



# AVIATION MAINTENANCE

[avm-mag.com](http://avm-mag.com)

Most Read MRO Publication in the World

**AEE** 19/20  
JUNE 18  
AVIONICS & FLIGHT OPS  
MUNICH, GERMANY | [AE-EXPO.EU](http://AE-EXPO.EU)

**AST** 19/20  
JUNE 18  
TESTING IN AEROSPACE  
MUNICH, GERMANY | [AST-EXPO.EU](http://AST-EXPO.EU)

# Showdown on the MRO Frontier

## Giants Battle for Market Share

Download free app via [www.avm-mag.com/iOS](http://www.avm-mag.com/iOS)

Update your subscription address! Add your email for digital access – contact [pcalderon@aerospace-media.com](mailto:pcalderon@aerospace-media.com)

December 2017 / January 2018

**PMAS  
AND STCS**  
PARTS AND  
REPAIRS TO SAVE  
YOU MONEY



**TRU  
TRAINING**  
TEXTRON'S  
TRU AVIATION  
MAINTENANCE  
TRAINING ACADEMY



**LEGAL  
SPIN**  
**MUST READ!**  
NEW EXPORT  
RULES FOR CHINA  
EXPLAINED



**GLOBALPARTS**  
AERO STRUCTURES

# INLET REPAIR

PUT YOUR TRUST IN OUR EXPERTS



At GlobalParts Aero Structures we bring together experience and quality with an extensive range of inlet capabilities that enable us to repair and replace D-rings, Frames and Barrel or Outer skins so that they look and perform as good as new. From cracks and corrosion – to chaffing, metal fatigue or F.O.D, our experts utilize specialized FAA-Approved repair and replacement processes to resolve virtually any inlet issue with industry-leading results.



[WWW.GLOBALPARTS.AERO](http://WWW.GLOBALPARTS.AERO) / 1.316.733.9240 / [REPAIRS@GLOBALPARTS.AERO](mailto:REPAIRS@GLOBALPARTS.AERO)

Designated Supplier for Bombardier Learjet 20, 30, & 50 Series Aircraft Support



# CONTENTS

DECEMBER 2017 / JANUARY 2018 VOL 37 ISSUE 1

Most Read MRO publication in the World



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

**EDITORIAL**  
**Editor-in-Chief**  
Joy Finnegan  
[jfinnegan@avm-mag.com](mailto: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](mailto:abroadbent@aerospace-media.com)

**East Coast Sales**  
Paul McPherson,  
[pmpcpherson@aerospace-media.com](mailto:pmpcpherson@aerospace-media.com)

**West Coast Sales**  
Danny Faupel  
[dfaupel@avm-mag.com](mailto:dfaupel@avm-mag.com)

**International Sales**  
Jina Lawrence  
[jinalawrence@avm-mag.com](mailto:jinalawrence@avm-mag.com)

**China & Asia Pacific Sales**  
Josephine Zhu  
[josephine\\_z@opplandcorp.com](mailto:josephine_z@opplandcorp.com)

**Classified Sales**  
Becky Duclos  
[bduclos@avm-mag.com](mailto:bduclos@avm-mag.com)

**DESIGN/PRODUCTION**  
**small axe studios**  
[mark@smallaxestudios.net](mailto:mark@smallaxestudios.net)  
[www.smallaxestudios.net](http://www.smallaxestudios.net)

**SUBSCRIPTIONS**  
Paula Calderon  
[pcalderon@aerospace-media.com](mailto:pcalderon@aerospace-media.com)  
+44 (0) 203 892 3055

**CLIENT SERVICES**  
**Administration**  
Maria Hernanz Reyes  
[maria@asi-mag.com](mailto:maria@asi-mag.com)

**LIST RENTAL**  
**Statistics**  
Jen Felling  
[felling@statistics.com](mailto:felling@statistics.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



Aerospace & Security Media  
is a trading arm of ASI Publications Ltd

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

[abroadbent@aerospace-media.com](mailto:abroadbent@aerospace-media.com)

[www.avm-mag.com](http://www.avm-mag.com) or  
[www.aerospace-media.com](http://www.aerospace-media.com)

UK Company registration no 5999781  
UK VAT no GB227106044

## DEPARTMENTS

- 04 Editor's Comment
- 06 Intelligence: News
- 07 Intelligence: People
- 47 Spotlight
- 50 Classified

# 12

## COVER STORY

### Showdown on the MRO Frontier

Challenges abound as the giants of our industry battle for market share. Learn how they are coping with competitors, big data, consolidation and more.



## 34 PMAs and STCs

Understanding the role PMA parts and STC repairs play in aircraft maintenance can save you money.

## 42 The TRU Approach to Maintenance Training

Textron's entry into the aviation-training field in Wichita, Kan., has unlimited access to the aircraft, systems data and engineering expertise.

## 48 Legal Spin

FAA Agrees to Limit US Exports to China; and They Admit That They Did It for Non-Safety Reasons.



### CATEGORIES

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

Aviation Maintenance (ISSN 1090-221X) is published bi-monthly by Aerospace & Security Media Ltd, 21362 Sparrow Place Potomac Falls, VA 20165. Application to mail at Periodicals postage paid at Dulles, VA and additional mailing offices. POSTMASTER send address changes to Aviation Maintenance 21362 Sparrow Place Potomac Falls, VA 20165. The editor welcomes articles, engineering and technical reports, new product information and other industry news. All editorial inquiries should be directed to Aviation Maintenance; Email: [news@avmain-mag.com](mailto:news@avmain-mag.com). Subscriptions: Free to qualified individuals involved in the aircraft maintenance industry. All other prepaid subscriptions, see [www.avmain-mag.com](http://www.avmain-mag.com). Content may not be produced in any form without written permission.

# Old Familiar Faces

BY JOY FINNEGAN  
EDITOR-IN-CHIEF



Last month I wrote here about the looming or actual shortage of maintenance personnel. I have heard from a number of businesses and readers confirming there is an issue, industry-wide. Not yet a crisis but still problematic. Thank you for your input.

Let me mention that there were a number of people from our industry that had been laid off in years past. I know of several that struggled to find work in the aviation maintenance business suitable to their knowledge and level of achievement.

Now the shortage looms. As businesses struggle to find workers, please don't overlook those that might be over 40 or those that have been out of the maintenance work force for a time. Let's rehire all those that may be out of the industry not by choice but by circumstance. Make searching for and hiring those folks part of the overall strategy of finding enough of the right fit (which includes experience, qualifications and work ethics) for your maintenance professionals. There are still plenty left and they can be found.

In our annual Giants feature, AAR's Danny Kleiman says this about the worker shortage: "The biggest challenges continue to be a significant shortage in trained and experienced resources to work on aircraft, as well as the cyclic nature of airframe maintenance work." Haeco's Jim Sokol agrees saying, "our biggest challenge is finding qualified people and retaining them."

Our industry is not alone. The unemployment rate has continued to tick down steadily in recent years and that trend continues. According to the Bureau of Labor Statistics (BLS) as the unemployment rate has been decreasing, the number of job openings has been increasing, creating huge talent shortages for companies in many different fields. The BLS also says the United States will need 3 million more workers in the next ten years to fill low-skilled jobs so that the country will achieve economic growth. The Society for Human Resource Management says many employers are finding it difficult to find those qualified candidates I hear many of you struggling to find.

Other industries such as the medical field, science and math, engineering, and skilled labor like machinists, welders, plumbers, electricians and carpenters are also experiencing difficulty finding qualified workers.

A report by Global Risk Insights states, "The problem is that most companies are needing workers with middle skills that include technical knowledge and a better-than-average understanding of the tools and machines they will operate while also involving a high degree of problem-solving skills." This is exactly what I am hearing from those of you in the trenches dealing with hiring.


And as we have been talking about for years, we, as an industry, need to be more proactive in our efforts to recruit, train, and retain the excellent caliber of employees that we need. We need to continue to start young, using outreach to junior high and high school students who might not have a clear career path in mind, and lure them into aviation maintenance.

Not every kid today must go to college. More vocational and technical training might be exactly what a young, as yet unfocused, young person needs. Lots of students would prefer the kind of hands on, on the job training that comes with A&P school and internships with companies in our niche. This certainly does not mean that they won't eventually go to college and earn a degree or two. But in the meantime, they can get a real certification, put it work, earn good money and move forward in life.

If we continually send kids off to college to analyze the fine arts, who will we get to troubleshoot the fault on our jet? Our economy will benefit from that specialized, vocational training and I believe there are many young people today who would thrive in it and would prefer it to college. We just need to make it attractive.

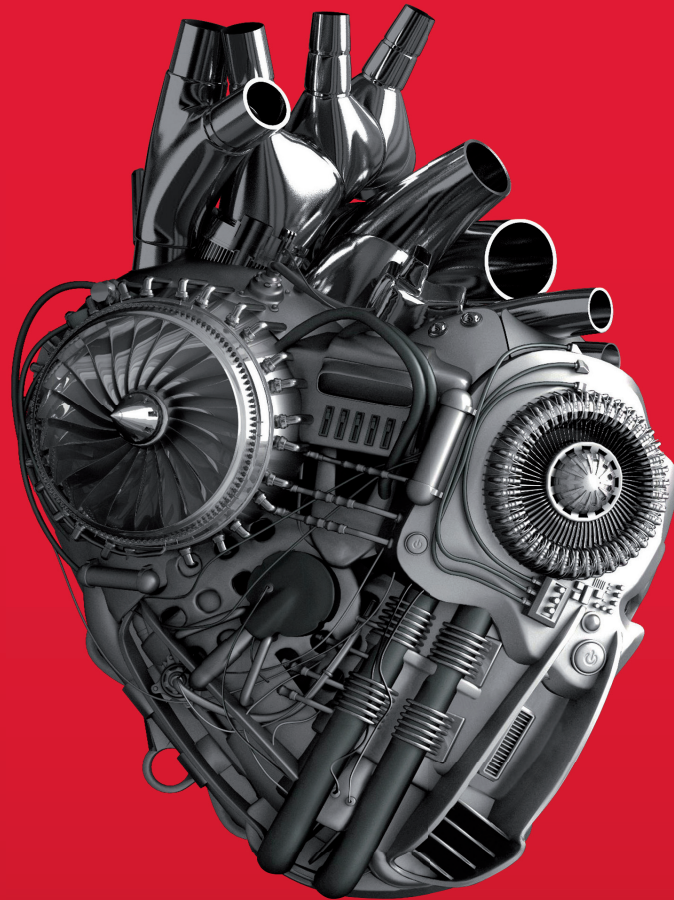
Speaking of money, that is one of the trickiest points, isn't it? Hourly rates of pay vs. shop rates. How can we justify raising one with out the other? Well, time and trial will tell. If there is a true shortage, then the market will bear these increases.

Diversity is also something we need to do better with in aviation in general. Don't exclude whole populations just because they are different from what has been typical in the industry for years. Women and minorities like airplanes, too. And trust me, airplanes cannot tell the gender or skin color of someone repairing them.

I wish you all luck in finding enough of the right employees to do the complex, challenging and something frustrating work of keeping the fleets of our world safely flying. 



**OUR EXPERIENCE DRIVES YOUR EXCELLENCE.**



When what matters is finely tuned, everything works. Iberia's merger with British Airways has made us stronger. Our technicians have more than 85 years of experience and are experts in their field. With our extended product range and joint resources we can offer you the high quality service that you demand.

**STRONGER TOGETHER.**

**Iberia Maintenance.** Commercial Direction.  
Adolfo Suárez Madrid-Barajas Airport. La Muñeza. Edificio END.  
28042 Madrid, España. Phone: + 34 91 587 48 27  
maintenance@iberia.es / www.iberiamaintenance.com  
**British Airways Engineering:** Technical Block C - Vanguard Way.  
Heathrow Airport. Hounslow. TW6 2JA  
bae@ba.com / web: www.ba-mro.com

**BRITISH AIRWAYS  
ENGINEERING**

**IBERIA  
MAINTENANCE**

Members de **IAG**

## East/West Industries Earns Part 145 FAA Repair Station Certification



From left, Stanley Routh, FAA Aviation Safety Inspector - Airworthiness; Rob Miller, East/West Industries (EWI) Sr. Quality Engineer; Joseph Spinosa, EWI VP Business Development; Teresa Ferraro, EWI President; Liz Maida, EWI Process Improvements Manager; and Conrad J. DePinto, FAA ASI/PMI - Airworthiness

East/West Industries has been certified by the Federal Aviation Administration (FAA) as an FAA Part 145 Repair Station (Air Agency Certificate No. 9EWR601C), the company announced recently.

East/West Industries designs, manufactures and maintains aircraft seats and other products critical to crew safety and survival from a 50,000 square foot facility on Long Island, where the company was founded in 1968.

The Repair Station approval means East/West has been authorized by the FAA to perform maintenance, inspection and repair on aircraft components. Prior to being named a Part 145 Repair Station, the company had its programs, practices, training, quality control, personnel, management, and more, reviewed and approved by the FAA. There are 5,000 Part 145 Repair Stations worldwide, according to the National Air Transportation Association (NATA).

"This is a great achievement and a reflection of the hard work and dedication of our entire team," said East/West President Teresa Ferraro. "Earning this FAA certification as a Part 145 FAA Repair Station adds an important new dimension to the work we do every day in support of aircrew safety."

Original equipment manufacturers like Bell Helicopter, Boeing, Lockheed Martin, Northrop Grumman and Sikorsky, to name a few, install East/West seats and other products on the aircraft they manufacture, including some of the newest commercial and military platforms under development, according to the company. The company has achieved the Performance Excellence Award (Gold) from the Boeing Company in both 2015 and 2016.



## IKHANA Completes Wins Several Clever Twin Otter STCs



*IKHANA Aircraft Services has been busy developing enhancements for the venerable Twin Otter.*

IKHANA Aircraft Services (IKHANA) achieved a new FAA STC for their latest DHC-6 Twin Otter upgrade, the RWWMI DHC-6-100HPTM/-200HPTM. The STC is an approved performance enhancement for the DHC-6-100/-200 series replacing the original PT6A-20 engines with PT6A-27 series engines. With authorization to operate at 50 PSI (620 SHP) of available torque, the modification provides improved performance especially under hot day high-pressure altitude conditions. The RWWMI DHC-6-100HPTM/-200HPTM matches the available power of a DHC-6-300 series, but differs from IKHANA's RWWMI DHC-6-200HGTM STC by keeping the original Maximum Take-Off Weight (MTOW) at 11,579 pounds (5252 Kg). IKHANA's RWWMI DHC-6-200HGTM STC provides increased power and a MTOW up to 12,500 pounds (5670 Kg). "Not all DHC-6-100/-200 operators benefit from increased payload, but they all want better performance," stated John Zublin, president and CEO of IKHANA. "This upgrade also supports aircraft fleet compatibility, improves utility, and returns value to the airframe, keeping with our philosophy of providing customers with options."

IKHANA has also developed an APU installation for the DHC-6 Twin Otter series. An operator needed to provide supplemental electrical power generation capability in support of special missions payloads and came to IKHANA for the request, who now offers the installation as a new enhancement product. "The electrical power now available is several magnitudes above that generated by the aircraft engines alone and is now a real option for operators needing power to support their missions," Zublin said. "We see this APU modification as a means to help future ideas develop into real technologies."

Additionally, IKHANA has achieved an STC for its Enhanced Vision System (EVS) for the DHC-6 Twin Otter series aircraft using the Astronics Max-Viz EVS 2300 sensor. The Max-Viz 2300 provides pilots situational awareness and safety by enabling them to see more precisely during day or night in adverse weather conditions such as haze, smoke, smog and light fog, even at night. "IKHANA is always looking to apply innovations that improve utility, and safety while expanding Twin Otter capabilities," Zublin stressed. "EVS offers a unique capability that fits well within the Twin Otter's typical operating mission in remote unimproved fields or other low visibility situations. As an alternative to computer database synthetic visions systems, the EVS 2300 provides the flight crew with a real-time visual situational awareness image that results in an additional level of safety for low visibility missions."

## about people

### Moeller is New MD/CEO at Spairliners

Spairliners has appointed Thies Moeller as new managing director and CEO. He succeeds Sven-Uve Hueschler heads the business alongside Benoit Crombois, managing director and CFO of the company. This has been employed by Lufthansa Technik since 2005. His previous experience



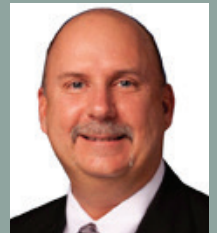
*Moeller*

within the corporate group includes leading positions in Key Account Management, Central Services and Processes as well as Central Controlling and Risk Management.

Former managing director and CEO, Sven-Uve Hueschler, returned to Lufthansa Technik after four years. Hueschler headed the company when Spairliners introduced its E-Jet component support in 2013 and during the development phase of its latest product SPACE.

### Constant Aviation Hires Clapsaddle

Constant Aviation announced the addition of Lane Clapsaddle as special accounts sales manager. Clapsaddle will specialize in pre-purchase evaluations, assisting buyers, sellers and brokers with technical support, imports, exports and complete MRO services. He will



*Clapsaddle*

also continue to expand upon the company's established standardized pre-purchase evaluation program. "Constant Aviation is seeing a significant increase in pre-purchase evaluations. Clapsaddle's objective will be to manage our existing client base while continuing to build on our relationships with large broker dealer accounts," said Stephen Maiden, President and CEO of Constant Aviation. Clapsaddle has more than 36 years in the aviation industry. He is a licensed A&P technician, and has a degree in Industrial Technology. His career originated in the United States Air Force as an aircraft technician on C-141 aircraft. Prior to joining Constant, he spent the past 15 years with StandardAero.

