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The U.S. Army is putting the finishing touches on a program aimed at fundamentally changing the way rotary wing maintainers are trained. The aim: to produce more holistic technicians, maintainers capable of better troubleshooting.

By Jerome Greer Chandler



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WELCOME TO 2018

Last Saturday I sat down at my computer to write this column and, well, I didn't get far. I was gazing out of my home office window at the morning winter sunshine, some fresh white snow covering the landscape, and a thermometer that was hovering around the freezing mark. Yes ... it's the middle of winter here in Minnesota and it was a NICE DAY! So I did what any good aviator does when there's a break in the brutal winter weather and went to the airport for a day of both airplane and hangar flying.



My good friend (and CFI) John Hall and I headed to Owatonna Degner Regional Airport. I really enjoy these small town airports, the friendly atmosphere with other aviators around to visit with. I think I spent an hour or more chatting with Brent Langer of Langer Aviation about the maintenance projects in his shop; he was in the process of changing the floats on a Cessna 185. Yes, summer and open water will soon arrive.

Eventually I did a fresh pre-flight on the Piper Warrior and off we went into the winter sky. When the weather is nice in the northern climates, winter flying can be really nice. A

developing snow shower to the west finally moved in and as the visibility began to deteriorate we made our last simulated instrument approach and landed. Yes, it was another fine winter day spent at the airport.

We had some staff changes at or company over the past couple months. I'd like to introduce Lester Craft as the new publisher of *Aircraft Maintenance Technology*. Lester is not new to our company, *AMT*, or to aviation, and you may have already met him. He's been with Southcomm for six years working with digital sales and business development with *AMT* and *AviationPros* that entire time. Prior to that, he was in digital product management and sales at a travel media company and publication so about nine years now in aviation-related B-2-B media.

The entire staff at *AMT* is busy with the New Year ramp-up and actively planning for another great year. Right now we are preparing to attend the 2018 HAI Heli Expo in Las Vegas, NV, Feb. 26 to March 1. We have many more events planned as the spring tradeshow season begins.

Thanks for reading and go have some fun at your local airport.

Ron

AMT AIRCRAFT MAINTENANCE TECHNOLOGY

Published by SouthComm Business Media, LLC.
PO Box 803 • 1233 Janesville Ave., Fort Atkinson, WI 53538
(920) 563-6388 • (800) 547-7377

Volume 29, No. 2, January/February 2018

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Aircraft Maintenance Technology (USPS 004-989; ISSN 1072-3145 print; ISSN 2150-2064 online) is published 7 times annually in January/February, March, April/May, June/July, August/September, October and November/December by SouthComm Business Media, LLC, 1233 Janesville Ave, Fort Atkinson, WI 53538. Periodicals postage paid at Fort Atkinson, WI 53538 and additional mailing offices. POSTMASTER: Send address changes to *Aircraft Maintenance Technology*, PO Box 3257, Northbrook, IL 60065-3257. Canada Post PM40612608. Return undeliverable Canadian addresses to: *Aircraft Maintenance Technology*, PO Box 25542, London, ON N6C 6B2.

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TAKE A LOOK AT DAHER

There's more to this aerospace giant than the TBM turboprop

By Marino Boric

MANY OF US WHO REGULARLY PILGRIM TO major aviation shows in the U.S. and in Europe have seen the sleek and fast TBM turboprop aircraft. Those who have recently visited the TBM exhibits may have noticed another name in front of TBM, the name DAHER. So who is Daher and what does this new name stand for?

Many still may remember the name Socata as somehow belonging to this same company. For some there may be an unclear understanding of the company and its activities, which has changed deeply in the last decades. This "uncertain" perception pushed me to dig deeper in order to better understand this aerospace giant.

One of first actions was to visit the Daher facility in Tarbes, France where all TBM aircraft are manufactured, followed by a visit to the Daher facility in Pompano Beach, FL. Those visits were for me an impressive boost of knowledge and changed my perception about the TBM and Daher radically.

It was soon obvious to me that the perception of many airmen, media and even mine was wrong, or better to say it was incomplete and even incorrect. In a few words, the TBM is just one small part of activities united under the name of Daher, the company which this year is celebrating its 155th birthday. Daher is today much more than "only" TBM. It's an equipment supplier which already has and is further developing, integrated industrial systems for aerospace and advanced technologies.

DAHER TODAY

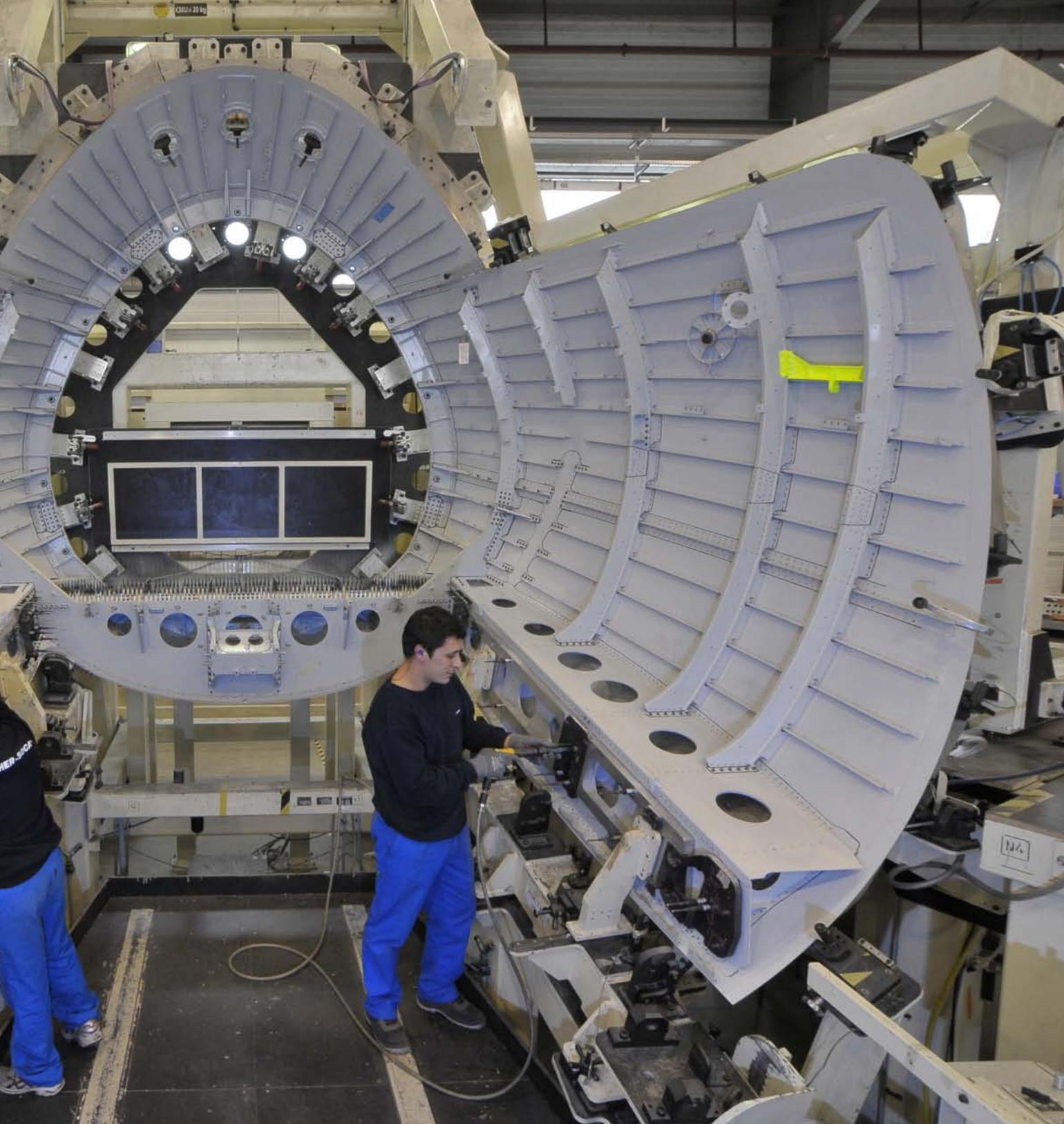
Daher today designs and develops solutions for itself and for its industrial partners by combining its know-how in industrial manufacturing, in product and process engineering, logistics and transport,



