

our growth trajectory in 2019. With an intelligent, multipronged aftermarket strategy that combines OEM program partnerships and joint ventures with airlines with an independent MRO stronghold and the largest engine portfolio worldwide, we intend to grow at a rate of around 10 percent well into the next decade, with MRO services complemented with fast growing leasing and asset management activities."

Russell Ford
CEO, StandardAero

This was a year of tremendous growth for StandardAero. "After acquiring four companies in 2017 and winning several very large new engine maintenance programs, 2018 has also been a year of execution for our company," CEO Russell Ford says. "In the last year, we have grown our company from 3,500 employees to 6,000 and increased our facilities footprint from 14 primary facilities at the beginning of 2017 to 37 primary sites in North America, Europe, Africa, Asia and Australia. In addition, we've expanded our serviceable aircraft engine platforms from 25 to 41 and we are authorized by all of the world's leading aircraft engine manufacturers." Still, Ford says, they are optimistic about even more growth opportunities ahead.

Since its formal standup on July 1, 2017, new giant on the block, Boeing Global Services (BGS), says it has outpaced the current services market's average growth rate. "As we further expand our offerings and continue to harness the full potential of Boeing's integrated resources, such as digital solutions powered by Boeing AnalytX, the services capability advantages and cost savings that we offer customers will grow exponentially," says Stan Deal, president and CEO, Boeing Global Services.

Stan Deal
CEO, Boeing Global Service

"We are pleased with our double-digit sales growth," says Chris Jessup, chief commercial officer, AAR. "Our market position as the largest independent aftermarket services provider, diversified portfolio of service offerings and strong balance sheet with substantial available liquidity, will help us grow our market positions both within the commercial and government sectors."

Behemoth Lufthansa Technik (LHT) is ready for more and is even more optimistic. "We expect a revenue growth for LHT in 2019 compared to 2018," says Frank Berweger, vice president Corporate

MTU image

MRO will grow about four percent during the next ten years according to the Oliver Wyman forecast. MTU's MRO division has broken records for four consecutive years, according to Holger Sindemann, EVP at MTU.

Sales Americas, Lufthansa Technik. "Regarding the overall MRO market, we forecast an annual growth rate of about seven percent for the next years.

Aiming High for Growth

Turkish Technic, one of the largest MRO companies in the world operating in one hub, says it has set its sights on being among the top five MRO companies in the world by the end of 2023. To help it reach this target, the company is building new hangar facilities at the new Istanbul Airport. The new airport will feature the world's largest single terminal, 11 million square feet, with a capacity of 90 million passengers per year. Operations at the new airport are set to begin in January 2019. Turkish Technic says it plans to "enhance and extend its capacity and capabilities at Istanbul Airport" to take advantage of those opportunities.

AAR predicts company-wide growth in 2019. "AAR expects the most growth to come from our aftermarket new and used parts trading, OEM new parts distribution and programs integrated solutions offerings," CCO Jessup says.

AJ Walter Group CEO Christopher Whiteside says 2018 was a "hugely successful year…with the addition of many new customers and extensions to existing contracts." Looking ahead to 2019 he adds, "In the context of a buoyant MRO market, we anticipate further growth in this area."

Israeli giant IAI Bedek says they are also optimistic for 2019 growth focused on several areas, including a "clear trend of growth in engine MRO demand with some additional growth of Bedek's APU, landing gear and components overhaul services."

Lufthansa Technik feels the highest potential for their growth is in engine services, component services, line maintenance and digital products, but also continues to invest in multiple internal areas. "We have invested more than €160 million in different areas in the first three quarters of 2018," says Berweger. "We are currently preparing the start of construction of a new hydraulics shop in Hamburg. Lufthansa Technik Malta has opened an innovation bay this Spring and we have made significant progress in establishing our two engine shop JVs in Poland."

From an engine perspective, MTU predicts "Shop visits will peak for the newer versions of V2500 and CFM56 engine families in the next two to five years – the V2500-A5 and CFM56-5B and CFM56-7 – and we expect to see growth on these engine types." MTU says they are experiencing a "perfect storm" of demand. Services for older legacy engines, such as the CF6-80C2, has continued longer than expected due to low fuel prices. And new generation engines are entering the shops earlier than originally anticipated. "All this has led to our shops being fully loaded worldwide," MTU EVP Sindemann says. He stresses that with capacity of more than 1,000 shop visits across their network, they still have flexibility for induction.

StandardAero points to their recent acquisitions, investments and new engine platform awards to show their appetite for growth and say they are in process of translating those things into growth opportunities. "[The] integrations of Jet Aviation Specialists (JAS), PAS Technologies and Vector Aerospace during the last two years have enabled us to credibly model synergies, acquire financing, etc. for future acquisitions, especially in the engine components space, which is highly fragmented," Ford says.

Asian Sunrise

There is pent-up demand for air travel in Asia, particularly domestic travel, according to Oliver Wyman. They predict the next 10 years will see a significant shift in passenger traffic, moving away from North America and toward Asia. An emerging middle class in China, and potentially India, will fuel this. Asia, as has been the case for several years, will remain the driver of MRO growth. India is forecast to grow 6.7 percent annually but will represent a smaller share of the total market (two to three percent). Lufthansa Technik agrees. "Important markets with high growth rates remain Asia Pacific, Middle East and Africa. Regarding potential, we estimate that Asia Pacific will pass the American MRO market within the next five years and stands out with the strongest fleet and MRO Market growth," Lufthansa Technik VP Berweger says.

Frank Berweger
VP Corporate Sales, LHT

StandardAero's CEO, Ford, agrees. "We see numerous opportunities to grow in emerging economies like Asia Pacific or Latin America," he says.

Boeing feels its worldwide presence and partnerships, including an expansive supply chain, ensures that they can respond to the

growing demand in Asia. "Global Services has more than 22,000 employees spread across 70 countries and 300 locations to ensure that offerings in the U.S. and abroad bring the depth and breadth of Boeing's resources, while providing the right level of indigenous capability expansion," BGS CEO, Deal says. "For example, Singapore is home to Boeing Asia Pacific Aviation Services, a joint venture with SIA Engineering Company that provides engineering, repair and maintenance services by combining Boeing's Global Fleet Care services with local MRO engineering expertise."

AJW Group says Asia will remain an important market for growth for them. "The addition of OEMs like COMAC in recent years has boosted jobs and fueled demand in the region and across the MRO industry as a whole. As China's relatively young aircraft fleet inevitably matures, and warranties expire, we can expect the rotables industry to grow," Whiteside maintains.

Christopher Whiteside
CEO, AJ Walter Group

Clearly, well-established regional leaders like ST Engineering Aerospace, a clear MRO giant with a global MRO network of facilities and affiliates in the Americas, Asia Pacific and Europe, will have continued success with the forecast growth in the area. Their MRO capabilities include airframe, component and engine, aviation materials and asset management services, as well as aircraft interior solutions. HAECO Group is also well-situated to address the growing MRO needs of the area. HAECO consists of 18 subsidiaries and affiliates, employing over 17,000 in Hong Kong, China, Singapore and the U. S.

High Tech Future

"We want to shape the digitization of our industry," Dr. Johannes Bussman, LHT's chairman boldly and confidently said at their annual press briefing in Hamburg in March. And they have many initiatives to prove their commitment to this end. "We are permanently determining the potential of new ideas for the MRO business, initiating innovative projects, integrating new advanced technologies and revolutionizing work processes," says Berweger. "Big data use and MRO 4.0 are major fields which we are focusing on. We are looking at additive manufacturing, digitization of MRO in general, with a special focus on AVIATAR [their modular IT-platform for digital fleet solutions], robotics and automation, drone services, health monitoring, predictive analytics, artificial intelligence and machine learning. In 2018, LHT also opened an "innovation bay." The innovation bay at Lufthansa Technik Malta focuses on reviewing state-of-the-art technologies for aircraft overhauls in the near future. LHT says everything that proves itself in practice there will be integrated in the work process and rolled out to all other Lufthansa Technik base maintenance locations. More innovation bays will follow at other sites of their network.