### Phillips 66 Aviation Picks New Director

Phillips 66 Aviation has chosen Matt Dill, currently director, NGL Business Development,

about people

» Midstream to transition to director of Supply, Military & Exports, U.S. Marketing. In his new role, Dill will lead sales activities of Military and Exports for Phillips 66. This position is also responsible for managing overall supply of fuels for the general aviation channel. Supply responsibilities include managing proprietary Jet and Avgas supply, third-party terminaling, leased storage and product purchases. A graduate of Kansas State University, Dill joined the Phillips 66 commercial organization in 2003 as a risk analyst and held a variety of trading and strategy roles. He will office in Houston and report directly to Grant.

**Mansoor Janahi Appointed Deputy CEO of TS&S Group**



Janahi

Mubadla announced that Mansoor Janahi has been appointed deputy CEO of its wholly-owned business, Turbine Services & Solutions Group (TS&S), a specialized solutions, maintenance, repair and overhaul (MRO) provider for aircraft and

industrial engines. The new deputy CEO will work closely with the TS&S executive team to ensure the Abu Dhabi-based aerospace business remains at the forefront of offering integrated solutions to an international network of industry partners while supporting the emirate's vision to become a global aerospace hub.

**AJW Group Appoints Haines as Technical Director**



Haines

AJW Group has appointed Martyn Haines as technical director. Haines began his new role in November 2017. Haines will be responsible for technical standards and best practices across all divisions

of the business, focusing on driving performance and continuous improvement of its supply chains and solutions to airline MRO challenges. Haines has an extensive background in aircraft leasing, MRO and airline operations. He joins AJW from Kenya Airways where he was technical director, responsible for the delivery of a cost effective operation for their fleet of circa 40 Boeing 737, 777, 787, Embraer E190 aircraft and associated MRO facilities. Haines will report

**Monarch Engineering Secures Icelandair Base Maintenance**

Monarch Aircraft Engineering Limited (MAEL) has signed a new base maintenance agreement with Icelandair. The airline is a new base maintenance customer for MAEL who will carry out C-check for Icelandair's Boeing 757 cargo aircraft. The maintenance work will be carried out at Monarch's Luton Airport hangar and began at the end of October 2017. "Following on from the successful line maintenance work we have completed in the past for Icelandair, we are happy to now be carrying out the base maintenance work," Andy Lowi, Business Development manager at Monarch Aircraft Engineering said. "We look forward to welcoming the airline's Boeing 757 cargo aircraft into our Luton hangar later this month"

**EPCOR to Support Gulf Air 787 APUs**

Gulf Air has chosen AFI KLM E&M for maintenance of the APS5000 auxiliary power units (APU) equipping the airline's 10 new, incoming, Boeing 787-9 Dreamliner aircraft. The long-term contract includes a guarantee covering APU replacement. The repair services will be provided by AFI KLM E&M subsidiary EPCOR. EPCOR has provided APU support for the Bahraini carrier's Airbus A330s for a number of years.

"EPCOR's proven TAT and service quality performance observed in the framework of our A330 APU contract convinced us to extend our partnership to this new type of APU and we are pleased to continue our relationship with them as we prepare to welcome new aircraft into our fleet," said Captain Waleed Abdulhameed Al Alawi, Gulf Air Deputy CEO.

**Lufthansa Technik and MTU Aero Engines Launch MRO JV**



Lufthansa Technik and MTU Aero Engines will work together to support geared turbofan engines.

Lufthansa Technik and MTU Aero Engines have set up a joint venture for the maintenance, repair and overhaul (MRO) of geared turbofan engines, with each of the partners holding a stake of 50 percent in the new company. The name of the new JV is Engine Maintenance Europe, or EME Aero for short. The contract, which followed up on an agreement on the general principles of the cooperation signed in February 2017, was finalized by the two companies on December 4.

EME Aero sp. z o.o. will be based in Poland and will have a workforce of 800 employees in the future. The two parties to the joint venture will invest a total amount of around 150 million euros by 2020. The company will be headed up by project manager Derrick Siebert (CEO) from Lufthansa Technik and by Dr. Uwe Zachau (COO), his counterpart at MTU Aero Engines. They plan to have the facility up and running in 2020. The planned annual capacity is more than 400 shop visits of PW1000G-series geared turbofans, which power the Airbus A320neo family of aircraft and other airliners. The two joint venture partners MTU and Lufthansa Technik have raised their forecast for the number of employees and the annual shop visits over the past few months.

"With this project we have taken the big challenge to get EME Aero up and running in a short time," said Siebert. "For us it is a tremendous motivation to push this project of providing maintenance for an entirely new generation of commercial engines in Europe to a successful start." Uwe Zachau added: "The launch of the company marks a key milestone for us. Over the coming two years, we'll have to tackle an ambitious ramp-up plan for our joint shop. We are very confident that with our excellent team, made up of colleagues from both shareholders, we'll successfully solve this challenge."



*TPAerospace*

# **WHEELS & BRAKES**

**IT'S THAT SIMPLE**



**WWW.TPAEROSPACE.COM**

about people

directly to Gavin Simmonds, COO of AJW Group, and will be based at the company's headquarters in the UK. "Marty is a proven leader with a high level of technical and commercial experience, and as such is the ideal candidate to continue to drive forward our technical strategy and execution within the AJW Group," said Christopher Whiteside, president and CEO, AJW Group.

**Jennings joins C&L Aviation Group**



Jennings

C&L is pleased to announce that Ron Jennings has joined the company as regional sales manager. Jennings will assist C&L's corporate aviation customers with maintenance packages, including modifications, avionics

upgrades, interior and paint services. Jennings' experience includes 33 years in the corporate aviation industry. Prior to C&L, Jennings served as VP Technical Sales and Services at J.A. Air Center near Chicago, IL and also at Constant Aviation. Prior to that, he held a 17-year tenure at Elliott Aviation beginning as a regional sales manager and progressing to director of Service Sales and later Completion Sales, while managing inside and technical sales teams. Earlier in his career, he served in an operational role as DOM at JetCorp. Throughout his career, Jennings has assisted customers with their technical services sales for many different aircraft types, including Bombardier, Gulfstream, Falcon, Textron, and Embraer. Jennings is a licensed A&P technician with Inspection Authorization, as well as a licensed pilot, and earned a degree from the Spartan School of Aeronautics.

**Greg Paxson Joins Air 7 as Director of Maintenance**



Paxson

Air 7 announced Greg Paxson as DOM. Paxson's responsibilities will include the oversight of the organization's maintenance operations, manufacturer-FAA guidelines, strategic aircraft fleet maintenance programs and logistics. Paxson has served as

DOM and executive maintenance leadership roles, with FAR Part 135 organizations for 20 years. Paxson also owned and operated a reputable 14 CFR Part 145 FAA Maintenance Repair Station. "Greg brings a tremendous

**FlightSafety Announces New P&W Canada PT6A Engine Series for Ag Ops**

FlightSafety International has introduced a new Pratt & Whitney Canada PT6A Series Pilot Familiarization Course designed specifically for Agricultural Aircraft operators. Training is planned to begin in Brazil early next year. Additional locations will be added according to Customer needs.

"This new course will provide agricultural pilots who fly aircraft equipped with Pratt & Whitney Canada PT6A series engines with the information and hands-on practical training needed to help operate and maintain the engines to the highest standards," said Steve Gross, Senior Vice President, Commercial.

"In listening to our agricultural customers' needs, we've recognized that in addition to providing high quality OEM maintenance training, it is equally important to optimize pilots' understanding of engine operability and performance to enhance communication with the technicians maintaining the aircraft," said Tim Swail, VP, Customer Programs, Pratt & Whitney Canada.

This one-day course provides pilots with information regarding normal and abnormal operation, operational procedures and recommendations to help ensure the engines perform at peak efficiency. It includes an in-depth overview of the engine's major systems and its interface with the aircraft.

**StandardAero Awarded Multi-Year Contracts to Provide APU MRO Services for Yamal Airlines**

StandardAero was recently awarded two multi-year auxiliary power unit (APU) maintenance, repair and overhaul (MRO) contracts to support Yamal Airlines, a Russian-based regional operator.

The contracts include a three-year agreement to provide Honeywell GTCP36-150RJ APU MRO services for Yamal's fleet of 10 CRJ-200LR aircraft and a five-year agreement supporting Honeywell RE220 APU MRO services on Yamal's fleet of 10 Sukhoi Superjet aircraft, which is expected to grow to 16 aircraft by early next year.

These new agreements were signed on November 24 and activated on December 1, 2017. APU services will be provided at StandardAero's Maryville, Tenn. facility.

Yamal Airlines is based in Salekhard, Yamalo-Nenets Autonomous Okrug, Russia, with main hub in Tyumen. It operates regional passenger services and was established in 1997.

"These long term agreements, with one of the largest fleets of the new Sukhoi Superjet 100 and a leading regional carrier in Russia, are a result of StandardAero's reputation for delivering high quality, cost effective services and our ability to support cross-product maintenance solutions for all of Yamal Airlines' APU MRO service requirements," said Peter Turner, president of StandardAero Airlines & Fleets.

**FALCON 5X Ends**

Dassault Aviation has initiated the termination process of the Silvercrest contract leading to the end of the Falcon 5X program and announced the launch of a new Falcon program with an entry into service in 2022.

The delivery of compliant Silvercrest engines was originally planned for the end of 2013 in accordance with the Falcon 5X flight test schedule. Safran met recurrent technical issues during the program development.

In 2015 and 2016, major technical issues have led Safran to announce a new schedule leading to engines delivery for the Falcon 5X flight tests by the end of 2017. Consequently, Dassault Aviation had to postpone the entry into service of the Falcon 5X from 2017 to 2020, i.e. a three-year delay. This slippage has caused customers' concerns and order cancellations (12 in 2016).

Equipped with a preliminary version of the engine, not compliant with the specifications, the Falcon 5X performed its maiden flight, on July 5, 2017, and started a preliminary flight test campaign, limited by engines capacity. The Falcon 5X flight behavior met all the expectations, the company said.

In the fall of 2017, Safran experienced issues with the high pressure compressor and informed Dassault Aviation of an additional delay and new performance shortfall, making the 2020 entry into service of the aircraft impossible.

Considering the magnitude of the risks involved both on the technical and schedule aspects of the Silvercrest program, Dassault Aviation says it has initiated the termination process of the Silvercrest contract leading to the end of the Falcon 5X program. "There is still a strong market need for a brand new long range aircraft with a very large cabin," Eric Trappier, Dassault Aviation CEO explained, " - so I have decided to launch a new Falcon project powered by Pratt & Whitney Canada engines, featuring the same cross section as the Falcon 5X, a range of 5,500 nm, and scheduled to enter into service in 2022."



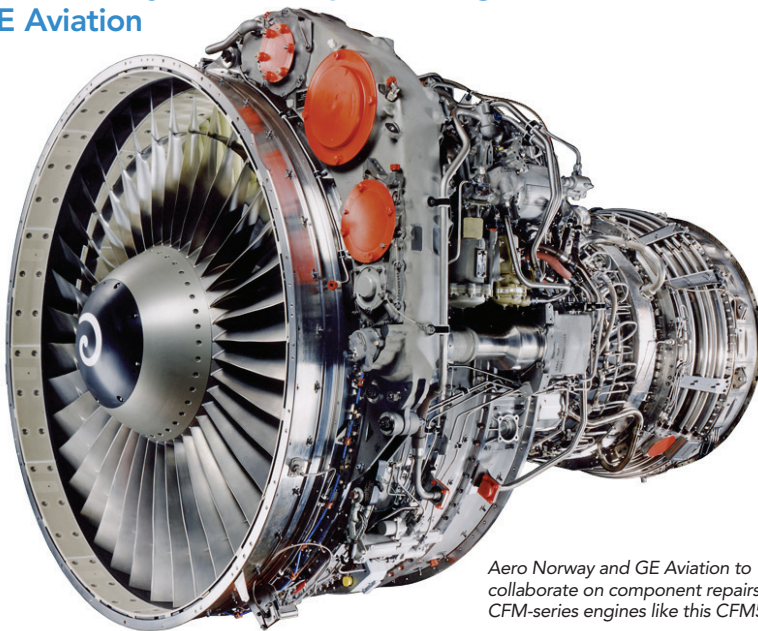
## Commsoft Adds TUS Air

Commsoft announced that its MRO IT system, OASES, has been chosen by new Cypriot airline, Tus Airways (Tus Air). OASES is structured in a modular format to allow for scalability and Tus Air has opted for the Core, Airworthiness and Planning modules with an option to add the Materials and Line Maintenance Control modules at a later date.

OASES software can either be installed on-site on a local server or accessed through Commsoft's private cloud hosting service, avoiding the need to install any additional hardware. Tus Airways is a Cyprus-based airline which commenced operations in March 2016. The airline currently operates a growing network of flights including from Larnaca to Tel Aviv, Rome, Athens and additional Greek cities and islands. The airline's fleet currently consists of two 100-seat Fokker 100 jetliners and two 77-seat Fokker 70s shortly to start operations.

"2017 has been very successful for Commsoft and this latest customer is further evidence that OASES leads the way in terms of its functionality, flexibility and cost-effectiveness," said Nick Godwin, Commsoft's managing director. "We have enjoyed working with Tus Air to ensure a successful implementation of the Fokker 100s and will support them closely as they introduce the New Fokker 70s."

## Aero Norway Awards Repair Management Contract to GE Aviation



Aero Norway and GE Aviation to collaborate on component repairs for the CFM-series engines like this CFM56-3.

Norway-based engine MRO facility Aero Norway recently signed a three-year TrueChoice Material agreement with GE Aviation to cover the component repairs on its CFM56-3, CFM56-5B and 7B engines. The agreement will cover engine modules, engine assemblies and sub-assemblies, engine mounted controls and accessories, and all parts incorporated within this equipment.

"At Aero Norway, the focus is always on delivering the best service and industry-recognized EGT margins, and we are globally acknowledged as a leader in CFM56-3 engine repairs," according to Sonia Tindall, manager of Global Sales & Marketing at Aero Norway. "To best serve our customers: MROs, independent engine owners and leasing companies, we need repair partners that can complement the flexibility of workscope that we, as an independent organization, strive to offer. Through this agreement with GE Aviation, we will further enhance operational efficiency and maximize the fast slot induction and quick turn-around that our global customers demand."

"GE Aviation has extensive component repair capabilities, and we continually invest in new repair techniques to help our customers," said Jean Lydon-Rodgers, president and CEO of GE Aviation. "This agreement with Aero Norway will bring our component repair offerings to their customers for their CFM56 engines."

The TrueChoice suite of engine maintenance offerings incorporates an array of GE capabilities and customization across an engine's lifecycle. The TrueChoice suite includes TrueChoice Flight Hour; TrueChoice Overhaul; TrueChoice Material and TrueChoice Transitions. GE says each of the TrueChoice offerings is underpinned by GE Aviation's data and analytic capabilities and experience to help reduce maintenance burden and service disruptions for customers.

## about people

amount of experience and knowledge to Air 7," states Bob Oliver, CEO Air 7. "Greg is extremely respected and recognized in the aviation maintenance industry and we are very fortunate to have his leadership as we grow and develop Air 7." Paxson holds an Airline Transport Pilots Certificate, A&P Certificate with Inspection Authorization and is an Aeronautical Operations and Maintenance Management graduate from San Jose State University.

### Mark King is the New Chairman for AVS-SYS

AVS-SYS has announced the appointment of Mark King to the position of chairman. King has more than 28 years of knowledge and experience gained from working at the highest levels with the aerospace industry particularly at Rolls Royce where he ultimately held the position president, Aerospace.

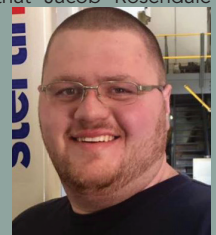


King

"We believe Mark will be a truly excellent addition to the team," said Paul Heaton, Managing Director of AVS-SYS. "His experience at Rolls Royce, his intelligence, drive and his in-depth knowledge of the aerospace industry will be invaluable as AVS-SYS takes its next exciting steps."

### Rosendale Named Service Technician at Stertil-Koni

Stertil-Koni, maker of heavy duty vehicle lifts, has announced that Jacob Rosendale has joined the company as a service technician. In his new position, Rosendale handles technical and organizational duties at the Stertil-Koni warehouse in Stevensville, MD and works as a key support person for company distributors and end-users.



Rosendale

In making the appointment, Dr. Jean DellAmore, president of Stertil-Koni, noted: "Jacob has dedicated his professional career to the service industry and brings a strong background in diagnosing and repairing heavy duty equipment, overseeing inventory as well as participating in the manufacturing and assembly process. His in-depth experience, focus and breadth of technical knowledge, along with a dedication to getting the job done, make Jacob a key contributor to Stertil-Koni's focus on delivering 'radical' customer service."