and other industrial services. Daher has grown into a leader in five fields of activity in aircraft manufacturing, aero structures and systems, integrated logistics, nuclear services, and specialized valves, generating a turnover in excess of 1 billion Euros, with an order book corresponding to more than three years of turnover.

Daher is the world's oldest aircraft manufacturer in operation today which has built airplanes for

AIRBUS A380 assembly.
DAHER



more than a century. It is a builder of the popular single-engine turboprop airplanes named TBM. The roots are in the pioneering Morane-Saulnier aviation company — and more recently in SOCATA.

DAHER TBM FAMILY

Not many know that the design of the TBM airplane family is connected to the Mooney 301. TBM originated from the initials “TB” for Tarbes and

“M” stands for Mooney. After Mooney’s acquisition by French owners, Mooney and SOCATA were discussing a co-development of a new enlarged turboprop design derived from the earlier 301. This resulted in the formation of a joint venture for developing and manufacturing the envisioned aircraft, designated as the TBM 700. The aircraft was considerably heavier than the original 301 but powered by more than twice the engine power. In



THE TBM assembly line at Tarbes, France.
TBM DAHER

1987, a joint-venture named TBM International was established with the aim of completing the 700's development and manufacturing. The ownership was divided between Mooney and SOCATA's parent company Aérospatiale. By mid-1990 Mooney withdrew from the joint venture leaving SOCATA as the primary company involved, which had started the production of the TBM 700 in Tarbes, France. The delivery of a TBM 700 started in early 1990 and the first production batch of 40 aircraft were sold out almost instantly paving the success of the TBM aircraft family.

Daher today designs, produces, and maintains the TBM family of aircraft; more than 800 Daher aircraft are in service today. The world of TBM consists of following TBM models: 700, 850, 900, 910, and 930. Daher offers factory TBM Care Program (TCP) as part of the purchase package.

The TBM family relied from the beginning on the Pratt & Whitney PT6 turboprop powerplant, and quickly grew with the introduction of the fully pressurized version 700A in 1992, followed in 1999 by the TBM 700B model with a larger cargo door and an optional pilot entry door. The French Army Aviation took delivery of three B model aircraft, bringing the total number of military aircraft to 28 TBMs 700 in 2000. The reinforced TBM 700C2 was certified in 2003 with increased MTOW and followed in 2006 by a TBM 850 Legacy. The 850

is strictly identical to the TBM 700 airframe but is powered by the 850 shaft horsepower PT6A which gives the TBM 850 jet-like performance with turboprop efficiency.

In 2009 Socata, the descendant of famous aircraft manufacturer Morane Saulnier, joined the Daher group. After more than 500 delivered TBMs in 2009, the TBM 850 was presented. In 2014, an aerodynamically refined version, the TBM 900, was presented. This version with winglets offered greater speed, range, and efficiency than previous TBMs together with improved short field capabilities and lower cabin noise.

The flagship TBM 930 was introduced in 2016 with upgraded interior and avionics, including the Garmin G3000 touchscreen avionics suite. The TBM 930 is currently

the world's fastest single-engine turboprop aircraft. The TBM 930 is now offered alongside the 900 and has not replaced it in the lineup. In 2017 the last TBM variant called 910 was presented with Garmin G1000 NXi all-glass avionics, which is an intermediate (avionics) model between the G1000 cockpit of the 900 and the multi-screen Garmin G3000 in the 930 flagship. The 910 has an upgraded cabin compared to the TBM 900 that's equal to the one in the TBM 930. The TBM MMA (Multi-Mission Aircraft) is based on Daher's TBM 900 and its predecessor versions and is suitable for many security, defense, surveillance, cargo, and medical evacuation missions.

AEROSTRUCTURES & SYSTEMS

As an aircraft manufacturer, Daher is a partner to the world's biggest aerospace and defense programs of Airbus, Airbus Helicopters, Dassault, and Embraer. Daher builds complex subassemblies relying on know-how and expertise in three key areas: metals, composite materials, and assembly.

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DAHER DELIVERS:

- **Nuclear services.** After over 30 years of experience in the sector, Daher has established itself as a major player in the global nuclear industry delivering turnkey services covering engineering, project management, and operations.
- **Integrated logistics.** Daher was founded on logistical challenges and they remain an integral part of the company today. This allows Daher to secure and optimize procurement to plants and to some of the world's largest projects. Thus Daher is a transport, logistics, industrial services, lead logistics, and service provider.

Daher Engineering

Daher's technical expertise and development know-how includes product development and

MORANE-SAULNIER, SOCATA HISTORY LESSON

In 1911 engineer Raymond Saulnier and pilot Léon Morane create one of the first aircraft manufacturing companies in the world: Morane-Saulnier.

Morane-Saulnier became famous with shoulder-wing monoplane aircraft. One crossed the Mediterranean Sea, while another one flew from Key West to Cuba, both in 1913. Later with highwing series nicknamed 'Parasol' it was used initially as scout airplanes and became the first fighter aircraft at the beginning of World War I. Specialized in training and fighter aircraft, always monoplane, 10,000 Morane-Saulnier aircraft were produced by the company or licensed built until WW2. The war brought destruction of the factories in Northern France ... and a new one in the south: Tarbes, which became soon Morane-Saulnier's main production center.