StandardAero says they innovate with their extensive engineering capabilities, develop component repairs and utilize OEM relationships to get access/ authorization to execute the repairs developed for customers. What about additive manufacturing? "For 3D technology, the biggest benefit is speed of manufacture by using 3D printing for tooling and making the tooling available within a few hours or days, versus the long process of ordering material and finishing tooling," Ford says. "For example, in our engine component repair facilities, we have used 3D printed plastic tooling to replace aluminum tooling and metallic printing for more complicated tooling geometries."

AAR has been investing heavily across the company with innovative technologies to help maintain a competitive edge. They have several proprietary products that resulted from the investments. "AARIVE is a self-service portal for our power-by -the-hour (PBH) component support customers that provides real-time order tracking and transparency," CCO Jessup explains. "Airvolution is our robust and secure cloud-based system for managing aircraft component repairs. PAARTS Store gives customers 24/7 visibility of more than one million parts and access to traceability documents and instant bidding or purchasing options. We've also launched our first paperless hangar environment approach in our airframe heavy maintenance network and drone testing to facilitate maintenance activities. Additionally, we are developing block chain solutions with industry partners."

Chris Jessup
CCO, AAR

AJW is spearheading a number of digital initiatives to enhance operational efficiency for its customers and colleagues. In the next three years, AJW says it will fully develop a modern cloud-based infrastructure to provide customers with the ability to engage digitally in real time across multiple platforms. "With 30 locations across five continents, local server-based data storage presents challenges of both capacity and consistency; consequently, AJW is migrating its data and many core digital services onto cloud-based storage systems," Whiteside says. Holding all of the data in one place will enable them to create a "data lake" from which the company can develop the building blocks for wider digital information. "This will enable AJW to guide and boost its predictive analytics expertise. As part of this digital evolution, AJW is also introducing a digital services platform for customer use to ensure efficient and effective interaction in all transactional areas," says Whiteside. "It incorporates a highly responsive portal which enables customers to manage transactions on a live basis. The platform is designed to quickly and reliably integrate with third party software systems, such as AMOS or SAP."

MTU Maintenance's largest project in the technology arena is their engine trend monitoring (ETM) system, based on engine data from flight operations and shop visit data. "We introduced ETM over fifteen years ago and continually develop and optimize the system," Sindemann says. "As an independent service, MTU's ETM system is not based on a single engine system and we can monitor a customer's GE90 and V2500 fleet with the same tool, for instance." MTU maintains that this is particularly helpful for engineers and technical managers and unusual in the industry. "We have recently introduced new features to our ETM system, such as remaining on-wing time prediction based on critical performance parameters, like EGT margin, automatic diagnosis to identify the root cause of a trend shift, quick fleet analysis tool to review on-wing deterioration per ESN and shop visit effects," he adds.

Not to be outdone, Boeing's digital solutions include predictive maintenance activities powered by Boeing AnalytX and the company says they will continue to evolve those technologies alongside other capabilities and platforms. "Predictive

Boeing Global Services image

Boeing Global Services says it is focused on organically growing their resources and expertise.

Maintenance represents an umbrella of activities that help operators turn unscheduled maintenance into scheduled activities. It includes establishing a maintenance strategy, maintenance planning, day-of operations monitoring, execution, reliability analysis, predictive and prescriptive maintenance, and post-operations monitoring for feedback and improvement," Deal says. One of Global Services' digital applications is the Jeppesen FliteDeck Pro electronic flight bag (EFB) solution. "We have recently added new features and capabilities to enhance operational efficiency for airlines and large-scale operators."

Recently, Turkish Technic established Cornea Aerospace Systems to develop IFE (In-Flight Entertainment System) as a Joint Venture with Havelsan. "Besides our comprehensive maintenance and repair capabilities and our high-quality aircraft galley and aircraft seat producer JV's, we are pleased to operate in [the] in-flight entertainment market through our Joint Venture Company to be established with Havelsan. I believe that this step will create many opportunities for both parties and also customers," Ahmet Karaman, CEO of Turkish Technic said when the JV was announced in May.

IAI Bedek Aviation founded an aviation innovation hub called Hangar in 2017 that promotes technologies which focus on MRO, freight, condition analysis, predictive maintenance, supply chain and big data analytics. Creators of Industry 4.0 – IoT, AI, Blockchain or automation and robotics were solicited and welcomed to apply by May this year to have an opportunity to mutually develop a commercial aviation application with IAI Bedek.

Cooperate, Collaborate

Studies show collaborative work can benefit problem-solving performance required in businesses. Global, cross-national team building sparks ingenuity. Instinctively, the giants in our industry know this. In 2018, Lufthansa Technik beefed up its collaborations. "At the end of September, we celebrated with our partner, MTU Aero Engines, the cornerstone ceremony of our Joint Venture EME Aero, a new engine overhaul shop for Pratt & Whitney's PW1100G engines," says Berweger. "At the beginning of November, we signed with UTC Aerospace Systems, a life-of-program component service agreement for maintenance of Geared Turbofan (GTF) engine accessories integrated and supplied by UTC Aerospace Systems for the A320neo."

"We are always looking for good business opportunities, either from geographical or technological perspectives," Berweger says. "We also want to enlarge our aircraft overhaul capabilities in Asia. Concretely, we plan to increase our hangar capacities at Lufthansa Technik Philippines in the next year. In the Americas we have expanded our overhaul site in Puerto Rico and are now also offering overhaul services for the Airbus 320neo family, there."

However, Boeing Global Services says it is first focused on organically growing their resources and expertise. BGS says they will also look to make complementary investments to enhance their current offerings portfolio, including joint ventures and acquisitions. "For example," Deal says, "Boeing's acquisition of KLX nearly doubled Boeing's supply chain product and service offerings. We will continue to make selective acquisitions and engage in partnerships when doing so enhances lifecycle value for our customers, makes sense for our business and benefits industry." The company says only 20 percent of the worldwide fleet of military aircraft will be retired and replaced over the next 10 years. They say this means the demand for services to maintain aging aircraft, extend service life and enhance capability will grow faster than overall fleet size. Boeing feels their worldwide presence and partnerships, including that expansive supply chain, will ensure they can respond to the demand.

Holger Sindemann
EVP MRO, MTU

MTU Aero Engines and Lufthansa Technik are setting up a joint venture named EME Aero (Engine Maintenance Europe) for the maintenance, repair and overhaul of geared turbofan (GTF) engines, with each of the partners holding a 50-percent stake. "The foundation stone was laid at the end of September this year. According to current plans, the facility in Jasionka, Poland, will be operational in 2019 and have an annual capacity of over 450 shops visits. It will service the new PW1000G-series geared turbofan engines as part of the OEM network," MTU's Sindemann says.

AJW's philosophy is unique in this regard. "At AJW Group we very much see OEMs as partners," Whiteside says. "Due to AJW Group's independence, we have the freedom and fluidity to move with the market's needs."

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Whiteside says the current set-up for a larger OEM tends to be engineered towards the high-volume users of their components, rather than ad hoc requests for a single part or repair. Additionally, airline customers are likely to require an outsourced nose-to-tail solution and are unwilling or unable to manage multiple OEM relationships. "Forward-thinking OEMs are overcoming those barriers by working with existing aftermarket providers. AJW can offer customized route-to-market solutions and much more, having established relationships with over 1,000 customers—airlines, MROs and leasing companies—globally. OEMS's can also benefit from AJW's infrastructure and global customer service teams speak the customer's language," says Whiteside. "As OEMs do not necessarily have the right aftermarket support to compete with aggregators or nimble trading organizations, collaboration with an established aftermarket provider is the logical solution."

Reduce, Reuse, Recycle

Where a particular engine platform is in its product lifecycle can determine if customers want or need to have used serviceable material (USM) as part of their maintenance program. Aircraft retirements will lead to the availability of engine assets and USM, which will help facilitate some of the customer requirements on cost and availability of parts for maintenance. "Creative, customized maintenance solutions for certain customers, such as with airlines meeting lease return conditions; lessors/owners retaining asset value and re-marketability to the next tier of operators; or disposition and creating customized maintenance solutions is a strength of StandardAero," says CEO Ford. "On mature platforms, customers' service requirements can skew towards cost and customized solutions facilitated by the embodiment of USM, repair development, asset acquisition/disposition, engine exchange programs, creative work-scoping (module level MRO, lifecycle-optimized build lives), etc. As an independent MRO, we have a long history of providing these solutions across market sectors, numerous engine platforms and products manufactured by all of the major OEMs."