# Titans Battle: Wild West of MRO

## Big Challenges, Big Opportunities

by Charlotte Adams

Boeing Global Services employees Michael Gutierrez (left) and Robert Zoricic perform maintenance, repair and overhaul to ensure the global C-17 Globemaster III fleet is always ready and evolving through continuous technology upgrades, including using data analytics to optimize predictive maintenance capabilities and minimize unscheduled maintenance. Boeing is the original equipment manufacturer for the C-17, and has provided sustainment to the fleet since delivery of the first aircraft in 1993. (Boeing image)



Commercial MRO is primed for growth but faces more than the usual challenges. Scale, flexibility, technology, and global reach will be important in this ever-more-competitive arena. And, besides the tight labor market, players will experience a magnified OEM effect, as Airbus and Boeing make a more concerted effort to capture after-sale revenues.

The next decade could see 20,000 airliner deliveries and 10,000 airliner retirements, so that by 2027 new-generation aircraft could comprise 58 percent of the commercial fleet, according to Oliver Wyman's Global Fleet & MRO forecast. MRO spending could grow from \$75.6 billion in 2017 to \$109.2 billion in 2027.

China and Asia Pacific will drive much of the new airplane and MRO business. MRO in China, alone, is expected to reach almost \$20 billion in 2027, the forecast says. Other high-growth markets include the Middle East, Latin America, and India.

Vendors' geographically dispersed service centers will make them available to customers worldwide, says Matthew Beres, airborne retrofit and modernization analyst with Forecast International. "MRO logistics is evolving ... to such a degree that turnaround time for repairs ... [will] be outstanding."

### Consolidation

Competitive pressures have spurred consolidation among OEMs and MROs. As Turkish Technic CEO Ahmet Karaman puts it, "Consolidation is essential, the current world economics dictate this."

China's \$90-billion-revenues conglomerate, HNA Group, has a portfolio including carriers such as Hainan Airlines and MROs such as HNA Technic (China), myTECHNIC (Turkey), and SR Technics (Switzerland). HNA Technic—which itself has more than 30 maintenance bases in China, 10 regional centers, and a service network of over 200 stations worldwide – "will integrate high-quality resources with SR Technics" to increase synergies, says Zhang Zhigang, HNA Technic chairman.

As he puts it, the intensifying competition in the global





HNA Group has a portfolio including carriers such as Hainan Airlines and MROs such as HNA Technic (China), myTECHNIC (Turkey), and SR Technics (Switzerland). HNA Technic, shown here, has more than 30 maintenance bases in China, 10 regional centers, and a service network of over 200 stations worldwide. (HNA Image)

MRO market has gradually shifted “competitive advantage... to a comprehensive, large-scale MRO enterprise with [a] global network...and aviation group background.”

SR Technics can also “rely on the massive fleet – [some 1,250 airplanes] — advanced management philosophy, and good brand image of HNA Group,” Zhigang says. He predicts cooperation between the sister companies in areas such as training, technology upgrades, and efficiency enhancements.

Independent MRO, StandardAero, meanwhile, has mushroomed in size. In 2017 it snapped up PAS Technologies, Jet Aviation Specialists, and Vector Aerospace – the last from Airbus – growing revenues to about \$3 billion. The company now boasts 42 locations across five continents, says CEO Russell Ford, who expects continued “aggressive growth” organically and through acquisitions. Vector adds stronger European and Asian content and expands capabilities in turboprop engine MRO and in helicopter engine, airframe, and component services. In sum, large MROs are becoming larger, as big operations and far-flung networks become increasingly the order of the day.

Then there’s HEICO, also an independent, which owes much of its expanding revenues to acquisitions, as well as internal growth.

On its way from \$64 million in sales in 1997 to \$1.4 billion at last count, the company has completed 65 acquisitions. Its \$1.3 billion revolving credit facility is expected to be used principally to fund further acquisitions.

HEICO Repair Group considers itself to be the largest independent component MRO, servicing and shipping more than 60,000 units a year. This includes components such as avionics, electro-mechanical, fuel, hydraulic and pneumatic applications, and flight structures and wheels and brakes.

### Aircraft OEM Push

Despite concerns about the airframe OEM push, “there’s plenty of work for everybody,” says Michel Merluzeau, director of aerospace and defense markets for AirInsightResearch (AIR). “The fleets are being stressed – airplanes are flying more – and there is also an MRO footprint shortage,” he says. Emerging markets, especially China, Asia, and the Middle East, will need more MRO capacity to meet their requirements.

“I don’t care how much maintenance capacity is being planned for and built, there’s going to be a demand for more,” especially in China and India, Beres agrees.





StandardAero, shown above, has mushroomed in size by acquiring companies like PAS Technologies, Jet Aviation Specialists, and Vector Aerospace which has grown their revenues to about \$3 billion. (StandardAero image)

Furthermore, the demographics of the airline industry are changing, Merluzeau says. Newcomers are not so much like Delta or Air France. They aren't so engineering-heavy and they lack large internal MRO capability. "They will rely more and more on the OEMs and systems suppliers to help them."

Boeing Global Services (BGS), the airframer's brand-new division, is not pursuing a "Boeing-only," "infinitely vertical" approach, however, says Stan Deal, the unit's president and CEO. He points to the partnership with Air France KLM on 737 and 777 programs, as well as to Boeing Shanghai, a JV with China Eastern, and Boeing Asia Pacific Services, a JV with SIA Engineering Co. But BGS is creating an entrepreneurial culture – "every two weeks we're making [internal] investment bets," he says. The unit nurtures ideas or pulls the plug on them quickly if they're not panning out.

BGS's "big focus" is on reducing customers' life-cycle operating costs, Deal says. "I think that's what the airlines want when they say they want to increase competition."

Airbus reorganized first, launching its Services by Airbus division in 2015. The unit focuses on maintenance, upgrades, training, and flight operations. This year Airbus rolled out the Skywise big data platform.

In 2017 Airbus also launched the Airbus MRO Alliance, which has signed on leading MROs to optimize heavy maintenance turnaround times. So far AAR, Aeroman, Sabena Technics, Etihad Airways Engineering, GAMECO, and China Airlines are on board. "There is business for both MROs and OEMs," says James Bruno, head of business development with Airbus Customer Services. "As far as MROs are concerned, our strategy...in the Airbus MRO Alliance [is to have] a limited number of privileged MROs with which we are building close working relationships."

## Scale Effects

"Due to OEM and airline consolidation, the MRO market is [becoming] more and more a giants' business, with major long-term deals, a stronger pressure on prices, and increasing financing needs," says Vincent Metz, vice president of strategy with Air France Industries KLM Engineering & Maintenance (AFI KLM E&M). "Large scale is becoming more essential to drive efficiencies and generate greater revenue," adds Jim Sokol, president, MRO services, for HAECO Americas.

AFI KLM E&M has positioned itself in growing economies like Asia and in new aircraft types, Metz says. It will continue to develop its MRO network "to answer the increasing need for

competitiveness, proximity, and dedication," he says. He cites as an example Singapore Component Solutions, a new JV with Sabena Technics to support A320 and ATR component repair.

Lufthansa Technik (LHT) also continues to expand outside of its home area. In November 2017 Lufthansa Technik Component Services "officially started operation of its significantly expanded component shop in Tulsa, Oklahoma," says Johannes Bussmann, LHT CEO. LHT JV, Lufthansa Technik Sofia, is also primed for expansion. When the project is completed, the facility will be the largest base maintenance facility in Eastern Europe.

In 2017 the Lufthansa Technik Middle East facility became operational in the United Arab Emirates. LHT and GE Aviation also laid the foundation stone for the XEOS JV in Poland, which will overhaul GENx-2b and GE 9X engines. A second JV in Poland was launched in December 2017 with MTU Aero Engines. The 50/50 partnership, Engine Maintenance Europe, or EME Aero, aims at MRO for Pratt & Whitney's geared turbofan engines.

AAR, one of the largest independent MROs, recently acquired two Canadian facilities from Premier Aviation. "We continue to seek additional opportunities for acquisitions and joint ventures to grow domestically and overseas," says Dany Kleiman, group vice president for MRO services. He expects to see single-digit growth in the North American airframe MRO market "with growth potential in wide-bodies, which is why we built our newest MRO [facility] in Rockford, [Ill.]."

HAECO also is expanding in the U.S. It plans to open a fifth hangar at Piedmont Triad International airport, N.C., in 2018.—

Monarch Aircraft Engineering Ltd. (MAEL) is expanding, as well. The independent British MRO expects to open a component maintenance center in Northampton by August 2018. Already part of Boeing's Global Fleet Care partnership, MAEL is also looking to grow its Specialized Monarch AOG Response Team (SMART) work as well as its CAMO (Continuing Airworthiness Management Organization) and Part 21 design services.

TAP Maintenance and Engineering, the Portuguese airline MRO,—is investing in test cells for its component overhaul shop to service its A320neos and A330neos and is adding tooling for the LEAP engine, says Carlos Ruivo, vice president of marketing and sales for TAP M&E. He expects growth mainly in engine maintenance. He also expects around 30 percent growth in global third-party work revenues in 2017 vs. 2016.





Delta TechOps is diversifying and feels confident about its components, engines, and interiors and mods business. Shown above is their planned new engine test cell. (Delta TechOps image)

Turkish Technic says their revenue increased by 15 percent in 2016. Since its spin-off from Turkish Airlines in May of 2016, Turkish Technic saw double digit growth in revenue despite establishing an engine shop with Pratt & Whitney in 2008 and not consolidating engine maintenance revenues after then. They forecast growth in 2017 and say that their “long-term goal is to be amongst the top five MROs in the world by the end of 2023,” according to Turkish Technic CEO Ahmet Karaman. The company is planning to construct a new hangar facility at Istanbul Grand Airport, which is still under construction. The new airport is planned to be operational next year and the existing Yesilkoy Ataturk International Airport will cease commercial operation. The company is finalizing plans for that investment to keep in line with their stated goals.

### Delta TechOps

Delta TechOps is bullish on components, engines, and interiors and mods. Delta Air Lines’ new subsidiary, Delta Material Services, will help with its focus on used/surplus aircraft, engines, and parts. Another subsidiary, Delta Flight Products, focuses on the design, integration, manufacture, and certification of aircraft components and modifications.

Delta Tech Ops is building on its relationship with Rolls-Royce as an authorized maintenance center, including the Trent XWB, 1000, and 7000 engines. The MRO is adding an engine shop and a test cell, which when complete in late 2018, will be the world’s largest, officials say.—

Delta has a joint maintenance facility at Queretaro InterContinental Airport with AeroMexico. Delta and GOL Airlines also are developing an “engine hospital shop” in Brazil. The U.S. airline collaborates with Air France KLM on A350 support and uses China Eastern’s STARCO facility for “significant airframe maintenance.”

### Opportunities and Challenges

AAR sees the OEMs’ plans to participate more actively in the aftermarket as an opportunity as well as a challenge. While much consolidation so far has stemmed from increased competition on legacy parts, next-gen aircraft and manufacturing advances do provide an opening for OEMs to control the aftermarket for new parts and aircraft, Kleiman says.

“Still it makes sense for OEMs to partner with ... providers like AAR on legacy support,” he says. AAR recently joined the Airbus MRO Alliance to become a preferred provider of heavy maintenance to Airbus customers.



Michel Merluzeau of AirInsightResearch says there is plenty of work for everybody right now with airplanes flying more and emerging markets like Asia coming up to speed. (HNA image)





HEICO Repair Group considers itself to be the largest independent component MRO, servicing and shipping more than 60,000 units a year. (Heico image)



StandardAero CEO Russell Ford says to expect continued "aggressive growth" for the company both organically and through acquisitions. (StandardAero image)

Finding a balance with the equipment, engine, and airframe makers is key, Metz adds. "So we continue ... forging partnerships with them, e.g., the A350 and the Boeing 787, to get access to licenses, including for the LEAP engine."

ST Aerospace is also adept at this balancing act. While the OEMs' growing investment in MRO will lead to a more competitive landscape, ST Aero's "suite of nose-to-tail ... solutions, coupled with our strong engineering capabilities and broad customer base" position the company well in the growing MRO market, says president, Lim Serh Ghee. ST Aero's track record "is part of the reason why we recently secured a 15-year contract to provide component support for Gulf Air's new fleet of 787-9s."

At the same time, however, ST Aerospace works closely with the OEMs. It recently entered into General Terms Agreements (GTAs) to provide airframe heavy maintenance and modification services to Airbus and its customers, Ghee says. "With these GTAs Airbus will gain greater access to ST Aerospace's MRO capabilities at any of our ... facilities across Asia and North America..."

A more pressing issue for some airframe MROs, is the need for skilled workers. "The biggest challenges continue to be a significant shortage in trained and experienced resources to work on aircraft, as well as the cyclic nature of airframe maintenance work," Kleiman says. AAR hopes that airlines "will transition to a more steady state for maintenance throughout the entire year to accommodate ... better planning, execution, and availability of resources."

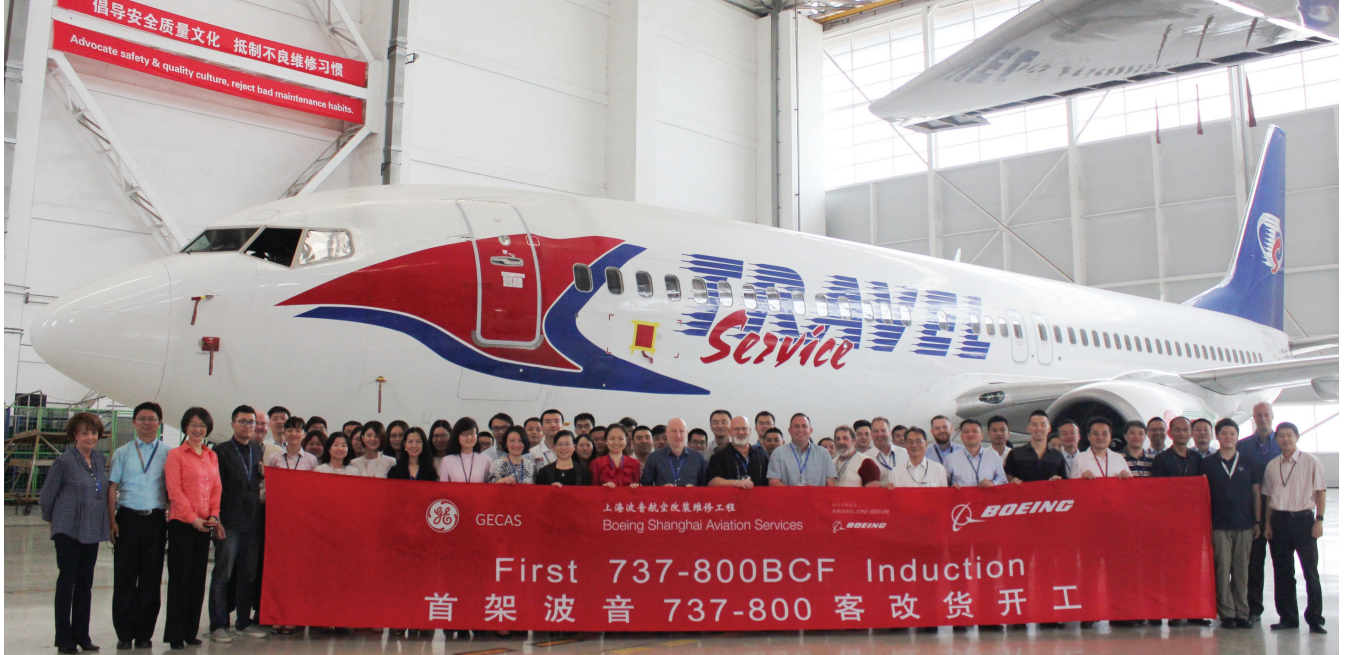
Sokol agrees that "our biggest challenge is finding qualified people and retaining them." HAECO traditionally "has sought to partner with OEMs, particularly on the engine side, through joint ventures, which is more of a win-win than competing directly," he says.

MROs in the near future will "need to invest in newer capabilities or gain them by partnering with OEMs, so as not to limit competition to legacy platforms," Kleiman says. The changing demographics of the airlines also will be beneficial, Sokol predicts. "We'll continue to see a trend toward outsourcing to MRO companies like us vs. OEMs," he says.

LHT sees itself as well situated to withstand OEM advances. It is "one of a few suppliers worldwide ... in the position to talk on an equal level about cooperation models with leading OEMs," Bussman says.

He points to "comprehensive long-term agreements" signed in recent months and years with OEMs such as Rolls-Royce, GE, Pratt





Boeing Shanghai Aviation Services inducted its first 737-800 Boeing Converted Freighter in June 2017. (Boeing image)

& Whitney, Honeywell, MTU Aero Engines, and Parker Aerospace. He also notes the 50/50 JV with AFI KLM E&M, Spairliners, which offers component services for the A380 and Embraer E-Jets.

TAP's Ruivo, on the other hand, sees the OEMs' growing presence as "no doubt the biggest challenge" for MROs as well as an "irreversible process."

Turkish Technic agrees that "OEM's increasing aftermarket dominance and developing strategies to cope" will be a main challenge. Additionally, next year, Turkish Technic will be obtaining the base maintenance capability for the A320 Neo and B737 Max as these aircraft join Turkish Airlines' fleet, Karaman says.

## Boeing Global Services

Although BGS expects to have "a limited set of capabilities" in commercial heavy maintenance, it intends to be "a smart consumer" and get involved where it is part of a "total program," Deal says. On the government side, however, sustainment is a focus, with jobs such as the maintenance of the C-17 fleet.

BGS, however, is homing in on parts supply and component repair, an evolution which traces back at least to the purchase of Aviall in 2006.