In 1953 Fouga's flagship aircraft, the Fouga Magister is chosen by the French Air Force as its first jet trainer, but the manufacturer doesn't have the structure in place for mass production. So its rival

Morane-Saulnier is called on to build the first 100 airframes and all the wings for this legendary aircraft. This marks the start of the aerostructure manufacturing business.

In 1954 Morane-Saulnier designs and builds the MS 760 Paris, the first business jet in the world.

Robert Morane and Raymond Saulnier launch in 1960 an all-metal, lightweight, single piston powered modern aircraft: the MS 880 Rallye. A total of 3,300 Rallye aircraft in 34 different models came out of the Tarbes plant and were exported to around 65 countries.

Founding fathers retired in 1963 and in 1966 the company was bought by Sud Aviation and became SOCATA.

In 1977, SOCATA, the descendant of Morane-Saulnier, works to create a successor to the Rallye, and launches the TB. Its success enables SOCATA to sustainably break into the American market. More TB models follow and win over private customers and pilot schools around the world.



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DAHER MANUFACTURES subassemblies for helicopters.

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modification, industrial design process and assembly line, flight testing of innovative solutions, and in-service fleet support. Visitors to the 2015 Paris Airshow could admire Daher's development of the world's first all-electric series production aircraft.

MRO

Daher provides and develops in-service support for all type and brands of aircraft and offers maintenance, repair, overhaul, and technical supervision for fleet operators. This is illustrated by the company's support of training aircraft utilized by the French Defense Ministry.

Retrofit

Daher is capable of modifying all types/brands of aircraft developing and offering tailored solutions for avionics moderniza-

tion and the integration of mission-specific equipment or systems including the necessary flight testing and certification, documentation, and support.

TARBES, HOME OF TBM & DAHER AEROSTRUCTURES

Visiting Daher at Tarbes on the Pyrenees foothills in the South of France, Philippe de Segovia toured me around the plant which manufactures structural components that go into the Airbus, Airbus Helicopters, Dassault and Embraer airplanes.

Daher Tarbes aeronautic factory is impressive, overwhelming, and in my modest opinion simply unique in the world. It is different from other factories I have visited; different because it has grown over more than a century becoming part of the aviation history not only in Europe but worldwide, and different because it

combines in one place production methods from the earliest days of aviation (tube, fabric, metal) to modern advanced composites manufacturing. In Tarbes you feel history but simultaneously you can see the most modern manufacturing of composite aviation parts and subassemblies made of carbon fiber and honeycomb sandwich, or aluminum and titanium, and/or a combination of both.

The history in Tarbes is omnipresent; the oldest building was built by Morane-Saulnier in 1939 and is still in regular use. Some of the plant's machinery is from the 1940s and is in original state but other machinery like the metalstretching machine was in the meantime updated with modern numeric controls. The oldest equipment is still used to build parts for the still-supported (but not serially produced) TB-series airplanes.

In one new production building, I was shown the composite gear door production for an Airbus A400M, and there is a line dedicated entirely to gear doors for the A350 where most modern composite sandwich structures are bonded and riveted to metallic hinges and locking mechanisms. Many aerospace companies subcontract work to Daher, like doors, control surfaces, and entire subsections. In Tarbes even the front end of the Airbus A380 is built. Composite parts are built in a brand-new building which was purposely developed for robotic production of composite layups. The whole process is highly automated and robotic arms with high precision cut the carbon filaments and place the woven tapes of material in place and apply resin automatically where needed.

The level of automation in Tarbes is high, but there is still an army of highly skilled bench workers which manufacture — in a traditional way — metal parts, finishing them with files and checking bend angles with gauges.

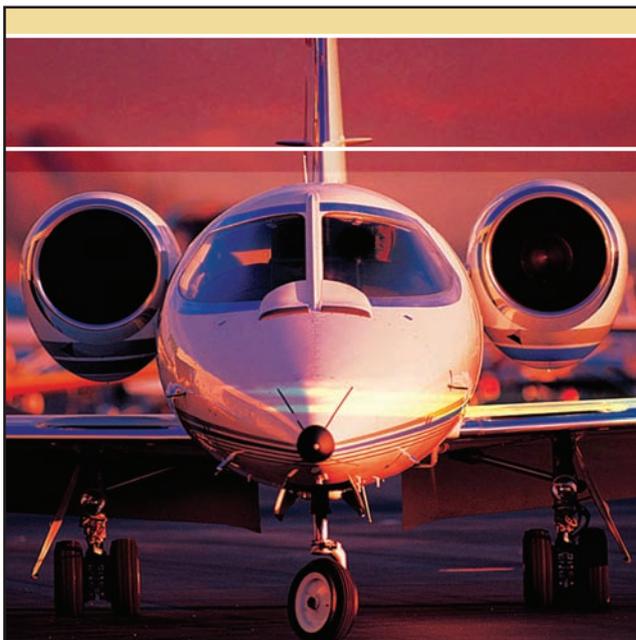
CENTRE DE MAINTENANCE

The Daher production complex in Tarbes has a proprietary paint building and a large hangar dedicated to maintenance, repair, and retrofit. In a busy “Centre de Maintenance” I not only observed seasoned technicians but trainees from around the world being trained in aviation MRO skills. Attached to the hangar is even the training facility ... but this is another story. Beside the regular maintenance on TBM products there were other piston aircraft of all genres. Daher activity in

this MRO and retrofit field is much bigger than initially expected. In fact, in front of the hangar sat one of the oldest TBMs around which was waiting for a complete refurbishing. **AMT**



MARINO BORIC graduated with a university degree as an aeronautic engineer, and acquired degrees in business development/ trade and commerce and in journalism. He is a civil and military pilot and has built experimental aircraft. As a journalist, he specializes in aviation and propulsion and travels worldwide, flight-testing UL, LSA, Experimental, and certified aircraft. He is writing for U.S., European, and Chinese media companies.



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WANTED: SKILLED TECHNICIANS FOR REWARDING CAREER IN AVIATION MAINTENANCE

By Steve Staedler

While it comes as no surprise that the aviation maintenance industry is facing a looming shortage of qualified technicians, the question that remains up for debate is how to close that gap.

Data recently released by the Aviation Technician Education Council (ATEC) found that new entrants make up 2 percent of the AMT population annually, while 30 percent of the workforce is at or near retirement age. That's not a very encouraging statistic, especially compared to Boeing's 2016 forecast that 679,000 new commercial airline maintenance technicians will be needed globally by 2035.

Although there doesn't seem to be any quick-fix to the issue, some believe the industry suffers from a public relations problem, and that it needs to reinvent its image to appeal to a wider audience. Select teams and organizations participating in the Aerospace Maintenance Competition (AMC)

Presented by Snap-on, weighed-in on what can be done to better position the industry as an attractive career choice. Crystal Maguire, executive director, ATEC (www.atec-amt.org), thinks the key is reaching people when they're young ... very young.