MTU says they use USM extensively, as a way of reducing material costs for operators. "These types of service are in high demand—in particular for V2500, CFM56 and CF6-80C2 engines, Sindemann says. "We provide asset management services for owners wanting to maximize asset value at the end-of-life and can teardown engines and remarket parts for them, purchase them for our own use, or provide a combination of both.

However, MTU says the market is volatile and supply of USM is dependent on various factors, such as traffic growth, production rates, oil prices, park and retirement rates, etc. In cases where oil prices are low and engines are being flown longer, there are fewer retirements and teardowns, which can result in a lack of certain parts. "We believe that experience and a strong network is key in navigating this volatile market," says Sindemann. "Our strength is in the technical understanding from our nearly 40 years of MRO experience, combined with our market understanding through MTU Maintenance Lease Services B.V. It means we are able to handle engines in-house, salvage and repair parts—and also know what a fair market value for mature engines and USM is."

Cost reduction is always crucial for customers, according to LHT. Their policy is always to better repair parts instead of throwing them away. "We are very experienced at supporting those who are open for recycled or used materials. We have gained a large expertise to develop repair methods," says Berweger. "But we also consider all sources of used material, full aircraft as well as engines, landing gear or single components. We do trade overstock from aircraft teardown to a certain extent. In the end," he stresses, "it is the decision of the customer…and it is our job to support him in the best possible manner."

IAI Bedek has seen requests for USM in more RFP's recently than in the past. They are also seeing customers' demand that the facility has "green operational tendency" in its way of acting and performing service. "We invest a lot of resources on a continuous basis and, in practice, we are completely prepared for all aspects and infrastructures involved in the work processes, to act properly and in accordance with the strict legal requirements in this matter." IAI-Bedek says it strictly abides by the regulations of the Israel Ministry of Environmental Protection.

BGS CEO Deal says, in response to customer demand with the creation of Boeing Global Services, it has developed the capability to support aerospace customers' USM needs, including part trading, aircraft and engine teardown, and surplus redistribution and consignment. "Aerospace customers are demanding use of recycled and used materials and parts to meet replacement part needs," Deal says. He says they understand utilizing USM to fill parts needs increases product availability and airlines' operational efficiency. "Currently, Boeing is harvesting more than 2,500 USM parts for the aftermarket, with a potential of harvesting a total of 6,000 parts," he emphasizes.

Outstanding in a Field

Technological change and the big data wave is coming and those companies that can leverage that aspect to their advantage are likely to do very well. Thousands of new tech aircraft are coming into service in the coming decade and will create new opportunities in the MRO industry. In the meantime, shops realize they need to focus their energy and resources on their core competencies, forge strategic partnerships and position themselves for growth in those regions where it will happen. It appears the giants of our industry have this figured out. With that said, what is the differentiating factor for these giants?

At MTU, Sindemann says their secret is offering alternatives. "We are the global market leader in customized solutions," he says. "As engine experts, we offer a wide range of individually-tailored solutions encompassing innovative MRO services, integrated leasing and asset management. We marry world-class engineering with intelligent creativity and never give up unless an optimal solution has been found."

Boeing Global Services says they offer the unique position of bringing commercial and government customers the full scale and scope of Boeing's lifecycle expertise and resources. "[This includes] the most advanced digital aviation and data analytics capabilities to anticipate their needs and maximize their investments. This 'one-stop shop' is unique in the industry and offers a full suite of services solutions integrated with our airplanes, which drives down lifecycle costs and optimizes capital expense and operating costs," Deal affirms.

AJW says its greatest strength is its independence. "It is that, together with its size and reputation, which gives AJW the freedom and fluidity to move with the market's needs, setting us apart from the competition," says Whiteside. "Our strategy is to redefine aviation supply chain management so that we are an enabler and a facilitator that meets the needs of both our customers and partners worldwide to continue to transform aviation efficiency."

Lufthansa Technik says its size, resulting scale effects and worldwide network with more than 35 subsidiaries and joint ventures sets it apart. Berweger also points to their comprehensive MRO-related R&D activities, their significant investment in innovation, and the integration of maintenance, production and design organizations as differentiators. "We have a focus on 'MRO goes digital' to create innovative and optimal customer services," he adds. "There is no 'one size fits all' business model [at LHT]."

StandardAero cites its mission as to be the best to work for and the most trusted service partner. "Our company's vision is to inspire the best and constantly raise the standard of aviation services," Ford says. "What sets us apart...is our highly trained technicians and collaborative and supportive company culture. We build that culture through trusted partnerships with our employees and our customers," Ford says.

AAR says their main differentiator is their independence. "We are not owned by an OEM or airline, so we can focus on delivering fast, flexible, customer tailored solutions to our customers within the commercial and government sectors," AAR CCO Jessup says.

Looks like 2019 will be an interesting year for the big, friendly giants of MRO. AVM

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SCHEDULE OF EVENTS

Tuesday 12th March 2019

9:00am – 10:30am	Joint Opening Keynote
10:30am – 11:00am	Networking Coffee Break
11:00am – 12:30pm	Mandates and Regulatory Updates Building Blocks of End-to-End Aircraft Connectivity Latest in Standards and Regulations in the Testing Environment
11:00am – 5.00pm	Technical Workshops
11:00am – 5.30pm	Certified Training: Optimizing DO-178C/DO-254 Avionics Software & Hardware Development Guidelines by AFuzion
11:00am – 5.30pm	Certified Training: The Emerging & Required DO-326/ED-202 Set: Aviation-Cyber-Security Regulation for Safety – Guide for the Perplexed by AFuzion
12:30pm – 2:00pm	Delegate Lunch
2:00pm – 3:30pm	Panel Discussion: GNSS Strategies – dealing with multiple constellations ATM and e-Enabling Benefits for Connected Aircraft Meeting Testing and Certification Standards
3:30pm – 4:00pm	Networking Coffee Break
4:00pm – 5:30pm	Safety & Certification Panel Discussion – Aircraft Data Communications – The Alternatives and Future Robust Methodologies for Safety-Critical Systems
5.30pm – 7.30pm	Networking Reception on Exhibition Floor

Wednesday 13th March 2019

9:00am – 10:30am	Trends in Communication, Navigation & Surveillance Connecting the 4 A's Using Models and Data Analytics for Enhancing Testing Efficiencies
10:00am – 4.00pm	Technical Workshops
9:30am – 4.30pm	Certified Training: Applying the New Mandatory Aviation Systems/Safety Regulations: ARP4754A (with ARP4761/A) by AFuzion
10:30am – 11:00am	Networking Coffee Break
11:00am – 12:30pm	Big Data & Cyber Security Panel Discussion – Demistifying Flight Tracking Enhancing Performance in Testing and Validation
12:30pm – 2:00pm	Delegate Lunch
2:00pm – 4:00pm	Innovation in the Industry Securing The Connected The Future for Testing and Certification

Registration Hours

Monday 11th March 2019	2:00pm – 5:00pm
Tuesday 12th March 2019	8:00am – 7:00pm
Wednesday 13th March 2019	8:00am – 5:00pm

Exhibition Opening Hours

Tuesday 12th March 2019	10:30am- 7:30pm
Wednesday 13th March 2019	9:30am – 5:30pm

CONFERENCE PROGRAMME

www.Avionics-Expo.com

Improving Performance, Integration and Harmonisation in SESAR and Next-Gen

EU and US collaboration in SESAR and Next-Gen aims to harmonise and secure Air Traffic Management (ATM) modernisation efforts as drivers of and in support of the International Civil Aviation Organisation (ICAO) Global Air Navigation Plan (GANP) with the Aviation System Block Upgrade (ASBU) programme.