Boeing Global Fleet Care, a customizable, power-by-the-hour based offering, contains materials as well as engineering and maintenance elements. Global Fleet Care programs support more than 60 customers and over 2,500 airplanes. Boeing, for example, has provided Global Fleet Care services for Norwegian's 787 fleet since 2012 and the airline's 737 MAX fleet since 2017, according to BGS.

The Fleet Material Solutions segment of Global Fleet Care can include spare parts planning, ordering, supplier management, and component repair and overhaul. The Component Services Program subset includes exchange and repair services for managing high-value rotatable parts, components, and line-replaceable units (LRUs). Boeing and its partners own, manage, and maintain a global exchange pool inventory. Oman Air opted for the Component Services Program in 2015 and recently expanded the agreement to provide LRU support for 787 engines.

BGS sees an expansion in the Global Fleet Care addressable market, partly driven by changing airline demographics. There are a lot of smaller airlines that aren't going to invest in organic maintenance systems, Deal says. "They'll be contracting for that."

Airbus likewise foresees a trend toward more maintenance



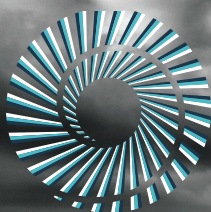
Cyber security will also be big focus as MROs rely more on big data. And artificial intelligence (AI) will increase the pace of the MRO market, he predicts, especially with its integration with big data and health monitoring.





Shown above is Haeco Aero's new Hangar 4, their fifth hangar in Greensboro, currently under construction. It will serve the same role as their existing hangars, which is heavy airframe maintenance. (HAECO Aero image)

Visit us at MRO Americas 2018  
April 10-12. Booth 950



**AERO  
NORWAY**  
Quality Engines

unequivocal precision  
exceptional EGT margins

Aero Norway is an independent engine MRO delivering globally recognised flexible worksopes for CFM56-3/5b/7b series engines.

Skilled and experienced technicians combine a fresh Norwegian spirit, with a long and proud international heritage to provide fast turnaround, quick slot inductions and a range of highly competitive and reliable engine services that are multi-release FAA, EASA, TCCA, GCAA, CAAC and DGCA certified.

It's precisely why operators choose Aero Norway.

[aeronorway.no](http://aeronorway.no)

outsourcing and therefore more integrated maintenance offerings such as Flight Hour Services/Tailored Support Package, Bruno says. "Our efforts will focus on bringing integrated solutions."

### Big Data Boom

MROs expect data analytics will be a growth industry in areas such as health monitoring, preventive maintenance, and supply chain/inventory management. As Turkish Technic CEO Karaman puts it, "Data is the core... of daily life in engineering."

Boeing expects a 140-fold increase in the amount of data generated annually by "flying data centers" – from 7 terabytes in 2010 to 1 petabyte in 2030. It also predicts that the proportion of e-enabled airplanes in the commercial fleet will grow from about 3 percent in 2015 to about 70 percent by 2035. Deal expects the digital aviation/ analytics portfolio to grow by an order of magnitude in the next five to 10 years.

"A lot of people are out flogging analytics and saying, 'give me your data and we'll help you,'" he says. But "we already have billions of bits of data – over the course of working our big apps – and we think that we can instantly turn and offer our airline [customers] something they'll appreciate and value." In addition to data-intensive services such as health management – with 4,000 aircraft — BGS plans to unveil a "self-service analytics" option in December 2017.

Boeing's Airplane Health Management (AHM) applications can act on aircraft data in real time. BGS cites as an example a 777 which had departed from "an interior U.S. city bound for its European hub." Less than an hour into its nine-hour flight the airplane sent an AHM low-tire-pressure alert to its maintenance control center. This was a serious situation, as tire failure on landing can cause costly flap damage.



Maintenance control used AHM tire pressure reporting to validate the alert and diverted the airplane to a maintenance base, where the tires were replaced. Increasing airspeed after takeoff, the airplane arrived at its destination within 20 minutes of scheduled arrival time. AHM evaluates up to 2 million conditions a day, BGS says.

AFI KLM E&M, with startup Lokad, has applied analytics to component inventory optimization. Designed for operators holding their own stocks of components and spare parts, the MRO Lab solution makes recommendations for each part number, such as how many to order, how many to hold at each site, and how many to potentially sell off. Daily updates are accessed via a Web interface.

In 2017 LHT launched a Digital Fleet Solutions product division, Bussman says. "Digitization offers completely new business opportunities and...will achieve...results, such as cost reduction, revenue growth, and safety and quality [enhancements]."

LHT's digitization products "are or will be bundled on the AVIATAR IT-platform," he says. This is open, neutral, and modular, focusing on the technical and operational aspects of airline business. It provides not only for "the safe storage of airlines' operational data, but also [for] the use of the data for predictive maintenance solutions, condition monitoring, and fault analytics."

Delta Air Lines uses predictive tools to help drive operational results. The carrier says it will have more than 325 days in 2017 without a mainline cancellation due to maintenance. Some of Delta's most effective fleets for prognostics have been the 737, 777, and 717.

Beres thinks that cyber security will also be big, as MROs rely more on big data. And artificial intelligence (AI) will increase the pace of the MRO market, he predicts, especially with its integration with big data and health monitoring. **AM**



The bottom line is commercial MRO is more competitive than ever, especially with OEMs Airbus and Boeing making focused efforts to capture market share. (StandardAero image)

## **HC** HEATCON COMPOSITE SYSTEMS®

**AUTHORIZED DISTRIBUTOR FOR 3M AND HEXCEL**  
ISO 9001:2008, AS9100C, AS9120A Certified

HEATCON Composite Systems has over 35 years of expertise in developing innovative products from design to delivery. We manufacture and supply composite repair equipment which include hot bonders, 3D heat blankets, accessories, and specialty equipment. Our ability to offer engineering and technical support to our customers gives them the confidence that we will provide a high-quality product needed for composite repair applications.

As a full solution provider, we also distribute a large selection of certified and non-certified composite repair materials.

*Innovative Solutions  
for Composite Repairs*



Composite Repair Systems • Dual Zone Hot Bonder • Single Zone Hot Bonder • Micro Hot Bonder • Double Vacuum Debulking Chamber RepairClave • Network Controller • Heat Lamps • Heat Blankets • Composite Repair Systems • Dual Zone Hot Bonder • Single Zone Hot Bonder • Micro Hot Bonder • Double Vacuum Debulking Chamber RepairClave • Network Controller • Heat Lamps • Heat Blankets Composite Repair Systems • Dual Zone Hot Bonder • Single Zone Hot Bonder • Micro Hot Bonder • Double Vacuum Debulking Chamber RepairClave • Network Controller • Heat Lamps • Heat Blankets • Composite Repair Systems • Dual Zone Hot Bonder • Single Zone

(206) 575-1333 | [info@heatcon.com](mailto:info@heatcon.com) | [www.heatcon.com](http://www.heatcon.com)

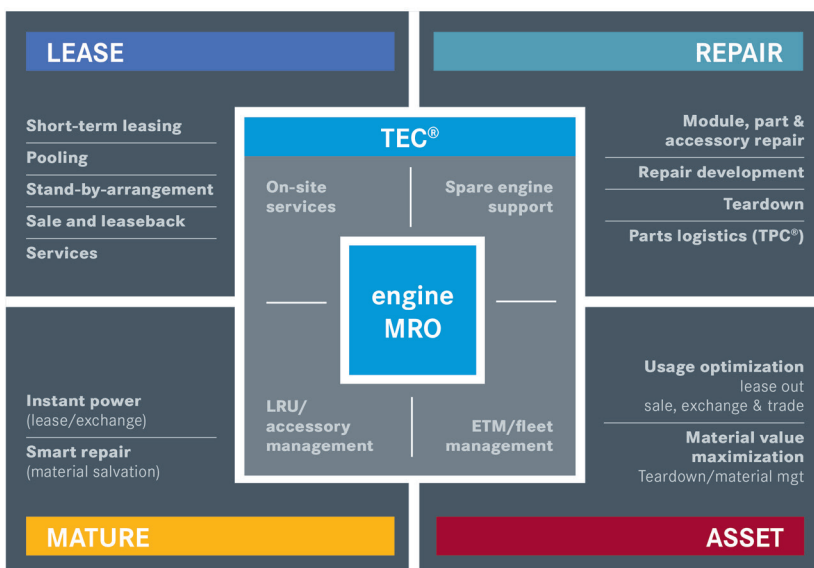
# MTU Maintenance



## Five Ws and one H

- Who?** MTU Maintenance is a division of MTU Aero Engines. We are the world's largest independent provider of engine services and a trusted OEM network partner. In short, we are engine experts.
- What?** Maintenance, repair and overhaul. And so much more. We make it our business to minimize costs and maximize engine value across the entire lifecycle. Our services include leasing and asset management too.
- Where?** All over the world! MTU Maintenance has its roots in Germany, but operates a global service network with locations in the Americas, Europe and Asia.
- When?** 24/7 and 365 days a year.
- How?** A combination of technical expertise and customized solutions. We have the largest MRO portfolio worldwide and have performed over 16,000 shop visits for our customers over the past 35+ years.
- Why?** We have the necessary technical experience and market knowledge to make all the difference. And when we talk about tailored-solutions, we look at your specific case from every angle and considering every tool in our toolbox and service in our repertoire.

Basically, we listen to our customers, understand their needs, and develop solutions with them – that is what being a true alternative means to us.



### Portfolio

**Turboprops:** PT6A, PW100/150<sup>1</sup>

**Helicopters:** PT6B/C/T<sup>1</sup>, PW200

**Business jets:** CF34-1/-3, JT15D<sup>1</sup>, PW300, PW500, PW600<sup>1</sup>

**Regional jets:** CF34-3/-8/-10E

**Narrowbodies:** CFM56-2/-3/-5B/-7, PW1100G-JM, PW2000, PW6000, V2500

**Widebodies:** CF6-50/-80C2, GENx<sup>2</sup>, GE90-110/-115B, GE9X<sup>2/3</sup>, GP7200<sup>4</sup>

- 1) P&WC Customer Service Center Europe,
- 2) Turbine Center Frame,
- 3) Planned,
- 4) Low Pressure Turbine

#### For further information contact us at:

MTU Maintenance Hannover GmbH, Münchner Straße 31, 30855 Langenhagen, Germany  
Tel.: +49 511 7806-0 - AOG: +49 171 4314333 - [www.mtu.de/maintenance](http://www.mtu.de/maintenance)







Over **17,000**  
**shop visits**  
**in 36 years**  
on more than  
30 engine  
programs



# LIFETIME EXCELLENCE

MTU Maintenance, the world leader in independent engine services. As engine experts, we focus on maximizing your earnings and optimizing costs during the life cycle of the engine and beyond. With decades of experience, we offer tailored solutions encompassing innovative MRO services, integrated leasing and best-of-breed asset management. There is always a better solution for your engines, MTU has it.

[www.mtu.de/maintenance](http://www.mtu.de/maintenance)



# Israel Aerospace Industries (IAI) BEDEK Aviation Group

## BEDEK – THE FULL SERVICE PROVIDER

Israel Aerospace Industries Ltd. (IAI) is a world leader in the delivery of state-of-the-art ground, air, sea, space, and cyber technologies and systems for both the defence and commercial markets.

**BEDEK Aviation Group**, one of IAI's six business groups, provides the full spectrum of aircraft services, all under one roof. This includes aircraft, engine and component MRO as well as aircraft conversion and development programs. BEDEK leverages IAI's global relationships and ample technologies to help carriers respond rapidly to developing market trends. BEDEK's growing list of satisfied customers, from around the world, is testament to its commitment to excellence, flexibility and superior service.

IAI's BEDEK Aviation Group is active through the following operating divisions: Aircraft Division, Engines Division, and Components Division.

**BEDEK's Aircraft Division** has been providing maintenance, modification and overhaul services for standard, modern wide-body and narrow-body aircraft for over sixty years. Its MRO support capabilities include liaison engineering, advanced composite material repairs, interior and completion overhaul, machining, sheet-metal fabrication, NDT level 3, stripping and painting, line maintenance and flight operations.

BEDEK's Aircraft Division is also a world leader in passenger-to-cargo conversions of the B767, B737 and B747 families of aircraft, with more than thirty years of experience and certified STCs from leading Civil Aviation Authorities.

Additionally, BEDEK has produced an extensive line of passenger-to-special freighter conversions. Following modification, these freighters have accumulated more than two million flying hours without issuance of a single AD relating to BEDEK's conversions.

BEDEK's Aircraft Division boasts extensive experience in design-to-cost and design-to-weight efforts. All of these conversions have met their customers' design weight goals while simultaneously providing the best value.

**The Engines Division** provides repair, maintenance and overhaul services for a wide range of civilian and military aircraft engines, including Pratt & Whitney, General Electric, CFM International, IAE-V2500 and Lycoming. In-house major parts repair and rapid turnaround times are accomplished with the support of a computerized planning, production and inventory control system that provides up-to-date information.

**The Components Division** is a recognized world-leader in the field of maintenance, overhaul and repair of hydraulic, pneumatic and avionics equipment and over 10,000 individual aircraft component types, including APUs, landing gears, transmission and gearboxes, constant speed drive units and integrated drive generators. The Components Division also offers its customers flexible hourly-rate programs for a wide range of components.

BEDEK has purchased and developed an extensive stock of engines of various types including: CFM56-3, -5, -7, V2500, PW4000, as



well as APUs, LGs and components. These are used to support its customers' on-going service requirements, as well as serve as a basis for BEDEK's ever-growing lease and sale program.

BEDEK has established the following joint ventures to enhance the company's services:

- **M&B – B-767-300** Aircraft Cargo Conversion, located in Ireland.
- **BELINCO** (established jointly by Lingyun Technology Group Co Ltd and Bedek), located in Three Gorges Dam, Yichang City, Hubei Province, China. This company is the first Sino-Israeli civil aviation maintenance enterprise.

One of the largest, independent, one-stop maintenance centers in the world, BEDEK holds the highest level of international certifications in work practices and safety, and is licensed by virtually all major Civil Aviation Authorities, including the FAA, EASA and Civil Aviation Authority-Israel, India, China, and many other countries. BEDEK holds the highest military aviation certifications from the US Air Force and Navy, in addition to the Israeli Air Force.

### For further information please contact:

BEDEK Aviation Group / IAI  
Ben Gurion International Airport  
70100 Lod, Israel  
t: +972 3 935 3090  
f: +972 3 935 9316  
e: bedek@iai.co.il  
www.iai.co.il



### Key personnel

Yosef (Yosi) Melamed, *Executive Vice President & General Manager of BEDEK Aviation Group*  
Rafi Matalon, *Senior Director & General Manager of Marketing and Business Development*



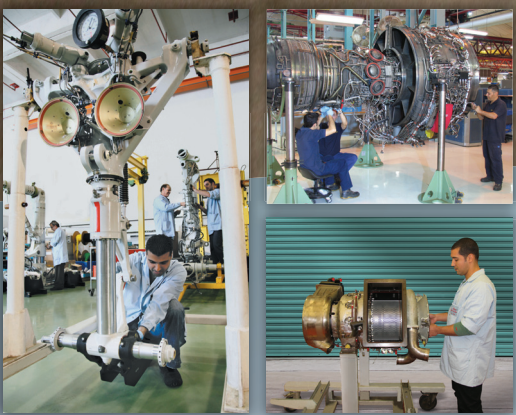
# We keep you flying. Anytime. Anywhere.



## World-Leading Full Service Provider of End-to-End MRO Services, Trade and Leasing

From airframes, engines, components and  
logistic support - we cover them all!  
**Around the clock, around the world.**

- Total maintenance solutions under one roof
- Trade and Leasing of engines, APUs and landing gears
- Highly experienced technical teams
- Wide-body hangars & extensive supporting facilities
- Over six decades of reliable operations



[www.iai.co.il](http://www.iai.co.il)  
[bedek@iai.co.il](mailto:bedek@iai.co.il)



**WHEN RESULTS MATTER**

# HEICO

*"Built on trust and earning that reputation every day"*

**HEICO** Corporation is a rapidly growing aerospace and electronics company focused on niche markets and cost-saving solutions for its customers. HEICO's products are found in the most demanding applications requiring high-reliability parts and components, such as aircraft, spacecraft, defense equipment, medical equipment, and telecommunications systems.

HEICO's **Electronic Technologies Group** designs, manufactures and sells high-quality, mission-critical and high-reliability subcomponents and subsystems used in aviation, defense, electronics, medical, telecommunications and other systems.

HEICO's **Flight Support Group** is known worldwide as a leader in high-quality and cost-saving aftermarket parts supply and repair solutions. These solutions include new parts design and manufacturing, proprietary FAA/EASA-approved repair & overhaul solutions, a leader in niche aircraft parts distribution; and a manufacturer of other critical aircraft parts.



Since 2002, our customers, which include all of the world's major airlines, have saved over \$2B by using HEICO Parts and Repairs and HEICO projects to save airlines an additional \$1.3B over the next 3-5 years.

## HEICO Parts Group

As of 2017, HEICO Parts Group holds over 10,000 FAA-approvals for parts on nearly every aircraft and engine platform, while producing around 500 new and highly engineered parts each year. Additionally we have shipped over 69 million parts and have a record of zero service bulletins, zero airworthiness directives and zero in-flight shutdowns.

## HEICO Repair Group

HEICO Repair Group is the largest independent component MRO in the world with the capability to service over 26,000 unique aircraft parts and over 60,000 that are serviced and shipped annually.