TWO-PRONGED APPROACH

Maguire believes the key to building more interest in aviation maintenance is through better training, and developing alliances between industry and schools.

Maguire says ATEC, whose mission is to promote and support aviation maintenance technical education, has been working alongside schools and the industry to update areas of the FAA's Part 147 curriculum requirements to more accurately reflect the minimum certification standards that enable graduating students to be more proficient on the job. These suggested updates include additional training on



A GLIMPSE of the 2017 Aerospace Maintenance Competition. SNAP-ON

One way Flybe is addressing the issue is through the creation of an apprenticeship program with a local college. Each year the program accepts 25 to 30 applicants, who complete a mix of traditional college coursework and hands-on aviation training. Flybe's aeronautical apprenticeship is a four-year program leading to a Level 3 Diploma in aviation maintenance, and an EASA Category A License is delivered at the Flybe Training Academy and Maintenance Repair Organization.



TIMOTHY PRIVETT, base maintenance production manager for Flybe Aviation Services

"The program gives us some homegrown, well-trained, reasonably experienced techs at the end of four years," Privett says. "At the moment the program is focused on having students receive their EASA license, but we're looking to change that to more of a 50-50 split, where half the students complete training to receive their license, while the other techs acquire more structures and avionics skills. Our goal is to get a broad mix of trained students."

Two members of Flybe's team that competed in the Aerospace Maintenance Competition last year were graduates of the airline's engineering apprenticeship program, and Flybe is competing in this year's event as well. Privett says the program has been well received since it started about 10 years ago, as they regularly receive many more applicants for the 25 to 30 slots.

This type of partnership is fairly common across the aviation industry. Altus Air Force Base, Oklahoma, works in conjunction with Southwest Technology Center (www.swtech.edu) to train civilian technicians on maintaining the base's fleet of C-5, C-17, and KC-135 aircraft. The newly redesigned program, called Pathways Recent Graduate, allows students to focus on their studies, and when they graduate, they're hired on full-time at the base. Local high school gradu-

today's highly technical aircraft, along with dropping some aptitude mandates on systems found on older aircraft that they're not likely to see on the job.

ATEC is also working with industry leaders on a branding campaign to better define what it means to be in aviation maintenance, and ultimately deliver those key messages to students in K-12 schools and postsecondary schools. The industry's ability to successfully reach students at an early age and show them that a career in aviation is a viable option may be a long-term solution to help alleviate the technician shortage, she says.

"If you have a school in your area that you can partner with and reach out to those students, that would be ideal. Industry just needs to get involved," she says. "It's really about building partnerships. We believe there's a lot of value in bringing companies and schools together to get the message out that aviation maintenance is a viable industry to be part of."

"Everyone is talking about the need to increase awareness of aviation maintenance, and I think ATEC is in a good position to help facilitate this because we are the common denominator."

SHOW AND TELL

Ken MacTiernan agrees with Maguire that adapting a more proactive stance to reach youngsters would pay dividends in the long run. MacTiernan, an aircraft maintenance technician with American

Airlines, and chairman of the Aerospace Maintenance Competition, believes that young people need to be exposed to what a career as an AMT is like.

Events like career days and giving youngsters the opportunity to interact with AMTs and see aircraft up close would help put the career on their radar.

"Explaining and demonstrating a technician's entry into our craft would go a long way," he says. "Ours is a profession that can really entice kids. When you're in this industry, you're going to be in an environment in which everyone shares the same responsibilities. I think showing them the pros of being an AMT would be effective."

COLLEGE PARTNERSHIPS

Some airlines "across the pond" are feeling the effects of the technician shortage as well.

"It's definitely a challenge. I've been in touch with other MROs that are having similar issues," says Tim Privett, base maintenance production manager for Flybe Aviation Services, the maintenance arm of Flybe, Europe's largest regional airline. "Depending on which research you believe, it's going to get a lot worse or just a little bit worse over the short and medium term. But it's definitely a challenge trying to attract the right people."

Privett believes the dip in interest stems from more people attending universities and not considering aviation or other skilled trades as a career.



FLYBE AVIATION Services technicians competing at the 2017 AMC. SNAP-ON

ates can enter the program and receive free tuition. The program was initially designed to inspire students to stay in the area, as the base traditionally has had difficulty attracting technicians to Southwest Oklahoma, where Altus AFB is located.

To date, 221 have entered the program, with 138 still employed; about 30 students are expected to graduate from the program this spring. A team of civilian technicians will be fielding a team at this year's AMC.

"The Recent Grad program gives the 97th Maintenance Group the flexibility to hire more trainees, which is extremely beneficial," says Brandi Roblez, personnel liaison, 97th Maintenance Operations, Altus AFB.

STRONG STAFFING

On the other hand, the U.S. Coast Guard, with its 92 percent retention rate in maintenance, isn't nearly feeling the effects of a technician shortage.

"To be able to keep that many of your young people, with an



MASTER CHIEF
Kit Harris
SNAP-ON

8 percent loss rate, is pretty good," AMT Rating Force Master Chief Kit Harris says.

Although the Coast Guard's technician staffing levels are high now, Harris says it's cyclical as the rate of retirees can affect staffing from year to year.

He attributes the high retention rate to the Coast Guard's culture of taking care of people, and overall satisfaction with the Coast Guard's mission. Last year, the Coast Guard fielded two teams in the AMC, one of which paid their own way to compete in Orlando.

"Those guys just had a strong desire to compete," he says of the team from Coast Guard Air Station Clearwater, FL. "They wanted to go down and show their stuff."

And show their stuff they did, as the team won first place in the AMC's military category.

MENTORING WOMEN

One challenge that's prevalent throughout aviation maintenance is how to attract more females to the industry. Kendra Kincade thinks she may have the answer. Kincade founded Elevate Aviation (www.elevateaviation.ca), a nonprofit organization whose mission is to introduce women to careers in aviation. The main strategy behind Elevate Aviation is to team up women with female mentors within the

industry to give them a better idea of what a career as a pilot, air traffic controller, flight attendant, or technician looks like.

"We're trying to get out there and raise awareness about these careers," she says. "For aircraft mechanics, the idea is to go out and job shadow them. She can show you the ropes, show you what it's like to work there, so you'll have a better idea of what a career as an AMT is like."

Founded in 2011 in Edmonton, Alberta, Canada, Elevate Aviation has mentored more than 500 women in several aviation disciplines. Kincade is looking to broaden Elevate Aviation's reach south of the boarder and establish female mentors in the United States by the end of the year ... and that's one of the reasons why she's bringing a team this year to the AMC.