Both SESAR and Next-Gen recognise the need to integrate the air and ground parts of their air traffic management systems by addressing efficiency needs of flight trajectories planning and execution and the seamless sharing of accurate information.

This framework provides a vehicle for the US and Europe to work together towards interoperable standards and in support of efforts towards achievement of ICAO global

Harmonisation. For example, a significant achievement in the NextGen and SESAR collaboration is the delivery of an agreed-upon baseline NextGen/SESAR Joint Avionics Roadmap.

ICAO estimates that 120 billion US dollars will be spent on air transportation systems transformation in the next 10 years. While the NextGen and SESAR modernisation programmes account for a large share of this spending in Europe and the US, there are parallel investment initiatives in other regions.

Avionics Expo is the leading exhibition and a conference programme with excellent content and discussion, which includes strategic and technical details, delivering high level and quality presentations for both the commercial and defence sectors, fixed wing and rotorcraft.

Tuesday 12th March

9am **Joint Opening Keynote**

Chair: Woodrow Bellamy
*Senior Representative, Qatar Airways**
*Senior Representative, DG MOVE, European Commission**
*Senior Representative, Aerologic**

10.30am-11am Coffee Break

11am-12.30pm **Session 1**

Mandates and Regulatory Updates

The ADS-B and PBN mandates arrives in 2020. With just a few months to go, is the industry ready and aware of the latest details? What are the latest updates in other mandates and regulation, such as GADSS, and how will these impact the industry and supply chain? Key institutions governing the strategy of regulation and compliance will give an overview of the changing landscape, including standardisation, certification and operational improvements.

Chair: Anna von Groote, EUROCAE
ADS-B Out – *Senior Representative, SESAR Deployment Manager**
Data link – *Senior Representative, SESAR Deployment Manager**
Aircraft Tracking (GADSS) – *Henk Hof, Head of the European ATM Master Plan Maintenance Unit, EUROCONTROL*
PBN – *Franca Pavlicevic, Head of the Navigation and CNS Research Unit, EUROCONTROL*

12.30pm-2pm Lunch Break

2pm-3.30pm **Session 2**

Panel Discussion: GNSS Strategies – dealing with multiple constellations

With more satellite constellations available delivering GNSS capabilities for aircraft, what are the overviews and benefits of each. How will multi-frequency and interoperability between constellations work for aircraft and airlines? The panel debates the pros, cons and challenges of the current options.

Chair: John McHale, Editor in Chief, Avionics Design & Military Embedded Systems
Chinese constellation – Senior Representative, AVIAGE SYSTEMS
EGNOS & Galileo – Katerina Strelcova, GSA
Multi-Frequency – Laurent Azoulai, Senior Expert Navigation Systems, Engineering Navigation Systems – EYAN, AIRBUS Operations S.A.S.
GPS/US – Senior Representative, Rockwell Collins
Senior Representative, Honeywell

3.30pm-4pm Coffee Break

4pm-5.30pm Session 3

Safety & Certification

Aircraft safety and security continues to be at the forefront of industry developments. How is new technology, including multi-core and sensors, able to enhance safety and what are the certification requirements for compliance?

Chair: Marc Gatti, Thales
Vulkan: The Future of Airborne Graphics Capabilities – Dan Joncas, Core Avionics
Advances in Civil Certification of Multicore Processing Systems in Commercial Avionics – Paul Parkinson, Wind River
Systems & Safety Risks / DO-178C Compliance – Mark Richardson, LDRA*
AIRBUS & NAVBLUE using aircraft as sensors to measure and report runway braking action – Logan Jones, NAVBLUE

5.30pm Networking Reception

Wednesday 13th March

9:00am Session 4

Trends in Communication, Navigation & Surveillance

In this session we review and discuss the latest trends in Navigation, Positioning, Communication & Surveillance in relation to RPAS, UTM, ATM and ADS-B.

Chair: Peter Green, Head of the Standardisation Unit, EUROCONTROL
Multi-function Micro Avionics – Dr Michael Contarino, VP/Snr Engineer, R Cubed Engineering
What Avionics does U-Space and UTM Require? – Dejan Damjanovic, The FANS Group
Cybersecure RPAS integration into civil airspace – Senior Representative, GOSNIIAS*
Dual Use CNS for Military – Ricardo Oliveira, EUROCONTROL

10.30am-11am Coffee Break

11am-12.30pm Session 5

Big Data & Cyber Security

Security is becoming one of the biggest challenges facing the connected aircraft, as the need for continuous online access for passengers and aircraft data makes systems vulnerable. We review how the threats could impact aircraft big data whether for communication or analytics, airline maintenance planning and explore what can be done to enhance security.

Chair: David Irwin, AVIAGE SYSTEMS
Cloud Based Service to centralize vertical profile optimization applied to a whole fleet using avionics and weather data – Matteo Crippa, Avionic Systems Engineer, TXT e-solutions
Connected aircraft – the impact on maintenance and uptime – Carl Fransman, Managing Director EMEA, Baxter Planning
EUROCAE WG72 – TBC
Cyber security and hacks against nav systems – DeeDee Rudenstein, President & CEO, Propel Strategic Communications

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

Innovation in the Industry

With a wave of new innovation in 'air transport' around the corner, what does this mean for the industry? Where will future avionics technologies, such as wireless avionics intra-communication (WAIC), provide real benefits for saving fuel, reducing the cost of flying or flight safety?

Chair: Alex Wilson, Wind River
eTaxi – a sustainable solution for a greener future – Valentin Vincent, Business development & marketing manager, Airbus SAS
Applying Data-Centric Connectivity to Avionics Systems – Paul Tingey, Senior Field Application Engineer, Real Time Solutions
ANGELS – Innovative Safe Landing Using ADS-B – Luca Branca, Beamflight
Architecture Driven Planning Approach for CNS Integration – Marc Brochard, ATM System Architect, EUROCONTROL
Communication in PJ14 EECNS – Felice Maccaro, Project Manager, Leonardo

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From Passenger Entertainment to Flight Operations

The London School of Economics (LSE) report there are 3.8 billion passengers flying annually with only around 25% of aircraft in the air offering passengers some form of onboard broadband connectivity service. This service is often of variable quality, with patchy coverage, slow speeds and low data limits.

By 2035, it is likely that IFC will be ubiquitous across the world as aircraft become smarter, fully connected machines, and with the new services being introduced to benefit the passenger experience, grow revenues for airlines and improve safety. However, to achieve these goals it relies on reliable and seamless connectivity – from the cabin to the cockpit.

According to Inmarsat the connected aircraft can transmit data in real-time to reveal insights that could transform operations, potentially saving $5.6bn a year in unplanned maintenance costs. Connectivity enables airlines to bring dramatic, yet cost effective enhancements to the passenger experience – and to take advantage of the new revenue streams that accompany them.

Tuesday 12th March

9am **Joint Opening Keynote**

Chair: Woodrow Bellamy
Senior Representative, Qatar Airways*
Senior Representative, DG MOVE, European Commission*
Senior Representative, Aerologic*

10.30am-11am Coffee Break

11am-12.30pm **Session 1**

Building Blocks of End-to-End Aircraft Connectivity

Connectivity, e-Enablement are great buzzwords in the airline industry, but what exactly does this mean for airlines? What do airlines really want from connectivity and what is achievable with a connected aircraft, from both flight deck and cabin operations under a digital transformation program? How do we understand and set the building blocks and what can vendors do to enhance the deployment of applications? Ultimately, what is the business case for the Connected Aircraft?

Chair: Steve Bogie, Air Canada
Business case for Connectivity – Turning Cost into Profit – TBC
Digitally Enabled Aircraft – Lise Gladines, Digital Services Marketing Manager, Airbus SAS
Connectivity benefits from a Flight Ops Perspective – Senior Representative, Esterline
Connectivity for Predictive Maintenance Efficiencies – Senior Representative, GE Aviation Digital
Connectivity in Cargo Operations – Senior Representative, Airbridge Cargo*
EFB Applications – Gretar Mar Odinsson, EFB Administrator, Icelandair*

12.30pm-2pm Lunch Break

2pm-3.30pm **Session 2**

ATM and e-Enabling Benefits for Connected Aircraft

What are the capabilities of connectivity and what does FMS need to do in the future? What does Flight and flow of Information for Collaborative Environment (FFICE) mean for 4D trajectory and replacement of current flight planning? How will future systems cope with the flow of data between ground and air?