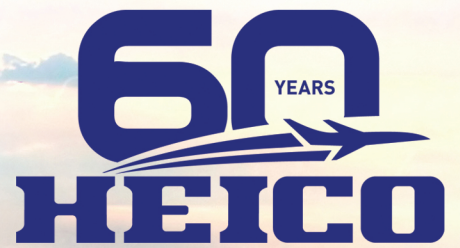
HEICO has an extensive range of repair capabilities for components such as avionic, electro-mechanical, aerostructure, fuel, hydraulic and pneumatic applications.

HEICO Repair Group works directly with the global airlines and military aircraft operators to develop enhanced and value-added repair solutions which can reduce cost, time, eliminate BER situations, and often improve reliability.

## HEICO Distribution Group

HEICO is a leading aftermarket supplier of high quality commercial and regional aircraft products. Through our Global Distribution Group, Seal Dynamics and recently acquired Airline Cost Control, HEICO serves the global aviation market and OEM industry by providing OEM approved replacement parts from the most successful corporations in the industry. In addition, Seal Dynamics provides full-spectrum engineering solutions.





HEICO Repair Group - Structures Facility

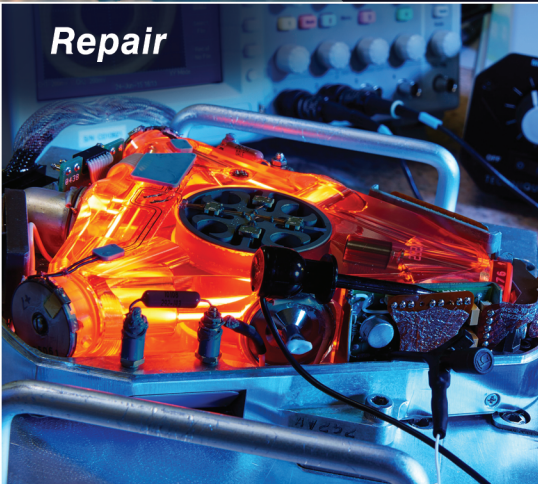
*Thank You to Our Valued  
Customers for 60 Years of  
Continued Support*

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

**Parts**



**Repair**



**Distribution**





# StandardAero Continues Growth Trajectory, Sets Stage for a Strong 2018

On November 3, 2017, StandardAero announced that the company had finalized the acquisition of Vector Aerospace Holding SAS from Airbus.

Vector is a global aerospace maintenance, repair and overhaul company, providing responsive, quality support for turbine engines, components, fixed- and rotary-wing aircraft. A truly international company, it generated revenues of over US\$700 million in 2016 and employs approximately 2,200 people in 22 locations across Canada, the United States, the United Kingdom, France, Kenya, South Africa, Australia and Singapore.

The newly combined company, which will maintain the name of StandardAero, has more than 6,000 employees in 42 locations across five continents, with annual revenues of approximately US\$3 billion.

"We are excited to join forces with the Vector team in becoming one of the largest MRO companies in the world," said Russell Ford, CEO of StandardAero. "Our combined organizations are better positioned to provide the industry with more global services, expanded MRO capabilities and operational benefits to deliver faster, higher quality solutions to our combined customers worldwide. We look forward to joining together with the Vector leadership and employees as we begin to integrate our two organizations."

The acquisition provides a very complementary fit for both companies. Like StandardAero, Vector has a highly skilled and long-tenured workforce of certified technicians and experienced aerospace professionals with a passion for outstanding customer service. Together, the companies will quickly align on a vision to constantly raise the standard for aerospace MRO services. "This is a great opportunity to bring together two successful entities and we foresee the following benefits for our customers, enhanced operational efficiency and better turn times; greater abilities for creating value-added custom solutions and partnerships with customers; expanded research and development expertise; expanded global presence to improve our products, reliability and after-market support network and services; and better overall service and highly responsive customer experience," said Ford.

Vector immediately expands StandardAero's capabilities for providing turboprop MRO services for PT6 and PW100 engines. In addition, the acquisition significantly expands the company's helicopter engine MRO capabilities with turboshaft engines and platforms on civil and military rotary-wing aircraft including M250, PT6T, Arriel 1&2, T58/CT58 and T700/CT7 engines. Vector also brings along new helicopter airframe and components services/support aligned with major OEMs like Boeing, Sikorsky, Airbus Helicopters and Bell Helicopter.


StandardAero has formed a dedicated team that is now working to integrate and transition the two companies over the weeks and months to come. "This transaction will facilitate the ability to provide better and more efficient service, combine the complementary expertise of both companies and allow us to offer a more complete portfolio of services to our customers," Ford added.



Vector Aerospace is one of three acquisitions completed by StandardAero in 2017. Earlier in the year, StandardAero purchased Jet Aviation Specialists, an independent turbine engine component repair specialist based in Miami. And, in March, the company entered into a definitive agreement to acquire PAS Technologies, a high technology components provider, to expand its portfolio of industry-leading MRO service offerings. PAS specializes in providing cost-effective OEM and MRO solutions for the aerospace, oil and gas, and industrial gas turbine markets. With PAS Technologies, StandardAero is now a key player with new make manufacturing capabilities along with supporting the entire MRO requirements across the full engine life cycle. PAS Technologies operates from five facilities around the world, at the following locations: Hillsboro, OH; Kansas City, MO; Phoenix, AZ; Singapore; and Romania. PAS has nearly 500 employees and annual revenues exceeding \$100 million.

In addition to these acquisitions, During Q2, 2017, StandardAero's Military business unit secured an agreement to acquire Kelly Aviation Center facilities and equipment to fuel growth in San Antonio. The agreement expands operations at the site and authorizes StandardAero to serve as the provider of F110 engine assembly services to GE Aviation in support of the U.S. Air Force and allied forces. With this agreement, StandardAero has also expanded its engine test cells from four to a total of eight test cells thereby extending capabilities to support higher thrust class and afterburning turbofan engines. The company will also hold the long-term lease for existing facilities in San Antonio, including expanded space previously leased by KAC to provide more room for growth.





**WE'RE COMMITTED** TO YOUR CUSTOMER EXPERIENCE  
BY PROVIDING INCREASED CAPABILITIES, TRUSTED  
PARTNERSHIPS AND CUSTOMIZED MRO SOLUTIONS.

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



**StandardAero**



# Communications Software (Airline Systems) Limited

With some 40 years' experience, Commssoft is the developer of one of the world's leading aviation MRO software systems. Taking advantage of the latest technologies, OASES offers a highly impressive level of technical sophistication whilst being intuitively user-friendly. To allow for scalability, the system is structured in a modular format and can either be installed on the client's own servers or hosted on Commssoft's OASES Private Cloud service.

With the active participation of its users, OASES is continually being developed -to ensure it remains fully up-to-date with technological progress and fully responsive to its users' ever-evolving needs.

Commssoft's personalised support culture also ensures that customers benefit from a comprehensive implementation, training and maintenance package which includes a dedicated help-desk, online support and membership of user groups as well as product update and software revision services.

The OASES user community currently numbers 130 organisations in 55 different countries and includes national carriers, 3rd party maintainers, regional carriers, leasing companies, cargo specialists, charter operators and specialist rotatable stockists across six continents. Demand for OASES continues to grow and Commssoft signed contracts with 25 new clients in the last year.

Reflecting its client base, Commssoft is a truly global organisation. It has its Head Office in Tiptree, Essex and a regional office in Derby. In addition, the company has support offices in Coimbatore, India and Brisbane, Australia. Adopting a partnership approach to its worldwide business, Commssoft also has an implementation partner in Romania and CAMO partners in several European and Asian countries.

<http://www.commssoft.aero>



**oases**

[www.commssoft.aero](http://www.commssoft.aero)

## MRO IT System



- Extensive airline, corporate, MRO and CAMO use
- 25 new customers / AOCs signed last year
- Linked to ops systems, EFBs and ETLS
- Also offered via Commssoft private cloud

Commssoft's OASES MRO system offers comprehensive professional functionality together with a flexible, affordable approach that understands your business' scalable growth needs in today's turbulent market.

Each OASES module can be offered individually or can be integrated at the engineering centre of your business systems.

Supporting over 130 aviation customers in 55 countries, including airlines, MROs, spares suppliers, CAMO, corporate aviation and bureau operators.

For more information call **+44 (0)1621 817425** or email us at [info@commssoft.aero](mailto:info@commssoft.aero)

**Most  
Read  
MRO  
Publication  
in  
the  
World.**

**AVIATION  
MAINTENANCE**  
[avm-mag.com](http://avm-mag.com)

Subscribe for free [www.avm-mag.com/subscribe](http://www.avm-mag.com/subscribe)



Most  
Read  
MRO  
Publication  
in  
the  
World.

## NEW V2 Deluxe Kits!

Everything you'll ever need all in one  
indestructible carrying case!



UP TO  
**\$2,000**  
IN SAVINGS!  
4mm & 6mm  
Deluxe Kits  
now starting  
at  
**\$9995!**



VIDEO BORESCOPES

### V2 Deluxe Kits Contain:

- 4-way Articulating V2 Videoscope
- All Standard Accessories
- 90° Prism Tip
- Close-Focus Tip
- V2 Stand
- V2 Rigidizer

V2 Videoscopes  
now starting at  
**\$7995!**



**AVIATION  
MAINTENANCE**

avm-mag.com

Subscribe for free [www.avm-mag.com/subscribe](http://www.avm-mag.com/subscribe)

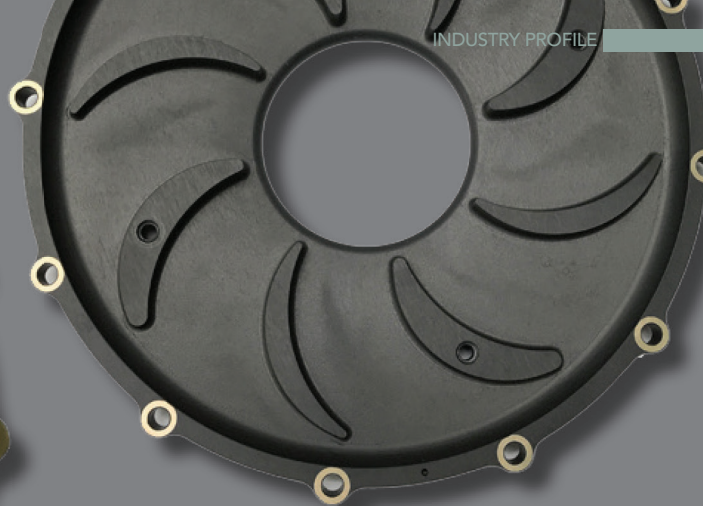
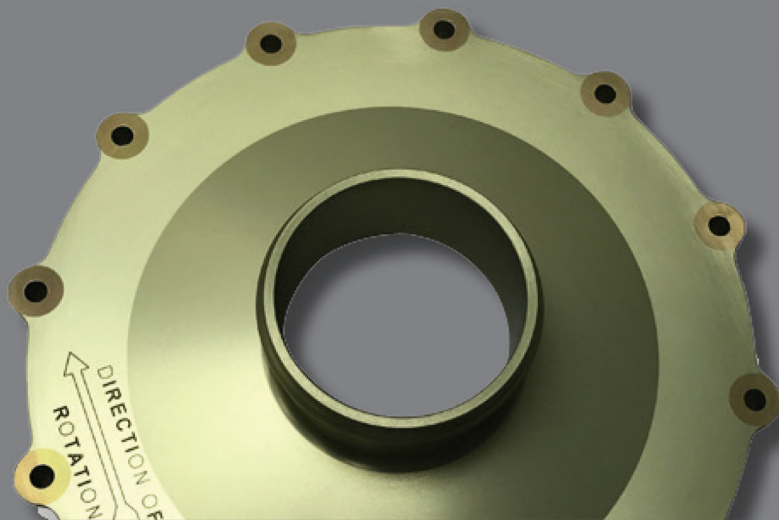
Gradient Lens Corporation® [gradientlens.com](http://gradientlens.com)

800.536.0790

Made in USA







## AVIATION COMPONENT SOLUTIONS

### The smart choice for PMA products

Aviation Component Solutions (ACS) is a leader in the PMA product industry. A world-class engineering company, ACS designs, certifies, manufactures, brokers and distributes PMA parts and assemblies for airframe and engine components and accessories, as well as engine and airframe parts and assemblies. Its products fly on Boeing, Airbus, Bombardier, Embraer, Fokker and Saab aircraft. ACS boasts a catalogue that contains more than 850 PMA products – all internally developed via test and computation – for a wide variety of applications. The company's products cover 20 different ATA chapters, including pneumatics, air conditioning, ice and rain protection, hydraulic power, powerplant, engine starting, flight controls, landing gears and several more.

The ACS customer base includes more than 400 of the world's leading airlines and repair stations. A global business, ACS customers can be found in more than 30 countries across six continents.

The company offers its customers significant cost savings. A typical ACS PMA product is 30-50% less expensive than the OEM product it replaces. Collectively, ACS customers are saving several million dollars every year in material costs.

Furthermore, ACS PMA products are readily available. The ACS order fill rate is consistently above 99% – with the vast majority of orders shipped the same day that the order is placed. This allows ACS customers to meet their turnaround time goals, while keeping their spare parts inventory to a minimum.

ACS' customer service extends beyond product availability. The company specialises in listening to its customers concerns and providing them with customised solutions.

From partnering with its customers, and developing new PMA products, through to consignment inventory programmes, ACS specialises in offering 'win-win' solutions.

Also key to the company's success is its ability to improve upon the OEM products by incorporating FAA approved product improvements in design and/or manufacturing methods. Through this engineering, an ACS product can stay on-wing longer than the OEM product it replaces. This way, customers not only save money when they buy the product, they also save money by not having to replace it as often. ACS continues to add to its product offering, with many new PMA products developed and approved each year. ACS has built a well-earned reputation for completing new product projects on schedule – with an average project taking less than a year from launch to PMA approval.

With this high level of efficiency, ACS customers can be sure that their material cost saving goals will be met.



### Address

26451 Curtiss Wright Parkway  
Suite 106  
Richmond Heights  
OH 44143  
United States  
t: +1 440 295 6590  
e: [betley@acs-parts.com](mailto:betley@acs-parts.com)  
[www.acs-parts.com](http://www.acs-parts.com)

### Key personnel

Joe Klinehamer  
President

Greg Kucera  
General Manager

Michael Carabotta  
Engineering Manager

# Lufthansa Technik AG

## Global service spectrum for commercial, VIP and Special Mission aircraft



The Lufthansa Technik Group, with more than 35 technical maintenance organizations, is the world's leading provider of technical services for the aviation industry and covers the entire process chain of the MRO (maintenance, repair & overhaul) business. Lufthansa Technik's range of products and services encompasses the entire service spectrum for commercial as well as VIP/Special Mission aircraft, engines, components and landing gear in the fields of digital fleet management, maintenance, repair, overhaul, modification, fitting out and conversion, along with the manufacture of innovative cabin products. More than 25,000 employees serve the internationally certified maintenance, production and development company. With a turnover exceeding 5 billion euros in 2016, the company now has more than 800 customers. In total, Lufthansa Technik currently supports more than 4,100 aircraft worldwide.

Lufthansa Technik has been an independent joint stock company within the Lufthansa Group since 1995, and established a network of holdings and partnerships around the globe. Today, subsidiaries and holdings in Europe, the USA and Asia all belong to the Lufthansa Technik Group's global network. Furthermore, the company is represented at more than 60 line maintenance sites, supporting its customers in their daily flight operations on-site. The technical service portfolio includes maintenance and support for the largest and most modern airliners such as the Airbus A320/A320neo family, A330/340, A350, A380, Boeing 737 CL/NG, 737 MAX, 747, 777 and 787 as well as total support for smaller regional airliners.

Hamburg is with more than 7,000 employees the biggest site of the Lufthansa Technik Group. It is the group's official base, competence center and controlling headquarters and also hosting production facilities for engine, component and landing gear services. At the VIP Completion Center private, government and special mission aircraft receive individual interior conversions and maintenance services. The product division OEI (Original Equipment Innovation) develops

high-tech products contributing to increased on-board comfort such as floor path marking systems, VIP seats or inflight-entertainment solution.

The commitment to research and development has been expanded massively in recent years. The latest technologies and numerous innovative repair procedures, developed in-house, are deployed here. Examples are new repair procedures for composite materials and the complete digitalization of work processes. In order to coordinate group-wide innovation activities a central innovation management has been established.

Digitalization is in the focus of Lufthansa Technik to create new business and to meet the challenges of the future MRO market. The company grasped this trend very early and is now continuing its consistent progress on multiple levels in the digitalization of processes. One of the core products in this area is AVIATAR, an open, neutral and modular digital platform. In a web-based environment AVIATAR serves as an integrating hub for apps providing digital fleet solutions for the aviation industry, with a focus on the technical and operational side of airline. AVIATAR not only allows the safe storage of airlines' operational data, but the data can be used for predictive maintenance solutions, condition monitoring and fault analytics. In addition, operators and other players in the aviation industry are digitally enabled by AVIATAR to collaborate for the optimization of airline operations, reduced consequential costs and safer as well as more reliable fleet management.

November 2017



# Size doesn't matter. Service does.



**Starting in 2019, our  
subsidiary XEOS  
will offer engine MRO  
services for the  
GEnx-2B and GE9X.**

From a regional jet to the latest in wide-body planes, we've got the right portfolio for every aircraft. From a single repair to a long-term service contract, from an engine wash to our Total Support Services, Lufthansa Technik looks after every customer and every service job with the same dedication. We speak from millions of flight hours of experience. So it pays to talk to us.