"We don't have a lot of women looking at aircraft mechanics because they're not thinking about it. That's why we're competing in the AMC; we need to get this out there and raise awareness. We just want to try and get women to look at maintenance as a career." **AMT**

The Aerospace Maintenance Competition Presented by Snap-on will be held during the MRO Americas (mroamericas.aviation-week.com/am18/Public/Enter.aspx) April 9-12 in Orlando (www.aerospacecompetition.com).



KENDRA KINCADE,
Elevate Aviation
ELEVATE



STEVE STAEDLER is a senior account executive at LePoidevin Marketing, a Brookfield, WI-based business-to-business marketing firm that specializes in the tooling and aerospace industries. Staedler

has been covering aeronautical maintenance for more than 10 years; is a former newspaper reporter and retired master sergeant from the U.S. Air Force Reserve, where he worked maintenance and public affairs. He can be reached at steve@lepoidevinmarketing.com; (262) 754-9550.



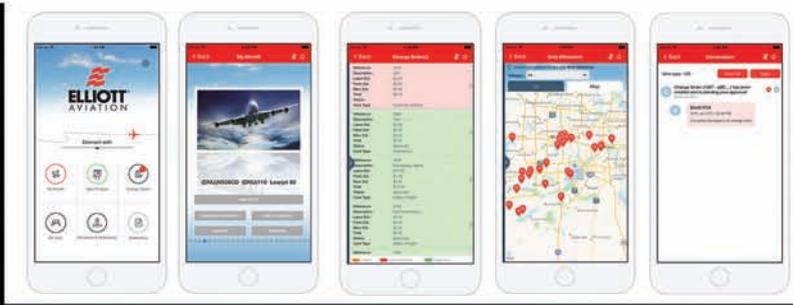
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Electrification and Aircraft — Part 2

NEW E-BIRDS TAKE TO THE SKY

By Marino Boric

Electric mobility is already in our lives and now we hear almost daily about new “electric” aircraft even from unusual and untypical aviation events. Most of the new aircraft look futuristic and let us dream about hard to believe freedom of air transportation. The majority of these new aircraft are different, exciting, innovative, and

they have one common ground: they are more or less electric propelled.

As soon as you think you have understood the purpose of an airplane a new variant from another — widely unknown — competitor is there. The borders between currently existing categories are vanishing and even the likes of Airbus and Boeing



ZUNUM FAMILY over Seattle depiction. ZUNUM

are taking advantage of start-up companies — some non-aviation.

This is leading to a variety of new aircraft families. They may be distinguished based on the type of lifting surfaces (fixed and rotary), type of propulsion architecture, and propulsion system.

WHY THE RUSH, WHY NOW?

The aviation industry has a problem and has become the victim of its own success. Air transport is continually growing and adds to environmental harm if further fossil fuel resources are used. The industry has recognized that best results could be achieved by improving the sustainability of air transport, especially now when travelers are becoming increasingly aware about the finite resources of the fossil fuels.

Engine makers are also actively contributing to reduction of fuel burn in their existing engines and are increasingly working on new concepts of open rotor engines and geared turbo fans.

IS ELECTRIC AIRCRAFT A SOLUTION?

Electric energy seems to be the only ecological “fuel” alternative especially if used to drive electric motors for propulsion. Combining existing technological resources, achieved knowledge, and thinking out of the box could radically change our way of designing air transport tools.

It seems that we are living in one of the best times ever for aircraft designers. They are able to benefit from sources which were not available just a decade ago. Many new tools are now available like computer chips and sensors, batteries, electric motors, and software which have become

faster, cheaper, and smaller with some coming from the automotive, smart phone, and consumer drones fields.

NEW AIRCRAFT FAMILIES

In the last issue of *AMT*, we provided you an overview of new electric aircraft. In this part we’ll attempt to distinguish between some of these new families of electric aircraft based on the choice of lifting surfaces.

FIXED WING AIRCRAFT WITH ELECTRIC PROPULSION

This category of aircraft includes both conventional aircraft that have been electrified, and newly designed electric or hybrid fixed wing aircraft. The classic use of fixed electric motors spin a single (or twin) propeller. They are simple, sturdy, easy to build and don’t allow vertical takeoff and landing (VTOL).

Aero Electric Aircraft Corp. The two-seat Sun Flyer trainer together with the bigger brother called Sun Flyer 4, four-seat, are both designed from scratch for electric propulsion.

NASA X-57 Maxwell project: A normal twin engine aircraft like a Tecnam P2006 is being converted by replacing the original wing with a long wing fitted with 14 electric motors — 12 on the leading edge for takeoffs and landings, and one larger motor on each wing tip for use during cruise.

Alice Commuter from the Israeli company **Eviation** presented a scale model in Paris last year designed to take 9+2 passengers 600 miles on a speed of 240 knots. The brand new design should get airborne by mid 2018 and is using distributed propulsion with one main pusher propeller in the tailcone and two pusher propellers at the wingtips.

Pipistrel’s Panthera Hybrid is a good example of a fixed wing general aviation airplane where the original Lycoming engine was exchanged by a combination of Rotax 914 gas engine and a Siemens electric motor — a beautiful example of a hybrid concept.

Airbus e-FanX: Airbus, Rolls-Royce, and Siemens have formed a partnership which aims at developing a near-term flight demonstrator which will be according to Airbus a significant step forward in hybrid-electric propulsion for commercial airliners. A 2MW (mega watt) serial hybrid architecture on board consists of 2MW electric turbine motor, 2MW energy storage, and 2MW generator that work together. More on Airbus and this topic in the next edition of *AMT* magazine.



EVIATION ALICE
EVIATION



PIPISTREL PANTHERA

PIPISTREL

AIRBUS E FanX graphic.
ROLLS-ROYCE

An example in the commuter market is the **Zunum Aero** project a 19-seater, optimized for a 700-nm range — a start-up financed by **Boeing Horizon X** and **JetBlue** technology Ventures which is supposed to fly in 2019/20. To be flown piloted or as a drone, its series-hybrid powertrain was designed for an eventual transition to fully electric, without requiring any mechanical retrofitting. More on Boeing and this topic in the next edition of *AMT* magazine.



ROTARY WING, E-HELICOPTERS, MULTICOPTERS

A flood of newcomers to the market are intruding with new VTOL designs into this previously classic helicopter segment. This segment includes electrified conven-

tional helicopters and new helicopter-like aircraft.

Many new designers and small startups (specially in the experimental world) are presenting traditional style helicopters with classic helicopter architecture engine,

main rotor, and tailrotor but powered by an electric motor.