Chair: Mark Ter Hove, Cobham SATCOM
TBO and FFICE – Henk Hof, Head of the European ATM Master Plan Maintenance Unit, EUROCONTROL
What e-Enabling does to improve services and situational awareness (show what can do disconnected then connected) – Philipp Barzen, Head of Product Strategy / Chief Product Owner Flight & Navigation Products & Solutions, Lufthansa Systems
Importance of SATCOM for C4I Applications – Serdar Uzumcu, System Engineering Group Lead, Havelsan
Spinning data or streaming data (on the ground or in the air) – Murray Skelton, Teledyne Controls

3.30pm-4pm Coffee Break

4pm-5.30pm **Session 3**

Panel Discussion – Aircraft Data Communications – The Alternatives and Future

Increasing connectivity can enhance safety of aircraft, but what are the safety service barriers of ACARS over IP? What is the future of safety services over IP and what is the potential for aircraft data communications? Our expert panelists discuss the options and opportunities for aircraft data communications.

Moderator: Philippe Lievin
Senior Representative, Scandinavian Airlines*
Gary Anderson, IMS Rockwell Collins
Senior Representative, SITA*
Senior Representative, Teledyne Controls
Darren L'Hereaux, Honeywell
FAA Parc Committee*
IRIS / ARTES – European Space Agency*

5.30pm Networking Reception

Wednesday 13th March

9:00am **Session 4**

Connecting the 4 A's

Connectivity brings efficiencies. We need to look beyond just the connected aircraft and review how connecting the 4 A's (Airport, Airline, ATM and Aircraft) can really bring efficiencies to the whole system. From ground efficiencies and virtual control towers to 4D navigation, we look at practical examples of how airlines can connect to the bigger picture for more efficient operations.

Chair: Anthony Spouncer, Inmarsat
Airline – Daniel Cherbowski, Flight Operations – EFB, Virgin Atlantic Airways
Airport – Senior Representative, Gatwick Airport
Aircraft – Senior Representative, Airbus LCS
ATM – Senior Representative, NATS*
EFBs (software/apps) – Julia Zick, NAVBLUE

10.30am-11am Coffee Break

11am-12.30pm **Session 5**

Panel Discussion – Demistifying Flight Tracking

How do we improve flight tracking and the tracking of aircraft in distress, following incidents such as MH370 and AF447? Our expert panelists discuss how connectivity can enhance tracking, the latest on GADSS, and also what the options and challenges are for the airline operator and their aircraft.

Moderator: Henk Hof, EUROCONTROL
Senior Representative, Shenzen Airlines*
Senior Representative, Inmarsat
Paul Rainford, SITAONAIR
Sean Riley, Avionica
Senior Representative, Thales*

12.30pm-2pm Lunch Break

2pm-4.00pm **Session 6**

Securing The Connected

From machine data-to-data confidentiality to IFEC, Wi-Fi and passenger data comms to flight data information, the connected aircraft also brings security vulnerabilities from cyber hackers to natural atmospheric threats. What are necessary security levels and what is involved to implement the right levels of security for the airlines?

Chair: Murray Skelton, Teledyne Controls
Connectivity security from an airline perspective – Steve Bogie, Air Canada
Addressing Cybersecurity on the Connected Aircraft – Paul Hart, Curtiss Wright
Senior Representative, Air France*
Senior Representative, Boeing*
Senior Representative, Safran*

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Developing Next Generation Testing Strategies

With maximum aircraft utilization a top priority for profitability at the airlines, aircraft are being worked harder than ever. And it is paying off – the airlines are seeing record profits. All well and good until you think about the usage of the asset. With every hour, every cycle, every landing added to the aircraft, comes the potential for vibration, fatigue, cracking, metal formation in oil, structural degradation and even the eventuality of a catastrophic engine failure like the one that happened on Southwest Flight 1380 in the Spring of 2018.

Even with record profits, not a single operator can afford a failure like that. And while the aviation safety record is enviable right now, there is no rest or slacking off in the inspections and testing of the equipment in operation in our fleets. Inspection and testing equipment technology is making technological leaps and bounds. Keeping up with those technological leaps is imperative to the safe operation of aircraft that begin aging as soon as they are flown away from the manufacturer.

Tuesday 12th March

9am **Joint Opening Keynote**

Chair: Woodrow Bellamy
Senior Representative, Qatar Airways*
Senior Representative, DG MOVE, European Commission*
Senior Representative, Aerologic*

11am-12.30pm **Session 1**

Latest in Standards and Regulations in the Testing Environment

What are the latest guidelines and regulation for aircraft testing? Are there environmental parameters that are key when testing critical aerospace components? What impact can regulation and standards have on manufacturing processes and how can these be best integrated in to best practice to ensure efficiencies and effectivess without compromising safety. How do we ensure the meeting of deadlines for ADS-B, EASA 25 hour CV, GADSS, etc.

Chair: Paul Hart, Curtiss Wright
Updates on ADS-B, EASA 25 hour CV, GADSS from testing perspective – TBC
Clarification of DO326A Mandate – Dietmar Freese, PCM, Safety, SW & AEH Expert, EASA
How DO-326 and DO356 standards are being applied by the industry – Senior Representative, Afuzion
Proposal for implementation of SORA Guideline based on IEC 61508 – Thorsten Langenhan, System Safety, AVQ GmbH

12.30pm-2pm Lunch Break

2pm-3.30pm **Session 2**

Meeting Testing and Certification Standards

Safety attributes in the design and as implemented as functionality must receive additional mandatory system safety tasks to drive and show objective evidence of meeting explicit safety requirements. From DO-178C to Non-Destructive and Structural Testing, this session review how some of these testing requirements can be met.

Chair: Ben Sampson, Aerospace Testing International
Automated Low-Level Requirements Testing for DO-178C – Dylan Llewellyn, QA Systems
AGILE way to avionics certification: myth or reality? – Massimo Bombino, Safer Software
Requirements-based Testing and Structural Coverage – Alexander Weiss, CEO, Accemic Technologies GmbH & Martin Heininger, CEO, HEICON – Global Engineering GmbH
Intermittent Fault Detection & Isolation System – Greig Dean, Accountable Manager, Star Aviation, Inc.

3.30pm-4pm Coffee Break

4pm-5.30pm **Session 3**

Robust Methodologies for Safety-Critical Systems

Modern safety critical systems are not just becoming more software intensive in avionics and multi-core systems are being adopted with greater frequency, but combining with manufacturing and operational data to provide insight. How do we enhance testing and certification capabilities and methodologies including the use of virtual or artificial platforms to reduce risk and how can we monitor the consistency of critical processing operations? Joy Finnegan, Editor, Aviation Maintenance Magazine

Rapid Embedded Software Verification using Virtual Platforms for Full Systems Simulation – James Hui, Wind River
Multicore Timing Analysis of Safety-Critical Applications on Complex Hardware Platforms – Guillem Bernat, CEO, Rapita Systems
CONNECT: Integration of Mission Software and Simulation Software via LAN Interface – Ali Ozturk, Havelsan Co
Artur Rudnik, EDC WIA Director, Engineering Design Center
PCRT Resonance Solutions for Additive Manufacturing – Thomas Koehler, Managing Director, Vibrant GmbH

5.30pm Networking Reception

Wednesday 13th March

9:00am Session 4

Using Models and Data Analytics for Enhancing Testing Efficiencies

With more aircraft using data driven solutions and analysis for predictive maintenance, maintenance tracking and management data in the drive to ensure aircraft are on the ground for the least time possible, how can we use technology and data analysis to minimise operating costs and down time, whilst maximising safety and profitability.