Lufthansa Technik AG, [marketing.sales@lht.dlh.de](mailto:marketing.sales@lht.dlh.de)  
Call us: +49-40-5070-5553



[www.lufthansa-technik.com/engine](http://www.lufthansa-technik.com/engine)



**Lufthansa Technik**

**More mobility for the world**



# STCs and PMAs in aircraft maintenance

How they're different. How they're the same. And how they can save owners, operators and MROs money at maintenance time.

"We can't solve problems by using the same kind of thinking we used when we created them."  
Albert Einstein

by Dale Smith

**I**ver since Charles Taylor started turning a wrench on the Wright Flyer, aviation has been an industry built on rules and regulations. The problem is, way too many of the "Regs" are written by administrators who don't have to understand them. But we do.

Take Parts Manufacturer Approvals (PMAs) and Supplemental Type Certificates (STCs) for example. Understanding the role each plays in aircraft maintenance may seem pretty simple, but yet, there are still technicians who get confused about when they need an STC and when it's okay to use a PMA part – and when the two can be used together.

"A Supplemental Type Certificate is an approval for a major alteration to a type certified product, i.e., an aircraft," explained Ken Farsi, Managing Partner and President of Aerospace Design

& Compliance, LLC and an FAA ODA. "PMAs are a form of FAA production approval for replacement parts, although even the TC holder can PMA parts during the TC process."

"One thing to note is that an STC being a type design approval for a major alteration and specific to a make and model or even a specific serial number as a one-only STC, a PMA part can be used, not only on the aircraft the approval was issued for, but also on any aircraft as long as an engineering evaluation is conducted to assure that the part does the same function on that aircraft," he said. "Of course, additional installation drawings and substantiations may also be required."

"For example, say you get a part that has been PMA'd for installation in a Boeing 737-800 – this does not mean you cannot use it on another model aircraft," Farsi stated. "You or your engineer must first assure the part can be used on the new model. The PMA includes the type design data, manufacturing and quality control of the part(s) in one approval. Another thing to remember is that multiple-use STCs are one way of





PMA and STC can be used not just to save money, but also to fix OEM reliability and maintenance problems, says Pat Markham, VP of Technical Services, HEICO. (Heico image)

receiving PMA for parts. The other way is through testing and computation."

Of course, these are FAA regulations, and the word "manufacture" can muddy the waters just a bit especially when it's "manufacture for use versus manufacture for sale."

"An STC is a design approval, it doesn't allow the holder to produce anything. To make replacement or modification parts, you have to have to hold a production approval like a PMA. However, Section 21.9 of the FAA regulations allows an owner/operator to make replacement or modification parts for its own aircraft in the same way a maintenance provider can fabricate parts for maintenance or alteration activities," stated Sarah MacLeod, Executive Director of the Aeronautical Repair Station Association (ARSA). "In the case of a PMA, you are receiving design, production and eligibility for installation all in one approval package: that authority can be based upon design data contained in an STC."



"We feel it's in ours, and our customers' best interest to invest in our own engineering to create our own solutions," says Nadim Fattaleh, VP of Operations for Jet Parts Engineering. (JPE image)





Airlines are now demanding leasing companies permit them to use non-OEM licensed parts because of the significant cost savings. (JPE image)



The FAA is delegating companies with more internal responsibilities to self-certify their components using STCs and PMA approvals, according to Ken Farsi, managing partner and president of Aerospace Design & Compliance. (JPE image)



"It's all spelled out in the regulations – and, one of the primary roles of an aircraft maintenance technician is to know those rules," she said. "Unfortunately, in most cases the industry learned regulatory compliance through 'tribal knowledge' as opposed to taking time to study and understand the written words. Constantly reading and re-reading the regulation sure would save a technician lot of headaches and confusion."

### If All Else Fails, Read the Damn Rules...

One added bit of caution Ms. MacLeod shared was that even when an owner/operator has a major modification done to their aircraft through an STC, their responsibility for knowing the rules does not end there.

"As the owner/operator I can use an authorized repair station to 'produce' parts using the STC design data with no problem," she said. "But, when I sell that airplane and the next owner needs to replace a part in that modified product, they can run into a problem especially if the STC'd components no longer exist or have changed. Then where do I get the replacement parts?"

"If you don't have the approved design data for those components, there may be a need to obtain further engineering expertise," Ms. MacLeod said. "Most owners don't think to ask for access to the design data as part of the STC package, but they should."

"If the company selling and installing that STC on your airplane won't provide continued access to the design information package, then go look for another provider," she said. "You are paying a lot of money for that STC and the way to ensure long-term value is to have access to all the data necessary for its ongoing support. You need to know what parts and materials may be compatible with the original installation without having to re-engineer the entire thing."

"Remember, the STC holder is getting paid to do this work," Ms. MacLeod stressed. "They're not giving anything away. You are paying for it up front and you need to protect yourself from a loss down the road."

### Myth Busters: STCs are Good - PMAs are Bad

While aircraft type and production certificate (TC/PC) holders may try to argue the point, it's pretty well established that STCs are good for aviation. They enable the STC developers and holders to offer significant performance and often maintenance advancements to a long list of aircraft types by making investments that the TC/PC holders may be reluctant to take on. This is particularly true to older aircraft types or when a small number of aircraft are involved.

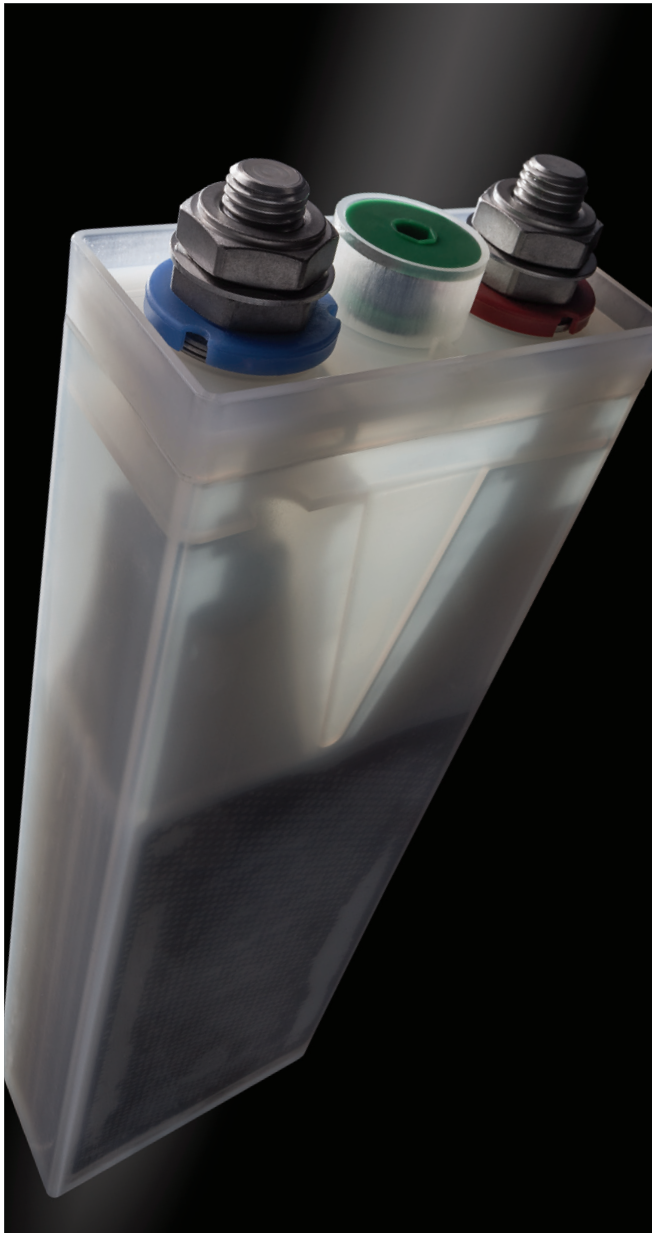
From putting more powerful and efficient engines on a legacy airframe, to installing more advanced, safety-enhancing avionics, to doing a passenger-to-freighter conversions – these types of programs have a history of making legacy airplanes, safer, faster, easier to maintain and more cost-effective to own and operate. A win-win for everyone.

But, speaking of history, ever since the Civil Air Regulation (CAR) 1.55 was issued some 60-years ago, parts created under PMA have suffered from a serious identity crisis. TC holders continue to cry foul because they believe that these replacement parts are nothing but copies of the originals.

On one hand they are right: The FAA requires that a PMA have the same form and fit as the part it is intended to, well, replace. But that's not to say that the PMAers are just "Xeroxing" other company's parts.

Whether it's a simple (are any parts used on airplanes simple?) bolt or a very precise turbine engine blade, today's FAA-approved PMA holders invest countless dollars and thousands of hours of engineering and testing to design and produce the





PMA provides operators with a useful tool, along with surplus parts, extensive part repairs, and joint procurement to counter the OEM pricing power and reduce the rate of price escalation, says consultant David Doll. (Heico images)



parts they create. These are not knock-offs. They are direct form, fit and functional replacements and in the eyes of the FAA are no different than the parts offered by the original TC/PC holder.

But that doesn't mean the airline industry, and in many cases the leasing companies, still don't cast a watchful eye out for the use of PMA parts on their aircraft.

"Due to the market acceptance issues, which stem from the limitation they themselves impose on airlines, the leasing companies and financial providers believe that any non-OEM solution, whether they be PMA, STC or an out-of-manual repair – any of these are determined to be detrimental to the value of the aircraft compared to an OEM provided solution," explained Nadim Fattaleh, Vice President of Operations for Jet Parts Engineering. "Even though that is not true, that belief requires airlines not to use non-OEM licensed solutions even though it will save the airline money."

### Monopolies and Maintenance Don't Mix

"The more OEMs and leasing companies structure these types of restrictive contracts, the more we see the airline operators coming to us to create this counter-monopoly force so to speak," he said. "Monopolies are not good for anyone. Competition is what makes all better."

"But that is changing. More airlines are now demanding the leasing companies permit them to use these non-OEM licensed parts because of the significant cost savings," Fattaleh said. "Airlines are not concerned about the residual value of a leased asset. If they use the non-OEM parts, then it forces the OEMs to control the costs of their parts to stay competitive as well as reducing maintenance costs."

"There is always an economic driving force with PMA, but more recently OEM performance, availability and reliability issues, have driven more airlines to look for an alternate material option," stated Patrick Markham, VP of Technical Services, HEICO Corporation. "Interestingly, in some cases the OEM's aggressiveness and attempts to restrict completion are driving some airlines and MROs to think strategically about non-OEM options."

"We at HEICO, spend a significant amount of our time on education and awareness with our airline and MRO customers," he continued. "It is particularly fulfilling to get that 'ah ha' moment, when an airline realizes that PMA and STC can be used not just to save money, but also to fix OEM reliability and maintenance problems."

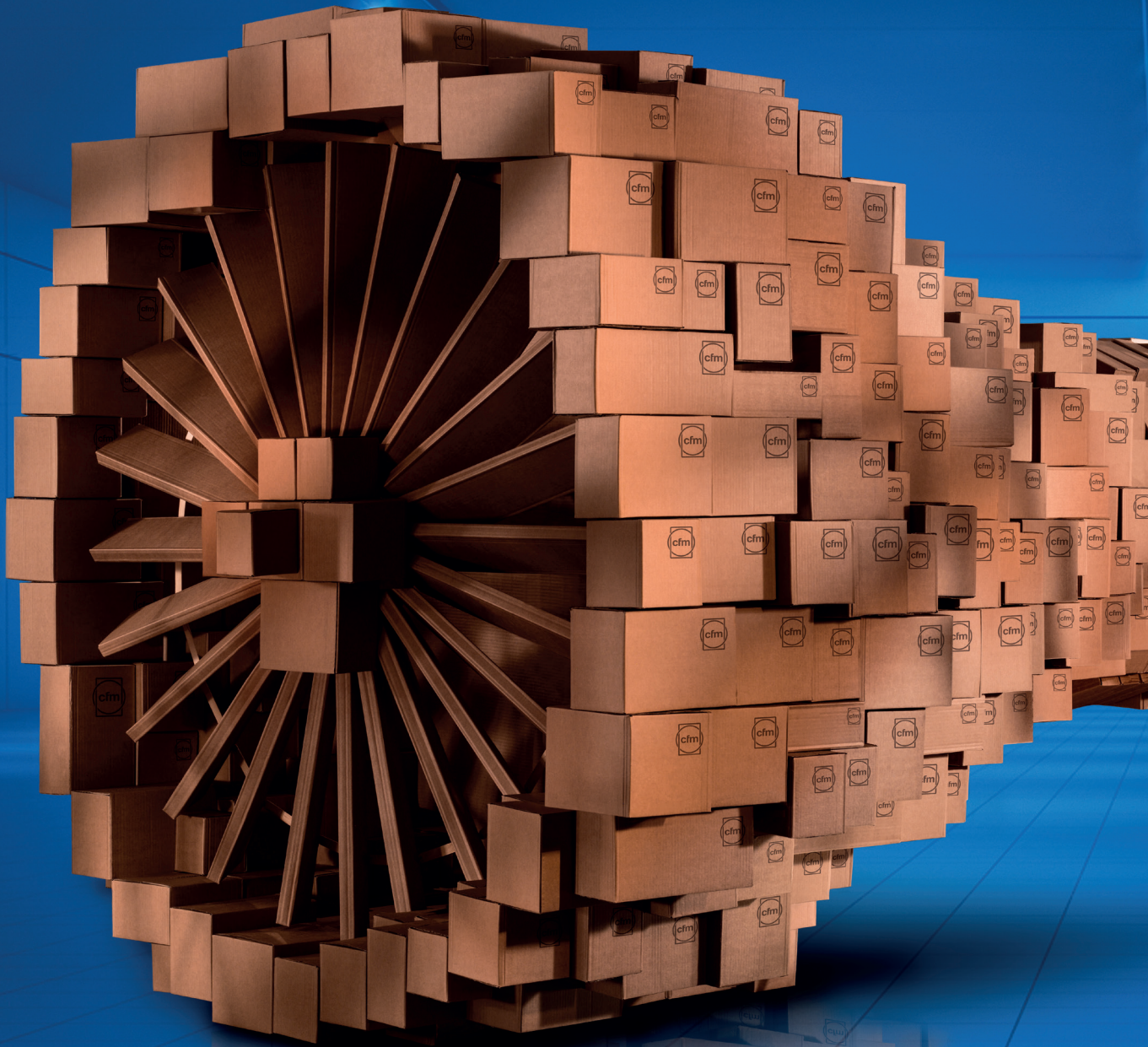
But while we're on the subject of saving money, just how much can an operator save with FAA PMA parts when it comes maintenance time?

"Because JPE's solutions are non-OEM licensed, our prices are typically 40- to 50-percent lower than the OEM sanctioned parts and/or repairs," Fattaleh said. "If we were making OEM-licensed parts, we would have to pay the OEM a fee for each one for as long as we create that product. We feel it's in ours, and our customers,' best interest to invest in our own engineering to create our own solutions."

In his paper titled "The Airline Guide to PMA," David Doll wrote, "One leading PMA supplier estimates that they can save a customer up to \$130,000 on a single engine overhaul, and there are many PMA suppliers. A single airline in the US has documented \$40 million in material cost savings per year due to an aggressive PMA approval program that covers airframes, engines, and components."

Doll also wrote, "The savings from PMA may go far beyond the PMA discount itself. Historically, the OEMs have held a









# TRUEngine.<sup>TM</sup> Protect your asset. Think outside the box

Optimum performance isn't just about individual parts. It's about the entire engine system. TRUEngine qualification is available for CFM engines maintained to our precise standards. This assures expedited technical support, unmatched product knowledge and peace of mind. With as much as 50% higher residual value\*, it's easy to see how our TRUEngine program helps to protect your overall investment.

**Take part now at [www.cfmaeroengines.com/services](http://www.cfmaeroengines.com/services)**

\*Based on CFM, GE and independent third-party research.

CFM International is a 50/50 joint company between GE and Safran Aircraft Engines







Consultants, associations and PMA manufacturers agree, helping companies obtain PMA and STC approvals is not a top priority at the FAA.



Common sense dictates that airlines and leasing companies should take a 21st century look at PMAs and STCs and make them a part of their business strategies.



strong monopoly on the sale of replacement parts. This has allowed them to push through spare part price increases on the order of 5% per year. According to AeroStrategy, competition from PMA has had a tendency to moderate this rate of growth. PMA provides operators with a useful tool, along with surplus parts, extensive part repairs, and joint procurement to counter the OEM pricing power and reduce the rate of price escalation," he stated.

Another way at looking at how using PMAs and STCs can help owner/operators save money – big money – is as Messrs.' Fattaleh and Markham stated, by creating and sustaining competition between the OEMs and the various non-OEM licensed solution providers. If an aircraft OEM has a required part and is the only one who makes it, the sky's the proverbial limit when it comes to what price they can put on it. History shows the OEMs take full advantage of this when they can.

An additional consideration is the parts' availability equation. If there's only one approved supplier and they, for whatever reason, quit making that part, what are you faced with now? Engineering and manufacturing the parts yourself, which although totally within the rules, takes a lot of time and money.