The German **Volocopter 2X** was launched in 2017. This VTOL aircraft is purely electric and is capable of carrying two persons. Its 18 electric motors give



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AMT MAGAZINE ATTENDS THE ELECTRIC & HYBRID AEROSPACE TECHNOLOGY SYMPOSIUM, COLOGNE, GERMANY

THE ELECTRIC & HYBRID Aerospace Technology Symposium held in Cologne, Germany on Nov. 16-17, 2017 has meanwhile grown to one of the leading events in the world for high level aerospace engineers, leading research academics, and heads of electrical system design and engineering to discuss, debate, and analyze the development of hybrid and electric aircraft commercial world.

The fourth event organized by the UKi Media & Events, a division of UKIP Media & Events Ltd. from Great Britain, covered almost all aspects of aerospace activities, from general aviation and smaller regional aircraft, to larger commercial airliners, with the intention to highlight and explain the fast-paced development of hybrid propulsion and electrical subsystem architecture or MEA, to discuss the vast research into the increased electrification of aircraft and the possibilities and challenges that brings.

Leading experts from around the world presented their views and their current findings, providing an opportunity to exchange

ideas and to network. The conference that was launched three years ago has quickly grown to an event with some 250 high-level speakers and delegates in 2017.

The industry has well embraced the conference so many of the industry's biggest players were present as speaker or as participant. Speakers come from OEMs, top tier suppliers, aviation organizations, and from various worldwide universities such as Airbus, Aurora, DLR, EASA, Embraer, Fokker, GE AviaSolutions, NASA, Rolls-Royce, Siemens, GAMA, and many others which contributed to the success of the event.

The Electric & Hybrid Aerospace Technology Symposium papers were focus on:

- The possibilities created by aircraft hybridization
- Commercial aircraft application possibilities and research
- Battery technologies
- Electric motor technologies
- Environmental impact
- Real-world fuel-saving possibilities
- Energy-storage systems



▲ **HUNDREDS** of people from around the world attended the Electric & Hybrid Aerospace Technology Symposium held in Cologne Germany in November 2017.

- Solar possibilities
- Efficiency and durability
- Increasing flight range through hybridization
- The possibilities of pure electric-only commercial and military flight
- Safety and legislative considerations
- Case studies on existing global electric and hybrid research programs
- Overcoming engineering challenges
- Best design practices
- Investment possibilities
- Additional advantages of increased electrification
- Range-extender technologies

The next symposium is scheduled for Nov. 8-9, 2018. For more information visit www.electricand-hybrid-aerospace-technology.com.

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In January 2018 **Bell Helicopter** revealed the cabin model of an electric, self-piloting urban air taxi. Bell's initial propulsion technology focus is expected to be hybrid electric with an eventual goal of fully electric. The propulsion system remains a secret for now but a sort of a multicopter design won't be a surprise.

VERTICAL TAKEOFF AND LANDING (VTOL)

The tilt-type architecture is right now very widely used by many aircraft designers and allows pretty radical designs which are almost all vertical takeoff and landing (VTOL) aircraft which is achieved in different ways.

Manufacturers combine different properties of fixed wings for cruise and multicopters for VTOL properties by tilting either only the propeller or tilting engines and propellers and sometimes tilting even wings (or portion of) together with complete powerplants. This requires changing the direction of thrust from hover to cruise. There is a need to design propulsors for a wide range of operating conditions (hover and horizontal flight).

In some cases it is difficult to categorize these new aircraft as they are often creating their own niche such as the XTI Aircraft, Trifan 600, and Airbus Vahana.

Motors and propellers are vertically installed, constantly creating lift, with no "mode change". Multicopters are VTOL aircraft, simple to design and build.

The American electric-drive truck manufacturer **Workhorse** showcased a hybrid-electric vertical-takeoff-and-landing (eVTOL) aircraft called SureFly in mid 2017. The octocopter builds on Workhorse's development of the HorseFly delivery drone, has four arms with two electric motors on their end. It is powered by a nondisclosed 200-hp turbocharged combustion engine which drives a generator, and which is backed up by a dual-battery system. Motors and propeller are vertically installed with no "mode change".

Aurora's eVTOL is a prototype of a new form of urban mobility using separate propulsion systems (motor and propeller) for hover (takeoff, landing) and cruise eliminating mechanical complexity

but still achieving cruise speed of 100 knots at 1 ton weight and approximately 500-pound payload.

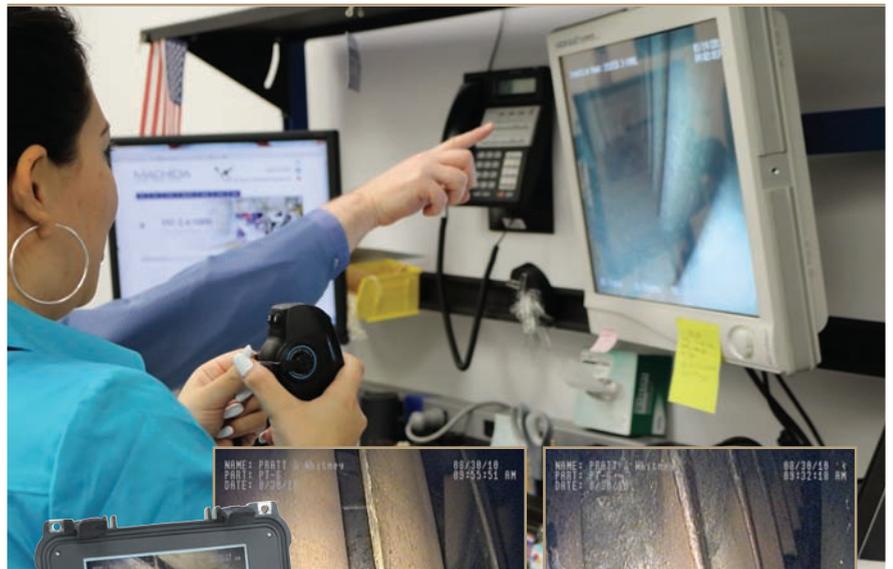
Aurora XV-24A LightningStrike: This VTOL assembled with combat helicop-