Chair: Matthew Jackson, Presagis
The Evolution of Ruggedness and Reliability Testing for Modern Avionics – Paul Hart, Curtiss Wright
Fatigue Risk Assessment & Mitigation – James Zawrotny, Managing Director, 3393 Aviation Services
Integration of COTS Solutions and Processes in F-16 Projects – Joseph Muller, BAE Systems
Design Modelling Test for R80 Flight Deck with Human Digital Ergonomics Factors (HDEF) – Anantia Prakasa, Lecturer & Researcher, Avionics Engineer, Institut Teknologi Telkom Purwokerto (ITTP), Indonesia

10.30am-11am Coffee Break

11am-12.30pm Session 5

Enhancing Performance in Testing and Validation

The data revolution has brought new opportunities, through data analytics and predictive maintenance, intermittent fault detection technology and 3D inspection technology, to reduce down time of aircraft. How can we improve testing procedures and validation to increased levels that will enhance quality and monetize assets?

Chair: Albert Ramirez, Mathworks
Creating and Implementing Digital Twins for Precictive Maintenance – Albert Ramirez Perez, MathWorks
Predictive Maintenance: Airbus D&S Manching*
Performance Test and Evaluation of Airborne BDS Receivers – Yude Ni, Civil Aviation University of China
Ground Support Test Equipment – Lew Wingate, Vice President, Barfield
Dr Oliver Kosing, Head of Tests & Analyses, IABG*

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

The Future for Testing and Certification

How will Supplemental Type Certificates (FAA) or EASA Part 21J Modifications provide lower cost alternatives for airlines to make their own equipment choice? What benefits can automatic test generation bring? Can we successfully test and certify flying cars and e-taxis? How will testing of new innovations fit within the current frameworks and regulations and what does the future hold for aero engines, structural or the technology and equipment on-board?

Chair: Ben Sampson, Aerospace Testing International
Looking for the Digital Twin Aircraft – Senior Representative, Airbus Defence & Space
Automatic Test Generation: Prof. Dr.-Ing. Florian Holzapfel, Head of Institute of Flight System Dynamics, Technical University of Munich
Senior Representative, Speedgoat*
TBC

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VENUE

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The Engine Experts

At MTU Maintenance, we understand that operators increasingly require services tailored to their specific needs in order to control and optimize cost. Additionally, we know that residual value is key to lessors and asset managers.

We are the global market leader in customized service solutions for aero engines and specialized in meeting these needs. As engine experts, we offer a wide range of individually-tailored solutions encompassing innovative MRO services, integrated leasing and asset management.

It is our people who make the difference: We are passionate about engines and dedicated to supporting our customers. We marry world-class engineering with in-telligent creativity and never give up unless an optimal solution has been found.

This is demonstrated by our track record of great customer relationships. MTU Maintenance and its 4,500-strong workforce currently perform 1,000 shop visits a year for more than 200 airline customers. We have over 30 engines in our portfolio and locations in the Americas, Europe and Asia.

More performance for you

For operators of newer engines, it is all about generating more flight hours with cus-tomized MRO. We reduce engine removals through fleet management, predictive maintenance, engine trend monitoring and on-site services. Once an engine comes into the shop, we use customized workscoping, alternative repairs and engineering expertise to help lower costs.

More efficiency for you

When it comes to the latter part of the lifecycle, we understand that engines need additional care. Which is why MTU Maintenance also provides smart strategies for mature engines. Our solutions include alternatives to MRO, such as smart repairs and tailored workscopes, material salvation and intelligent teardowns. Furthermore, these services can be combined with alternatives to MRO such as green-time en-gine leasing.

More value for you

At the end of life, asset owners are looking to get the most value from their engines. There is no single best exit strategy for assets, it can range from generating addi-tional income through green-time lease out to sale, exchange and trade all the way to maximizing the material value of the asset through teardown and material man-agement. We find the best solution.

More flexibility for you

MRO solutions for lessors and asset owners are all about risk mitigation, easy trans-fers and predictable costs. We provide this in the form of a portable MRO solution across the lifecycle. Transfers between operators are not restricted by operational or geographical constraints, maintenance reserves reside with the lessor and the pro-gram is flexible: entry and exit is possible at any time and also includes intelligent end-of-life strategies.

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2) Turbine Center Frame,
3) Planned,
4) Low Pressure Turbine,
5) on behalf of OEM

Ballard Aviation
The Unconventional Shop

By David Jensen

Would an A&P mechanic make a good aircraft salesman? Skeptics would say he or she would lack the polish and fast talk typical of good salesmanship. But contrarians could logically argue who better knows the aircraft being sold than the person inclusively familiar with it, inside and out?

That is the premise followed by Ballard Aviation, based in Newton, Kan. Its primary business is buying, modifying and selling pre-owned aircraft, particularly Beechcraft King Airs. Despite its sales negotiating mission, however, Ballard has no dedicated sales staff. Rather, transactions are conducted by the company's general manager, Shane Rives, who is a licensed A&P, an IA (inspection authorization) and pilot with a multi-engine rating but, by his own admission, not a conventional salesman.

Rives says he does not make solicitant phone calls or usually even follow-up calls to people enquiring about aircraft. "I won't hound people," he states. "But when prospective buyers do call me, I provide answers." And because of his firsthand knowledge of the aircraft in Ballard Aviation's inventory, he can provide them promptly, often within an hour or so, and thoroughly.

While some aircraft buyers may feel slighted by such an abrupt non-conventional approach, aircraft owners like Bill Passey, a Mesa, Ariz., insurance agent who flies his own King Air B200, value the "wealth of knowledge" available at Ballard Aviation. Passey, incidentally, has owned various Beech models and is co-founder of the (Beechcraft) Duke Owners Group. Capitalizing on Ballard Aviation's experience in modifying King Airs, he has taken his aircraft to the company multiple times, to have new avionics put in, his aircraft painted and new engines and Hartzell swept-blade propellers installed. "I'll probably have the interior done [at Ballard Aviation] next year," says Passey.

"He doesn't just sell you an airplane; he asks what you are looking for and then gives you options," Passey says of Rives. "I have friends who have bought from him and will go back, because he has so much knowledge."

Mom-and-Pop Company

Other non-OEM companies may sell more aircraft, but Ballard Aviation enjoys robust business, selling eight to 10 aircraft yearly. It mostly sells King Airs but also the occasional

Newton, Kan.- based Ballard Aviation offers numerous aircraft services but buying, modifying and selling pre-owned aircraft, particularly Beechcraft King Airs, is its specialty. Ballard image.

helicopter and Cessna and Piper product. In addition, it offers an array of aircraft operation and maintenance services. Its 20-person staff includes five A&Ps, as well as employees working on aircraft paint, interiors and sheet metal repair. The firm has two hangars, each able to house up to five King Airs, plus an aircraft interior facility at Newton City-County Airport. It also has a paint facility at Strother Field, near Winfield, Kan.

Newton Airport was an auxiliary flight training center for the U.S. Navy during World War II. It has a 3,500-foot runway and another more than 7,000 feet long. Strother Field was an Army Air Force training facility during World War II. It, too, has two runways, one 5,500 feet long.

While Ballard Aviation does broker a small number of aircraft each year, Rives is quick to distinguish the company from dedicated aircraft brokers who, he claims, often do not own, maintain or modify the aircraft they sell. He believes that being an A&P, IA and pilot "helps with the purchasing, modification and selling of Ballard products, not to mention delivering to customers after-sale service."

The company also is unique because it is largely a "mom-and-pop" company, launched by Jim and Iva Ballard. Both worked for Cessna Aircraft, headquartered in Wichita, some 22 miles south of Newton. Jim was a flight instructor and A&P, having attended Spartan College of Aeronautics and Technology in Tulsa, Okla. He also managed and flew aircraft for their owners. Jim gave flying lessons to Iva; they subsequently dated and married. In 1979, the Ballards decided to start a Part 135 charter operation, which quickly included air-medical transport.

Shortly after launching Ballard Aviation, Jim read in a newspaper about a military veteran who died in a taxicab while being transported to a Kansas City hospital for special treatment. A former Marine, Jim decided to offer air transport to vets, a charitable act that resulted in air-medical contracts from local hospitals and agencies, and in launching Eagle Med, a dedicated air-medical transport service. Over close to three decades, Eagle Med grew to include a fleet of 13 Airbus AS-350 helicopters and nine fixed-wing aircraft, mostly King Air C90s. The aircraft provided transport from 15 bases in Kansas, Oklahoma and Missouri.