No, the best solution is for the airlines and leasing companies to take a 21st century look at PMAs and STCs and make them a part of their going-forward strategy.

"If I were a leasing company I would use this strategy as a marketing tool to attract airlines today," Fattaleh said. "I think it would be a very good business move to get ahead of the curve."

### STCs and PMAs Playing Hard to Get

Just as widening segments of both business and commercial aviation around the world are warming to the ideas of using STCs and/or PMA'd components on their aircraft, the FAA's shrinking operating budget is acting as a "speed bump" to their ongoing implementation.

"The 'road block' I continue to see is the aviation industry going to the agency (FAA) with its hat in its hand saying 'please help me with my approval,'" Ms. MacLeod said. "As long as it has existed the agency has never helped us on the business side. It helps setting aviation safety standards and rules compliance, but it was not created to help us conduct business."

"Helping companies complete STC or PMA projects is not the FAA's priority," Farsi said. "They've made it clear this kind of work is getting diminished priority so companies can expect increasingly long times to get approvals."

"But, the one thing the FAA has done in the past year or so has been to delegate companies with more internal responsibilities to self-certify their components," he said. "Sort of like EASA does it. The agencies are now awarding qualified companies and individuals with ODA (Organization Designation Authorization) certifications."

"There are now ODA's for specific authorizations like STC and PMA designations," Farsi said. "The ODA will do the same thing the FAA now does, and can take some pressure off of the FAA regional offices and put it back on the manufacturers. The only drawback is that the ODA costs money, whereas the FAA has always done it for free."

But as Farsi explained, in today's world the time saved is often well worth the money spent to speed the approval process.

"I have a client who has been working on a new STC through the FAA and have been waiting seven months for the FAA to assign a pilot to their project," he stated. "Had they just hired an independent ODA, the project would have been done five months ago. That's a lot of lost business opportunities." **AM**





Buying PMA saves you money.

# Buying PMA from us saves your sanity.

Buying PMA parts benefits our customers and we make it easy for them, which is why companies that buy PMA, buy from us. We've made our mark in the industry as a recognized and awarded PMA leader with some of the largest airlines in the world as our customers. Our priority is to help our customers battle their increasing costs of maintenance with our economically priced spare parts, greatly reduced lead times and excellent customer support, all without sacrificing outstanding quality. Questions about our parts? Contact us and be connected immediately with someone who will answer. When you buy PMA, you want the process to be seamless. Make Jet Parts Engineering your PMA solution today.

Call 206-281-0963 or visit  
[www.jetpartsenineering.com](http://www.jetpartsenineering.com)

**JET PARTS**  
ENGINEERING, INC.



# TRU Approach of Maintenance Training

**What advantages exist for a maintenance-training center closely associated with an OEM?**

**A newly established academy next door to Textron Aviation is set to provide an answer.**



by David Jensen

The TRU Aircraft Maintenance Academy (TAMA), is located at Textron Aviation's headquarters in Wichita, Kansas. (Textron image)

Textron Inc.'s full-on entry into the aviation-training field begat a unique center for maintenance instruction accredited by OEMs. Unique because the center's location in Wichita, Kan., allows it unlimited access to the aircraft, systems data and engineering expertise on hand at the OEM it primarily serves: Textron Aviation. Unique, too, because of the center's depth of training, especially in creating a real-world experience.

The TRU Aircraft Maintenance Academy (TAMA), which opened in late 2015, is located on the premises of Textron Aviation's headquarters and the plants where Cessna and Beechcraft airplanes are assembled. It established an incremental growth plan that began with maintenance training for the Beechcraft King Air airplane family and products produced by McCauley Propeller Systems, a Cessna subsidiary

purchased in 1960. A small part of TAMA's business also includes OEM-certified training to maintain Beech and Cessna piston-powered aircraft: Baron, Bonanza, 172, 182, and 206 models.

But that is only a start. TAMA now offers maintenance training courses for all Cessna airplanes in production as well as legacy aircraft built by Cessna and Beechcraft. Most recently, the academy received approval from EASA for several popular Cessna and Beechcraft theory and practical courses for the King Air 200, 208 Caravan, 560 Excel, and 680 Sovereign/Latitude.

"We're talking about a seven- or eight-fold increase in product [training program] offerings," say David Smith, TRU's vice president, training centers. "Ultimately, we plan to offer maintenance training for Hawker jets, too, but that's long term." In addition, TAMA officials are pursuing maintenance training for all aviation products—engines, avionics, landing gear, hydraulic systems, etc.—that OEMs may choose not to provide themselves.





Textron's plan to go its own way in training began in earnest after the acquisition in November 2013 of Montreal-based Mechtronix and Florida-based Opinicus Corp., both manufacturers and supporters of aviation simulators. These two companies were joined with AAI Corp., acquired by Textron in 2007, to form TRU Simulation + Training Inc., headquartered in Goose Creek, S.C. (TRU is not in itself an acronym, but the company's full name was chosen, in part, to create the acronymic word "TRUST.") Early in 2017, TRU completed another acquisition: ETOPS, a training and simulation services provider with offices in France and Malaysia. This expansion boosted the company's management and staff to about 1,000 employees.

As is evident in its name, TRU Simulation + Training comprises two profit centers. The company began solely as a designer and producer of training devices, including full flight simulators for business and commercial aviation. Boeing, for example, has contracted TRU to supply flight simulators for both the B777X and B737 Max. Not surprisingly, TRU's simulator branch takes on capital projects, supplying devices for the company's other profit center: training. For example, TRU's pilot training programs utilize company-built simulators.

TRU also furnishes maintenance-training equipment to military customers on a system or subsystem level. Examples include devices to simulate failure modes in landing gear, electrical systems and doors for aircraft such as the C-130, C-17, F-22 and F-35.

TRU has two pilot training centers for business aviation, in Tampa, Fla., and Carlsbad, Calif. In addition, the Textron subsidiary provides on-site pilot training services to foreign militaries, for example, serving operators of the Beech T6 trainer/attack aircraft.

"At the same time we started pilot training, we began a land deal at Textron Aviation to establish a Part 147 maintenance training academy," says Smith, referring to the TAMA center. However, TRU's maintenance training is not confined to its Wichita facility. Beyond U.S. borders, the company provides both pilot and maintenance-technician training through "high-level partnerships," according to TRU vice president. In February of 2017, TRU and sister-company Bell Helicopter teamed up to open their first international pilot training center, located in Valencia, Spain. Here, they provide regional rotorcraft pilots with initial type rating and recurrent training on their innovative ODYSSEY H simulator, beginning with pilot training for the Bell 429.

Non-U.S. facilities under Textron's purview are significant to TAMA's mission because they provide venues to conduct maintenance instruction around the world. Such services are particularly beneficial for customers regulated by the European Aviation Safety Agency (EASA), which has more, if not the most, stringent maintenance-training requirements.

Tru Simulation + Training has two profit centers. It is a designer and producer of training devices and it does the actual training of pilots and mechanics. (Textron image)

## Foray into Training

TAMA's plans are all part of Textron Inc.'s goal in becoming an aviation-training powerhouse. Smith attributes the corporate parent's intent, in part, to the fact that "several members" of Textron's Leadership Team, including chairman and CEO Scott Donnelly, are pilots with years of aviation experience. In addition, he adds, Textron leadership "determined that Textron product customers can come to us for literally everything: devices, aircraft and training for both pilots and maintenance technicians."

"Before we established our own training services, we had partnerships with training outfits around the world," he says. "FlightSafety was probably our biggest partner."

James Hall, dean of Aviation Technologies at Wichita Area Technical College, which offers ab-initio maintenance training and is located across town from TAMA, proposes another take on why Textron launch its training business. "FlightSafety International offers some 90 percent of the aircraft-specific training for general aviation," he says. "Textron saw an opportunity to bring training in-house and have tighter control."





TAMA's facilities include hangars and a complex of offices and classrooms. (Textron image)

Often a Textron service center will request TAMA's service at its location; however, invitations to provide on-site training also may come from Textron Aviation aircraft operators and third-party service centers that maintain and/or modify the OEM's aircraft. TAMA's requirement is that classes outside of Wichita take in at least four students each. TAMA currently conducts about 20 to 30 on-site training sessions a year, but more are expected as the academy's curricula grows to include more aircraft families.

TAMA has made their maintenance instruction quite portable. For its "robust" courseware (visual aids), "we just need connectors to our monitors," says Smith. Because of its off-site capability, TAMA management "currently has no intention of opening another facility like this one," he adds, referring to the Wichita academy.

### Training in Wichita

TRU is an autonomous Textron subsidiary, which means it must compete for contracts, even from Textron Aviation. "We have to demonstrate our value," says Smith. He adds that TAMA won the King Air maintenance-training program, in part, because of fortuitous timing. The King Air 350i/ER with Pro Line Fusion avionics happened to enter the market about the same time TAMA opened its doors, and Textron Aviation needed a maintenance-training program to accompany the new aircraft.

For hands-on, or practical, training, TAMA has a King Air fuselage in the hangar section of its modern 35,000-square-foot, climate-controlled facility, once Textron Aviation's customer center, where Cessna buyers took delivery of their aircraft. For authenticity during hands-on training, TAMA instructors make sure the King Air needs repair, according to Smith. A tool crib is on hand with more than 600 parts, some used and some new from Textron Aviation. Maintenance equipment not available in TAMA's hangar can be accessed at one of Textron Aviation's nearby facilities. Near the King Air, a large LCD screen shows a manual with tasks to perform—in fact, tasks students from EASA-controlled countries must perform in order to satisfy the European agency's Part 145 rules.

In a corner of the hangar away from the King Air, TAMA conducts hands-on maintenance training for the McCauley propellers. About a half dozen holding stands bear propellers that, during a five-day class, are completely disassembled down to the hub and then reassembled according to the McCauley maintenance manual. "Students will do that three times," says Rodney Dowell, TAMA's center manager. "The third time, they receive no assistance, so we make sure they fully understand how to repair the propellers."

TAMA's staff assures the propellers need repair. "Students will have to do things like balance the blades, file dings out and put in new O-rings," says Dowell. All needed tools and parts are available.

### Classroom Instruction

Adjoining TAMA's hangar is a modern complex of offices, a reception area, five classrooms and a sixth classroom is currently under construction and set to be open by mid-Q1 of 2018.

TAMA does plan to add to its instructor staff, however, from eight to about 10 in preparation for forthcoming Cessna aircraft-maintenance training. Smith says the instructors hired have various backgrounds, coming from the OEM or a maintenance center either within or outside the Textron organization. All of them must be "experienced practitioners... able to relate to the challenges of running a line or working with a specific product family," he adds. "We don't want instructors who haven't done the job." Many in the TAMA



faculty have “a history of instruction” as well. Such experience is advantageous because TAMA instructors have the dual responsibility of developing new courseware, when TAMA takes on training for more aircraft families, and then using it for instruction.

TAMA’s classrooms accommodate up to 16 students each or currently a total of about 60 students. While some students are in classrooms, learning the “theoretical” aspects of aircraft and systems repair, a comparable number can be in the hangar learning the “practical,” or the hands-on, aspects. Therefore, TAMA can train at least 120 students at once, Smith says, adding that multiple aircraft programs can be taught simultaneously. “In the coming years, we would like to train more than a 1000 students a year at TAMA,” says TRU’s vice president.

Smith won’t project student body growth at TAMA beyond this year, but he knows the market offers considerable potential. “There’s a Cessna or Beechcraft logo on a building at nearly every airport,” he says. “There are thousands of people who need training, so we’re talking in those numbers to train each year.”

Still, TAMA staff must convince operators and repair centers that their training services have value, since many regulatory agencies, other than EASA, require little in terms of maintenance type training for general-aviation aircraft. “We have to aggressively sell the value,” says Smith. “For some centers, the value is obvious, but there are others who see maintenance training as an expense, one they can cut down on.”

Students come to Wichita from Textron facilities, service centers and modification shops. Motivation for attending may include recurrent training requirements (such as from EASA),

reducing liability insurance costs or, for an individual, a chance to advance professionally.

Each instructor teaches both the theory and practical parts of the curricula. All major systems in an aircraft are covered. Typically, according to Dowell, students learn about an aircraft system in the classroom—how it works, how it might interconnect with other systems, what failures to look for, etc.—and then they enter the hangar to work on the system.

Much of the hands-on training involves testing, remove and replace, all according to the OEM manual. There are exceptions, for example, the airplane’s flight controls. “We have all the cables sitting on a bench, and we’ll tell the students to rig the plane, do the checks and make sure it works,” says Dowell.

With avionics, the student will power up the systems and check the functioning of such items as the nav/com radios, software and antennas. “But we don’t tear into the boxes,” says Dowell. In addition to the Pro Line Fusion suite, TAMA’s curricula covers all Cessna and Beechcraft-delivered avionics and classic cockpits including Rockwell Collins ProLine 21, Fusion and Garmin G1000, G3000, and G5000 as well as various Honeywell installations from the legacy jet fleet.

TAMA students don’t “tear into” engines either. “We do such things as pull the igniters and look at the fans and ignition box,” says Dowell. Hydraulics maintenance training entails such tasks as inspecting reservoirs and shutoff valves, again, following the manual.

### Interactive Visuals

While TAMA students may not disassemble aircraft systems,

**FILL THE SKILLS GAP**

**ADVANCED COMPOSITE REPAIR TRAINING**

• MANUFACTURING • ENGINEERING • REPAIR

**ABARIS**  
TRAINING

+1 (775) 827-6568 • [www.abaris.com](http://www.abaris.com)

partner of choice  
to streamline your  
supply chain.

**AJW**  
ajw-group.com



they leave the academy with a thorough knowledge of how the systems function. Much of it is taught using sophisticated, interactive visuals.

During training, students are issued laptop computers that can be hooked to docking stations in the classroom. The instructor, who has a projector and screen available, and the students can jointly access visuals created by TRU's training courseware team, which provides courseware development. The visuals are the result of much data gathering, according to Smith.

"Our competitors use data that comes off the shelf from our OEM, but we want higher fidelity [and from Textron Aviation] we receive more data and we enhance it to make the maintenance process even more realistic," he adds. Smith describes TAMA's close association with fellow subsidiary Textron Aviation as "natural synergy."

TRU's training courseware team utilizes OEM data to produce computerized, interactive visuals for the aircraft's various systems: avionics, engines, electronics, air-conditioning, pressurization, fire control, fuel system, etc. (Visuals currently are being developed for Cessna's new Citation Longitude, among other aircraft.) The visuals are employed to help teach both pilots and maintenance technicians. TRU believes knowing how a system works is equally important for persons in the cockpit as well as in the maintenance shop.

The interactive visuals allow students in a classroom setting to operate a system and monitor its performance. "You have full control of the system," says Smith. Students can switch the system on and off. With, say, the engine visual, they can start the power plant and view indicators that show readings

such as N1 speed, torque increase, oil pressure and ITT (inter-stage turbine temperature). Scenarios and failures can be implemented and students learn the consequences of their actions—for example, if the correct generator is pulled off line or how much charge is drawn from a battery. "We've put in all the failure modes and check lists for all failures," says Smith. "We can adjust temperatures, speeds and pressurization to see their effects.

"With avionics, there's a lot pull and replace, but knowing when to do that is the hard part," adds TRU's vice president. "It's important to understand what the avionics is telling the technician, and the interactive visuals assist in that understanding because they bridge the gap between theory and hands-on training. They're so much better than showing a static image and then trying to verbalize how a system works." In short, the interactive visuals fit hand-in-glove with TRU's aim to make its instruction realistic.

TRU training seeks realism other ways, too. In TRU's flight training, for example, "you take off and you land," says Smith. "We don't push a reset button when you're at 10,000 feet. That's not a normal scenario." Comparably, in maintenance training, if one class doesn't complete a project during its session, the succeeding class will pick up where it left off. "It's like an actual shift change at an MRO," says Dowell.

### Class Length

Most TAMA classes are two weeks in length, but they could be longer. "There may be cases where the team [of technicians sent by a repair center] comes with specific challenges because of an aircraft's configuration or the environment it operates in," says Smith. "In addition, a customer might come to us and say we really don't know a lot about the aircraft's pressurization system or some other part of the aircraft, so we'll spend more time on that.


"The customer doesn't have to feel he is adapting to learning we want to provide," he adds. "We adapt to the customer's needs."

Perhaps most impacting class-time length at TAMA are regulations. For example, for the King Air program, non-EASA students "generally spend two weeks learning theory and, if they choose, one week taking the practical," says Dowell. "Many of those students take only the theory instruction."

However, EASA requires students training in the King Air program spend three weeks in the classroom and two in the hangar, according to TAMA's manager. "There's a separate, operational document within the EASA framework that demands more depth. It includes more detail and means more topics must be covered."

Two TAMA classrooms include soundproof translation booths in the back. Most customers bring their own translators, according to Dowell, but if not, TAMA has translating services available. "We can provide virtually any language," Smith adds. TAMA also will secure hotel accommodations and shuttle service for students—the latter because "some students from third-world countries don't have driver's licenses," says Dowell.

With training complete, the students at the Wichita academy must complete a written test in a room equipped with surveillance cameras and staffed with a proctor, to assure no cheating takes place. Testing software is certified for integrity.

Students who complete and pass TAMA's courses receive a certificate that says they have been trained in an OEM-approved program. EASA students receive comparable certification plus additional documentation showing the agency's approval. 