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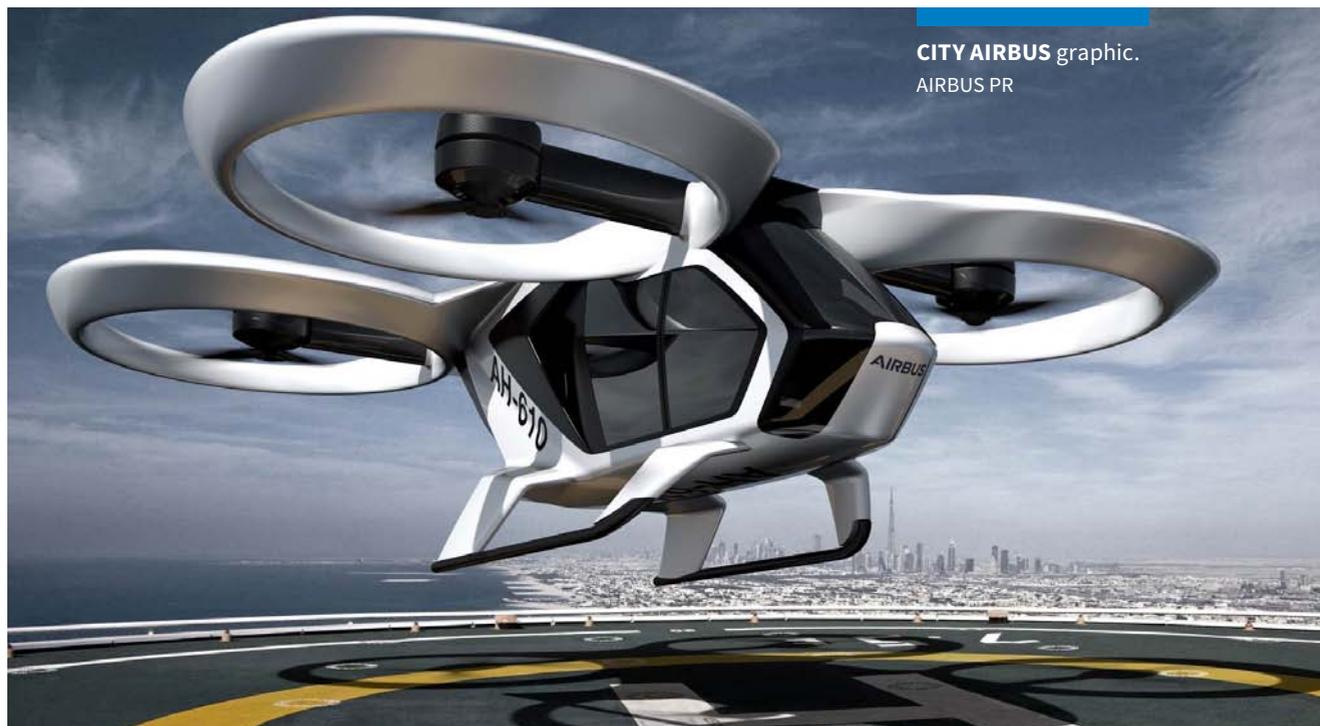


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CITY AIRBUS graphic.
AIRBUS PR

ters is now an experimental UAV created by Aurora and partners Rolls-Royce and Honeywell. XV-24A should achieve 300 knots cruise and have useful load close to 40 percent MTOW. To achieve this, a complex coupled aerodynamic aircraft was designed using 24 motors with enclosed propellers and 48 nozzle flaps plus tilt actuators on front and rear wing.

XTI Aircraft, TriFan 600 is another example of an all-new design, conventional looking, fixed-wing aircraft with three ducted fans; two of them rotate approximately 90 degrees. The three fans will be powered by a not yet disclosed and dislocated turbine/generator unit. The American company and its CEO Robert LaBelle are saying that the six-seat airplane will have the speed, range, and comfort of a business jet and the ability to take off and land vertically, like a helicopter. Using three ducted fans, each driven by two Siemens electric motors, it should travel at over 300 miles an hour, with a range of up to 1,200 miles.

Lilium is a VTOL-jet designed and manufactured by German aircraft company Lilium Jet. Lilium plans to launch a

five-seat model in the future with an eye toward enabling a sky taxi service. Lilium says that it has invented a completely new aircraft concept for the modern age. Lilium's goal was to define a transition aircraft concept with better performance in safety, noise, speed, range, and payload than existing concepts, while cutting complexity to one third. All this should be possible by a fixed wing fitted with 12 highly deflectable flaps and 36 electric-driven "jet engines". An unmanned, remotely controlled prototype was test-flown on April 20, 2017.

CityAirbus: The VTOL craft will first be flown by a pilot for certification purposes, even though Airbus eventually wants the craft to be capable of autonomous flight. CityAirbus is a multi-passenger, self-piloted battery-powered vertical takeoff and landing vehicle designed for urban air mobility. It is designed to carry up to four passengers in a fast, affordable, and environmentally friendly way. The quad-fairing design uses a total of eight propellers and promises a much lower acoustic footprint, according to Airbus, in addition to greater safety and stability.

Vahana³ by Airbus: The Santa Clara, CA, company is financed by Airbus and is exploring tilting, distributed electric propulsion on Vahana. Single-seat eight-prop flying prototype is planned for maiden flight in the first quarter 2018. Small-scale models have been flying to test the concept. More on Airbus e-flight in the next issue of *AMT*.

Erik Lindbergh, grandson of aviators Charles and Anne Morrow Lindbergh, has announced the formation of **VerdeGo Aero**, an innovative new aerospace company with a mission to provide the upcoming urban transportation market with a safe, clean, and quiet hybrid electric vertical take-off and landing (eVTOL) aircraft that can fly piloted or autonomously.

CONCLUSION

As in the Segway world where the initially presented prototype went through several stages of development, lessons will also be learned in this new world of E-Flight. Some of them will possibly reach this goal sooner than others, but in all cases a maturity will certainly be needed before mass public air transportation. **AMT**