In 2007, Rives joined Ballard Aviation as director of maintenance, risk manager and head of new base development. Soon after, the company bought its first King Air B200. In 2009, Ballard Aviation sold Eagle Med assets and name to AirMedical Group Holdings Inc., a major air medical transport provider, based in Lewisville, Texas. Ballard Aviation kept the B200 but needed a new company mission, and because of their joint preference for King Airs, the mission the Ballards and Rives chose was unanimous: buy, restore, modify and sell Beechcraft's popular turboprop.

Jim Ballard personally likes King Airs and believes the aircraft-sales market does, too. In agreement, Rives maintains that the Beech turboprop holds value and is "a better investment than most bizjets, which may have more ramp appeal, but in some political environments, been accused falsely of having a 'fat cat' image." He adds that a Beechcraft vice president once told him, "The best competition for a new King Air is a used one."

For Jim and Iva Ballard, the market confirmed their preference. "We were only anticipating [modifying and selling] about one airplane a year," said Iva Ballard. She added, however, that in the new venture's first full year, and in each year since, the company has sold six or seven King Airs. Still, the firm retains a mom-and-pop-like environment and is "small enough to offer personal service and attention," Rives adds.

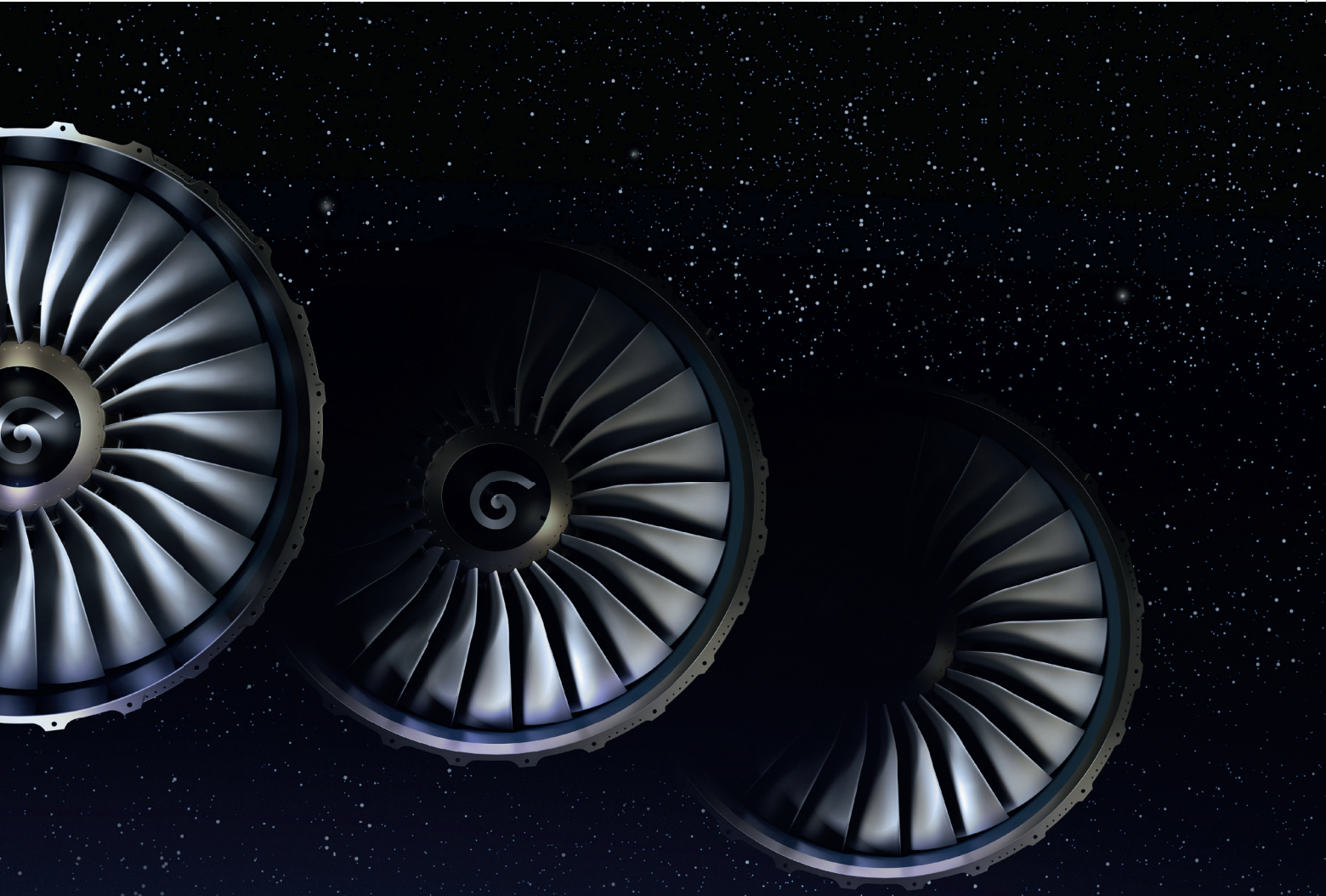
Ballard buys primarily B200 and 350 models but have also bought C90Bs and 300 King Airs. The aircraft come from around the world—Norway, India, Brazil, among other countries—though a majority are acquired in the U.S. The company seeks aircraft no more than 20 years old, as banks are reluctant to finance ones older.

Upgrading King Airs

Ballard's King Air upgrades generally comprise new engines, new avionics, interior work and paint. The firm works extensively with, and is an authorized dealer for, two companies: Blackhawk Modifications Inc., Waco, Texas, and Raisbeck Engineering, Seattle, Wash.

From Blackhawk, Ballard receives the STC paperwork, installation drawings, flight manual supplements and instructions for continued airworthiness that accompany the newest version Pratt & Whitney Canada PT6-52 (Blackhawk designation XP52) and -61 (XP61) engines for the King Air 200 and B200. Installations require minor sheet-metal work. Because the swapped out PT6-41 and -42 engines each need two bleed-air overboard vents and the XP52 and XP61 need just one, an about six-by-six-inch patch is placed on the right side of the King Air's engine cowlings. Other adjustments to the upgrade include remarking the engine gauges and changing the air-conditioning drive.

Ballard also was one of the first companies to install and then sell Blackhawk XP67As



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in a King Air 350. Replacing the standard PT6-60, the XP67A is essentially a 1,214-shp PT6A-67D, originally developed for the Beech 1900D regional airliner. It has been flat rated to the King Air 350 airframe limitation of 1,050 shp, a power level the aircraft now can maintain up to 25,000 feet, or about 10,000 feet higher than with the PT6-60s. The boost in performance is dramatic. Not only does the XP67A provide more torque at higher altitudes, it also increases the King Air 350's airspeed by up to 35 to 45 knots.

According to Chris Dunkin, chief pilot and regional sales manager at Blackhawk, the XP67A comes with modifications for model 350 installation, such as new seals, brackets, modified oil-cooler door and an air dam to accommodate the new engine's two inches of extra length. Every XP67A comes with a composite five-blade propeller, made by MT-Propeller Entwicklung GmbH, in Atting, Germany. Dunkin says more than 650 aircraft, mostly King Airs, have been upgraded with Blackhawk engines, which come with a five-year/2,500-hour warranty.

Ballard Aviation's general manager, Shane Rives, is a licensed A&P, IA and multi-engine rated pilot. Ballard image.

Installing Blackhawk engines requires no special tooling and could be completed in several days. However, Ballard's installations take two to three weeks, according to Rives, because they are part of a more complete upgrade. "We always have the engine trusses, starter generators and overspeed governors overhauled, and we replace the hoses and tach generators," he says. Ballard's A&Ps also remove the oil coolers, then have them flushed by an outside vendor before being reinstalled.