# USAVS2-4-1500

## VIDEOSCOPE

4MM x 1500MM  
2-WAY ARTICULATION

---

**STARTING AT**  
**\$3495**

---

- 4MM DIAMETER
- 1500MM LENGTH
- 2-WAY ARTICULATION  
(4-WAY OPTIONAL)
- 4.5" LCD SCREEN
- ADJUSTABLE LED LIGHTING
- RECHARGEABLE BATTERY PACK
- IP67 WATERPROOF





931-362-3304

SALES@USABORESOPES.COM

# USABORESOPES.COM



Aviation Maintenance Magazine is proud to present the following Products & Services to its readers



+1 9202 140 140



+44 (0) 203 892 3050

# AVIATION MAINTENANCE

[avm-mag.com](http://avm-mag.com)



## Product and Service Spotlight



### Keep your fleet in good hands

We develop innovative aircraft products and back

them with a global network of service and support. With award-winning service centers located in the United Kingdom, the Americas, and Asia, we strive to provide more than 600 customers with the best service and support.

**BAE Systems**

<http://www.baesystems-ps.com/index.php>

### AEE 2018 - 19/20 JUNE 2018, MUNICH, GERMANY 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.

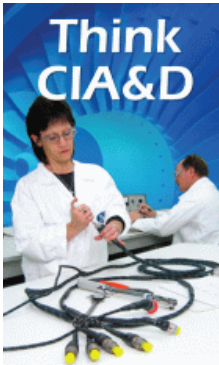
AEE is the leading exhibition and a conference programme with excellent content and discussion to address these challenges.

As the premier platform for the international avionics industry to learn, network and source new information, products and services at one unique annual event, ensure you take advantage of the unique and limited exhibiting and sponsorship opportunities.



**Aviation Electronics Europe (AAE)**

<https://www.ae-expo.eu>



### Electrical Wiring Harness Repair Services

If your organization is looking for reliable wiring harness repairs, you can trust Co-Operative Industries Aerospace & Defense to deliver the results you need. With quality workmanship and responsive turn-times, CIA&D offers cost-effective harness repair options to airlines and MROs. Contact us to learn more about how we can benefit your organization.

**Co-Operative Industries  
Aerospace & Defense**

<http://coopind.aero/product-repair.htm>

### Aircraft Paint and Powder Coating Remover

Spray-on / Brush-on Type Stripper D-Zolve 15-33R

Fully conforms to T.O. 1-1-8 and TT-R-2918

Compatible with most ferrous and non-ferrous metals, including Aluminum B209 (2024 -T3) Magnesium AMS 4372, Steel, and class 1 Cadmium Plated Steel.

Non-Hazardous

No Chlorinated components

No peroxides

U.S. Air Force Approved

NSN# On File

Free sample available

**Solvent Kleene, Inc**

<http://solventkleene.com>



**AVIATION  
MAINTENANCE**  
[avm-mag.com](http://avm-mag.com)

# 100% FREE SUBSCRIPTION

**SUPER EASY SIGN IN WITH FACEBOOK**

**KICK BACK, READ,  
AND STAY INFORMED.**



# FAA Agrees to Limit US Exports to China; and They Admit That They Did It for Non-Safety Reasons

If you work in a repair station, then being able to obtain the replacement parts that you need is tremendously important to your day-to-day business. But a recent agreement between China and the United States sets a precedent for excluding parts for commercial (non-safety) reasons; and this sort of exclusion could put repair stations and operators in the difficult position of having no reasonable source for their parts.

The FAA has signed a new 2017 Implementation Procedures for Airworthiness (IPA) with their Chinese counterpart. This agreement has trade effects, and stops some US parts manufacturers from selling certain parts into China when they compete with non-US manufacturers.

To understand the context of this new agreement, it is worthwhile to begin with an analysis of the history of US airworthiness agreements with China.

## PMA exports to China from the US: A Quick History

In 1995, the United States signed a Schedule of Implementation Procedures (SIP) with China. This was the detailed annex to the Bilateral Airworthiness Agreement (BAA) between the US and China. The BAA is the high-level agreement in which both authorities recognize the similarities in their systems, and their desire to work together. The SIP was the implementation document that provided the details for how the two authorities would work together. At the root of the agreement, the two authorities each agree that in certain situations, an importing authority can recognize and rely on some or all of the work done by an exporting authority. This recognition/reliance permits the authorities to share efforts, which allows them to each redirect their resources to other areas where there are true safety risks that need to be examined.

One of the areas where the SIP provides guidance is in what parts can be accepted by each authority. The SIP explains that "The importing authority shall accept the certificate of airworthiness for export of the exporting authority on parts and materials."

The SIP includes a caveat that the part must be documented - the language is similar to the language in other US international agreements that requires an 8130-3 tag.

The SIP represented a reasonable set of requirements that were consistent with international norms for accepting PMA parts. Generally, it permitted US PMA holders (and their distributors) to sell any FAA-PMA parts to Chinese customers for use on Chinese aircraft. From the Chinese side, Chinese repair stations and operators were allowed to accept PMA parts, secure in the knowledge that the Chinese government had found that the FAA's mechanisms for issuing PMA were sufficiently robust so as to protect safety in the Chinese aerospace system.

In 2003, the FAA and CAAC signed a clarification document explaining that Chinese acceptance of parts from the United States included PMA parts. This was an important caveat as it cleared up any doubt that PMA parts could be sold to Chinese carriers and MROs.

One thing that the SIP did not do was to permit CAAC-PMA parts into the United States. For PMA parts, the SIP was a one-way agreement, and this was largely due to the fact that there was not a significant PMA manufacturing community based in China when the SIP was signed.

## The Change

In the intervening two decades since the US-China SIP was signed, China has started to develop a PMA industry of its own. Thus, in the most recent round of negotiations, the Civil Aviation Authority of China (CAAC) asked that the US begin to accept PMA parts produced under CAAC-PMA. This request was rolled into the negotiations for a new 2017 Agreement.

The 2017 Agreement is a new Implementation Procedure for Airworthiness (IPA), which is an annex to the US-China bilateral agreement. The IPA replaces the SIP. And in doing so, it changed the scope of PMA parts that could be sold into China. Under US law, each FAA-PMA part has at least one eligible installation. This eligible installation is part of the approval basis of the PMA part. Under the new IPA, the following new PMA parts are acceptable in China:

- ▶ FAA-PMA parts eligible to be installed on products for which the US is the State of Design; this would include PMA parts for Boeing aircraft (a US State of Design aircraft);
- ▶ FAA-PMA parts eligible to be installed on products for which the US is not the SoD, provided that the design approval basis is
- ▶ STC (meaning that it was a major change to type design and it was approved under an FAA supplemental type certificate) and if the design approval for a PMA was based on an STC, then the STC must be validated in China; or,
- ▶ Identity under a licensing agreement with the type certificate holder;

The problem arises when the bilateral agreement is applied to PMA parts that are intended for installation on products for which the US is NOT the State of Design. This would include PMA parts for non-US aircraft from manufacturers like Airbus or Embraer. It would also include PMA parts for non-US engines and propellers, like Rolls Royce engines and Dowty propellers. Under the agreement, PMA parts for such non-US State of Design products that were approved based on test and computation, will only be accepted in China when the article's consequence of failure has a failure condition of 'no safety effect' or 'minor.' These terms are defined in FAA advisory circulars, such as: AC 23.1309-1E, AC 25.1309-1A, AC 27-1B, AC 29-2C.

Historically, the failure condition has been used to gauge the level of FAA scrutiny during the approval process. Where an article is "on the fence" or where the applicant has limited experience with that sort of part, the applicant and FAA may have agreed on a higher level of failure condition in order to drive a higher level of FAA scrutiny. It did not matter to the future of the part, if the FAA scrutiny was higher during approval. But now, such decisions could prohibit the export of that part to China!

The failure condition has been used to reflect the hazard conditions associated with the part. Where there is a higher level of potential hazard condition, the FAA has applied a higher level of scrutiny to the part's design. This higher level of scrutiny mitigates the actual risk down to a lower level, so that there is a high level of confidence in the airworthiness of the PMA part.

## Why Did the FAA Do This?

The decision to exclude these parts seems counter-intuitive, because



the IPA excludes the PMA parts that have experienced a higher level of FAA scrutiny (and we are therefore more certain to meet applicable safety standards). And these parts, which have received a higher level of scrutiny, are the ones that are excluded from export to China.

This is contrary to the FAA's stated international goals. The FAA has said that they will use risk-based philosophies to identify where the authorities need to remain involved, and where the authorities can rely on each other's assessments. After decades in which the CAAC relied on FAA safety assessment of PMA parts, it seems odd that the CAAC would suddenly identify certain PMA parts as a potential safety risk for which they can no longer accept FAA approval.

With this in mind, we asked FAA executives whether China had identified any safety concerns with respect to these PMA parts. They responded that China had not. We asked FAA executives whether these PMA parts that were being excluded posed any known safety risk within the US system. Again, FAA responded that there was no known safety risk associated with these parts.

So, of course, we asked "Why? If there is no safety risk associated with these parts, and if CAAC has been accepting these PMA parts without complaint for many years, and if risk-based decision making is supposed to be guiding out bilateral safety agreements, then why did we decide to impede the export of certain PMA parts? The answer we got was shocking, considering the US's official policies on trade.

The FAA executives told us that the reason for impeding the export of certain FAA-PMA parts to China was that the other main philosophy of our bilateral agreements is reciprocity, and the US is not yet ready to accept all of China's PMA parts because FAA has investigated some sample CAAC PMA packages and found that they were not comfortable with the CAAC process for approving those CAAC PMA packages. Because FAA is not comfortable with the Chinese system (even though CAAC seems to have no complaints with the FAA-PMA system), the FAA decided to start accepting

certain low-risk CAAC-PMA parts and to stop exporting certain FAA-PMA parts that were known to be good parts.

The obvious answer, here, should have been to begin accepting the CAAC-PMA parts that the FAA was comfortable accepting, and to NOT CHANGE the past practices for FAA-PMA parts with which CAAC was comfortable. Just because we are unwilling to accept a foreign good for safety reasons, does not mean that we agree to stop exporting our safe goods to that same country.

There is an additional problem with this limitation. It is based on information that is not public - it is typically only known to the PMA applicant and the FAA office. As a consequence, a third-party distributor who attempts to export a part to China may be unable to independently identify whether the PMA's failure mode at the time of application was identified as minor or major. And PMA parts that were approved before the issue of the advisory circulars that established these terms may have no documented failure condition. These factors could make it very difficult for third party distributors to sell test-and-computation PMA parts into China, for lack of categorization data.

### The Effect

This affects PMA parts on non-US (state of design) aircraft. Luckily this is a minority of the US PMA parts that are produced, and most PMA parts remain unaffected.

Many independent PMA parts for these non-US (state of design) aircraft, which have competed with the parts available from the non-US production approval holder, will be unable to be sold into China.

Under this Agreement, the US has gone from being competitive with European aircraft parts manufacturers to withdrawing from the previously competitive market for these parts. This is not good policy for the United States, but it also sets a bad precedent for the global community, by using a safety agreement to exclude parts for a non-safety reason. **AM**



# 2018 MARPA EMEA Conference

## FIRST WEEK OF MAY 2018 IN DUBLIN, IRELAND

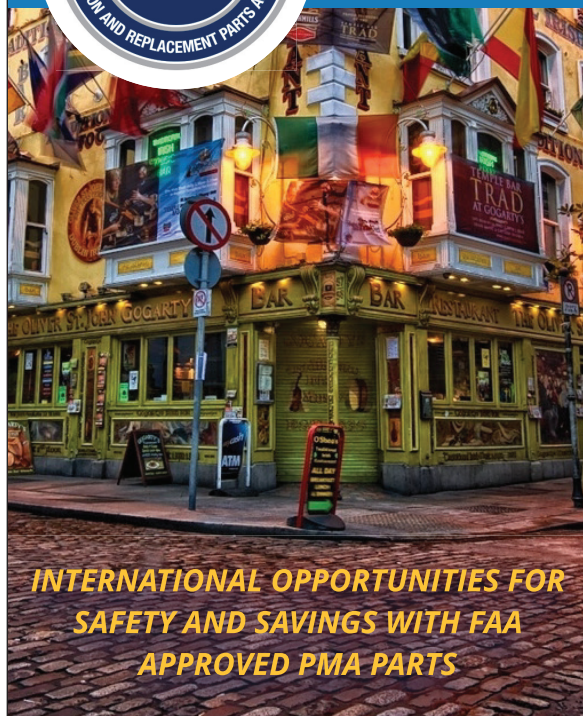
### Why should you be interested in FAA Approved PMA parts?

- Airlines worldwide have already begun taking advantage of PMA parts on their own aircraft in order to achieve benefits
- Other operators could be enjoying these same benefits like reliability, safety, availability and savings
- The global leasing community should look to FAA-PMA as a way to protect the value of their assets

### Why should you be interested in the 2018 MARPA EMEA Conference?

- Networking and education opportunities with lessors, manufacturers, air carriers, and more
- For operators and leasing companies, FAA-PMA parts are part of the solution-oriented approach to safety, reflecting opportunities to achieve benefits like reliability, safety, availability and savings
- For maintenance facilities, FAA-PMA parts can be a competitive advantage when bidding maintenance jobs
- For manufacturers, the FAA-PMA community reflects opportunities for manufacturing partnerships

Visit us online at [www.PMAparts.org/EMEAconference](http://www.PMAparts.org/EMEAconference)



**INTERNATIONAL OPPORTUNITIES FOR SAFETY AND SAVINGS WITH FAA APPROVED PMA PARTS**

## ALBERTH AVIATION

**Tools and Equipment Designed by Mechanics for Mechanics**

---

### TIRE INFLATION CAGE

now available for 42" tires



- Protect Employees from injuries
- Prevent costly hangar damage
- Exceeds OSHA & military standards
- Triple safety redundant features

**Online test videos**

**Safety Equipment**

---

### HYDRAULIC WHEEL DOLLY



optional brake dolly attachment

- Helps prevent back injuries and aircraft damage
- Low profile design eliminates clearance issues
- For wheel diameters 25-40", up to 350 lbs
- Converts to brake dolly with optional attachment

**GSE | Tooling | Aircraft Parts**

★ Celebrating Our 20th Anniversary ★

[www.AlberthAviation.com](http://www.AlberthAviation.com)  
832-934-0055



**macnaught AVIATION COUPLER KIT**  
PN# ACK-02

**SALE PRICE**  
**\$ 295.00 EA**  
IN STOCK

**IMMEDIATE SHIPMENT**

- ✓ Contains standard & specialty couplers required for greasing aircraft all stored in a rugged case.
- ✓ Includes 13 pieces: KDN, KDR, KDE8, KDF21, KY, KZDXL, KZHY, KZLNJ, KZLNS, KZLNR, KZLN45, KZSNR & J65

**AVIATION PAIL GREASE PUMPS**  
-IN STOCK

**10 year warranty**

**ORDER: (813) 628-5506**  
INFO@MACNAUGHTUSA.COM

**CONTACT: macnaught USA**  
613 S Ware Blvd. Tampa FL 33619



**PENTAGON 2000SQL™**  
SOFTWARE EMPOWERING THE ENTERPRISE

# MRO SOFTWARE SOLUTIONS



WWW.PENTAGON2000.COM

**ONE SYSTEM ONE SOLUTION ONE TIME**

# AEE

19/20 JUNE 18

**AVIONICS & FLIGHT OPS**

MUNICH, GERMANY | [AE-EXPO.EU](http://AE-EXPO.EU)

# AST

19/20 JUNE 18

**TESTING IN AEROSPACE**

MUNICH, GERMANY | [AST-EXPO.EU](http://AST-EXPO.EU)

## FAR 25.853 Certified Epoxy Adhesives

- Flame retardant
- For bonding, sealing & coating
- Used in aircraft interior applications



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

KICK BACK, READ, AND STAY INFORMED. ↘





**100% FREE SUBSCRIPTION**

SUPER EASY SIGN IN WITH FACEBOOK

## Whiskey Tango Foxtrot!

**49% SAVINGS AND 9.5X PRODUCTIVITY INCREASE??**

**ONLY with DTi's SpringFast® Grommet Edgings**



**DTi offers Best-In-Class Wire Protection & Interface Solutions:**

- Spring-Fast® Grommet Edgings
- Seal-Fast™ Edge Seals
- Trim Fast™ Edge Trims

Ideal Solutions For Seating & IFEC – Contact Us For Your Free Sample Kit

[devicetech.com](http://devicetech.com) 



Visit us at MRO Middle East 2018 on stand 209



Aircraft Engineering

# 50 years of excellence



Since 1967 we have been providing Maintenance Repair Overhaul services to some of the world's best known airlines. With all that experience, our people can provide you the high quality service that you expect.

[Monarchaircraftengineering.com](http://Monarchaircraftengineering.com) | [engineering@monarch.co.uk](mailto:engineering@monarch.co.uk) | follow us    





# The MRO Lab

## Adaptive Innovations

As an Airline MRO, Air France Industries KLM Engineering & Maintenance has developed a unique portfolio of know-how and engineering capabilities reflected in its development of a wide range of value-adding innovations.

"The MRO Lab" is the program where all the innovations developed by AFI KLM E&M and its network of affiliates converge. Specially tailored to the challenges of aircraft maintenance, the innovations are the fruit of continuous development aimed at satisfying the requirements of airline operating performance.

The know-how deriving from mastery of these technologies benefits AFI KLM E&M clients by generating scale effects and optimizing fleet performance.