Ballard Aviation employs a dedicated sheet-metal worker who is aided by up to six assistants, depending on workload. Since the company buys newer King Airs, only about 20 percent of its sheet-metal work is for repair. Much of the work accompanies installation of Raisbeck products. For example, Ballard's shop removes the aft ventral fin on King Airs and replaces it with Raisbeck's dual aft strakes, for improved directional stability. Perhaps Ballard's biggest sheet-metal job is installing Raisbeck wing lockers, able to store behind the PT6 engines golf clubs, skis, luggage, etc., freeing space in the cabin.

To further improve the performance and fuel savings of King Air 200s and B200s, Ballard A&Ps can remove each engine cowling and affix Raisbeck's ram air recovery system (RARS). The RARS includes a particle separator, flaps, seals and an ice shredder, to protect the PT6s against foreign object damage (FOD), as well as improve air flow and thus raise torque. In addition, Raisbeck has developed for King Airs high-flotation wheel doors, which are made about twice as large as the King Air's factory-made doors, to fully enclose the protruding tires and thus increase airspeed through improved aerodynamics.

Ballard Aviation also installs the Raisbeck enhanced leading edges, replacing the King Air's leading edges between the engine cowlings and fuselage. The Raisbeck product has a contour design made to increase cruise speed, reduce stall speed and lengthen wing service life.

And Ballard replaces de-ice boots, too. For this, the company designed a stand with a wing-length trough that catches the old glue and the abrasive glue-removing chemicals that could damage a hangar floor during boot stripping. The company also has designed its own stand for engine and propeller removal and installation, and one to conveniently store engine cowlings and prop spinners.

Ready for Sale

All upgrades to Ballard's King Airs are maintained to Part 135 standards. The company keeps in its inventory many "high-dollar" parts, such as PT6 engines, props, engine trusses, exhaust stacks, landing gear, wheels and brakes. With readily available rotables, Ballard not only saves time during repairs, but also is assured of knowing each rotable part's history, according to Rives. Most standard King Air parts come from the nearby Beechcraft factory. Ballard also readily makes use of Beechcraft's repair and design office (RDO).

For King Air cockpit upgrades, Ballard incorporates Garmin's G1000 all-glass avionics suite. "We have four companies that install the G1000 for us," says Rives.

The three employees in Ballard's interior shop work solely on interior components that call for fabric or leather, such as seats, head liners and sidewalls. They do not do woodworking or cabinetry. Because of its ongoing connection with the emergency medical service (EMS) community, Ballard often is called upon to outfit King Airs with life-support systems. "We do about three or four air-medical completions a year," says Rives.

Surprisingly, despite having its Winfield facility, Ballard doesn't paint many of its own aircraft. "But not by design," Rives adds. Rather, it forwards aircraft paint jobs to four or five other companies. "I'd like to paint our own aircraft," he explains, "but we've been so busy painting planes for other people that this has not been an option. We always have at least one or two aircraft in the shop."

Many of the aircraft painted by the nine employees in Ballard's Winfield shop are new models off Cessna's and Beechcraft's assembly lines. Ballard also paints components such as cowlings, flaps, thrust reversers and landing-gear doors that have been repaired by Wichita-based Spirit Aerosystems for Boeing and Airbus aircraft. "Spirit's business represents about 15 to 20 percent of our paint-shop work," says Rives.

The price for a completed King Air from Ballard Aviation ranges from $1.2 million to $4.5 million, depending on the number of upgrades installed. "You can have $1.8 million spent just on the modifications," says Rives. He adds that some 60 percent of Ballard's King Air customers are private owners and the remaining are Part 135 operators.

Other Services

Ballard offers various aircraft services. Rives admits that some services offered do not generate a lot of income, but they do hold two key benefits: they serve as an advertising tool by introducing potential aircraft buyers to the company, and they further Ballard's expertise in aircraft operations and maintenance. The services include the following:

- Repossession service—working with banks to make sure the log books, maintenance and other records for

repossessed aircraft are in order.

- Excess management service—assisting people who want the benefits of aircraft ownership without the management headaches.
- Due diligence—assisting buyers by thoroughly researching an aircraft's history.
- Record audits—inspecting an aircraft's documentation involving, airworthiness, maintenance due items, modifications, registration, weight and balance, etc.
- Records retention and imaging—making and securing copies of log books. "Some people have log books scattered all over the country. We'll keep [copies] safe to protect the aircraft value," says Rives.
- Corporate aircraft management services.
- Legal assistance and expert testimony.

In addition, Ballard conducts routine phase and out-of-phase inspections on Cessna aircraft and helicopters, but, most often, King Airs. Most inspections performed are on aircraft owned by Ballard Aviation.

Career Advice

Ballard Aviation's array of services keeps its shops humming. And like other maintenance and completion facilities, the company faces the challenge of keeping a full staff of qualified and experienced A&Ps. Rives has rather strong views of the trade.

First, he believes technical schools are "all right for some people but not always the solution for others" and points out that persons interested in aircraft maintenance can earn their A&P license through another route. "They can come to an aviation maintenance facility, gain employment as a helper or assistant, be supervised by an A&P, document their experience on each system and aircraft model, and log their hours for three years full-time.

"Then after receiving a letter of recommendation from a supervisor, manager or another FAA-certified airman, they can proceed to the next step of meeting the FAA's requirements," Rives adds. "The candidate can then request an interview, conducted by an FAA inspector and, with inspector approval and upon completing required testing, receive certification.

"During that time, they can also see if they like working on airplanes," says Rives, who himself became an A&P after working in an engine overhaul shop.

Rives also advises maintenance personnel to not be bound by tunnel vision. "Some will say they're an engine guy, and that's it, and some say they're an avionics guy, and that's it," Rives explains. "But the most successful people [in aircraft maintenance] can do it all, and they're the ones who have no problem getting a job." AVM

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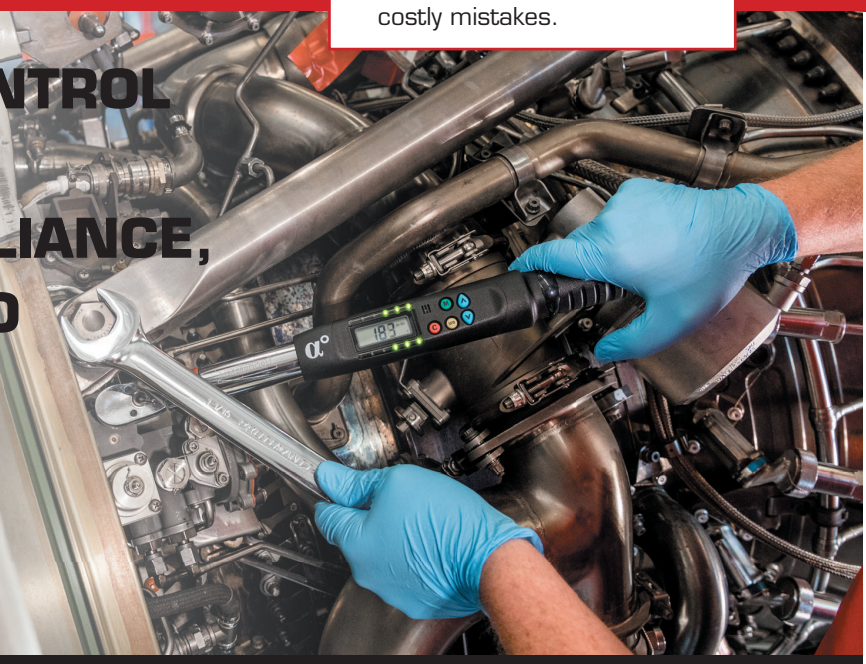

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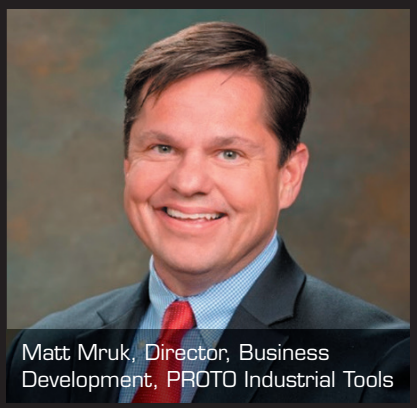

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