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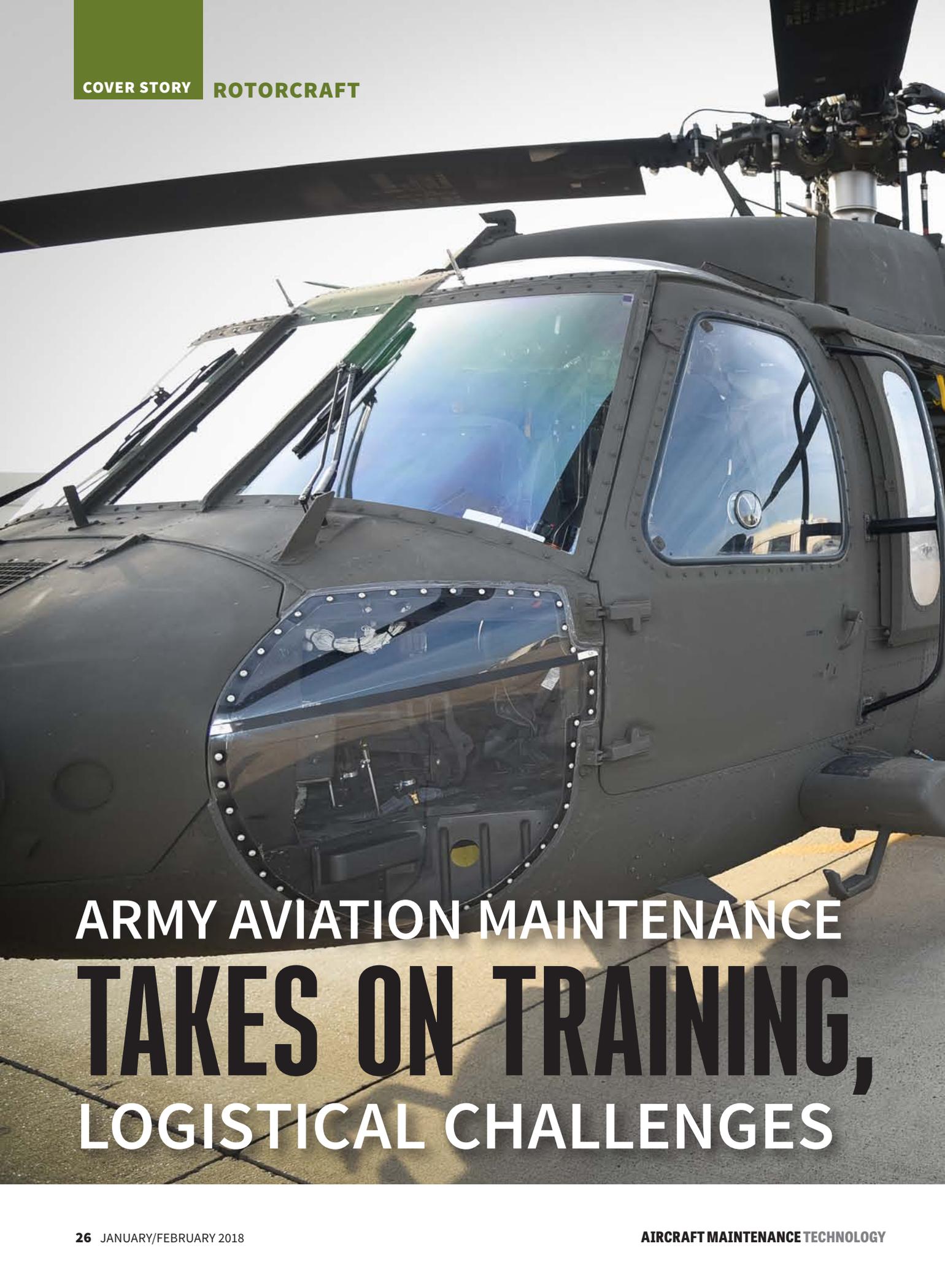


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**ARMY AVIATION MAINTENANCE
TAKES ON TRAINING,
LOGISTICAL CHALLENGES**



The aim: to produce more holistic technicians, maintainers capable of better troubleshooting problems

By Jerome Greer Chandler

“SIXTEEN YEARS OF THE GLOBAL WAR ON Terrorism has really eroded our ability ... to maintain our helicopters,” says a man in position to know. Gregory M. Chambers is the Command Sergeant Major (CSM) of the Aviation Branch at the United States Army’s Aviation Center of Excellence at Fort Rucker, Alabama. In conjunction with col-

leagues at the 128th Aviation Brigade at Joint Base Langley-Eustis in Virginia he helps fashion the nuts and bolts of maintenance training for Army maintainers.

Just now CSM Chambers is in the process of helping put the finishing touches on a program aimed at fundamentally changing the way rotary

CORPUS CHRISTI

Army Depot test pilots Dominique Benitez and Matt Garza check the No. 1 engine on a UH60 Black Hawk before flight test.

PHOTO BY KIANA ALLEN



wing maintainers are trained. The aim: to produce more holistic technicians, maintainers capable of better troubleshooting problems. The aviation maintenance training program (AMTP) is “on track for initial implementation in FY ‘19,” says Chambers.

“The [Aviation] Branch is very, very good at removing and re-installing a component on a helicopter,” says Chambers. A good example is the intermediate gearbox on the AH64E. The component is critical. It drives the tail rotor on the aircraft.

What maintainers have been less adept at is troubleshooting certain components, such as the General Electric T701 powerplant that propels both the Apache and the ubiquitous UH-60 Blackhawk. “We’ve taken a lot of good engines off helicopters,” says Chambers, “where we thought there was something wrong, removed them and sent to the

Corpus Christi Army Depot (CCAD) to have them repaired. The problem is when they put them on [diagnostic equipment] they couldn’t find a fault.” As a result he says, “The Combat Aviation Brigade spends a lot of money buying brand new engines.”

The solution: instilling understanding on how a particular component works, not merely how to remove it and convey it on to CCAD. The intermediate gearbox once again illustrates Chambers’ point. The Army now wants soldiers to understand how exactly it works, how fast it spins, how it interacts with the driveshaft, and how it fits with the aircraft in its entirety. “It’s important that our soldiers understand the interaction with the helicopter [as a whole],” says the Command Sergeant Major, and how it’s dependent on other components in the aircraft.

SOLDIERS WITH C Company, 2-210th Aviation Regiment, 128th Aviation Brigade, U.S. Army Aviation Center of Excellence, learn to repair a T700 engine as part of Military Occupation Specialty 15B training at 128th Aviation Brigade at Joint Base Langley-Eustis, VA. U.S. ARMY PHOTO

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Technology helps. The 128th Aviation Brigade at Joint Base Langley-Eustis is teaching military operation specialty (MOS) 15B engine maintainers via virtual means. “We teach them virtually how to tear an engine apart: the cold section, the hot section, the gas generating section, and how to remove an accessory module,” says Chambers. “We do it virtually first. We can ‘explode’ the engine visually and talk about all the parts and components. It’s so much more efficient than going out and trying to do this on a real engine.” The virtual exposure complete, “We take them out on the [hangar] floor and we teach the real task of (for example) removing the cold section of a T701 engine.”

Virtual training is a key component in the new AMTP, avoiding as much as possible the practice of taking a fully mission-capable aircraft out of service and employing it to train people.

ARTISANS AT the Corpus Christi Army Depot drill out the skin in the nose cockpit and lower transition end areas of a UH60 Black Hawk; once removed a new piece of skin is installed.

PHOTO BY DELLA ADAME

The virtual approach is important, but there’s more to it than that. The mastery of Individual Critical Task List (ICTL) is even more important.

TASK MASTERS

Every military operational specialty has specific ICTL. The shorthand for Blackhawk Mechanic in the Army is 15 Tango (15T). A 15T soldier must be proficient in a full 91 ICTL. One is removing and reinstalling the main rotor blade. A couple of other more extensive critical tasks are removing and reinstalling the inboard retention plate on the tail rotor gearbox and removing and reinstalling the main transmission on the Black Hawk. Along with mastery of mainline items like these comes a multitude of supporting tasks.

AIT (advanced individual training) of the type dispensed by instructors at the 128th Aviation Brigade is only the starting point of the learning experience. “How fast [the soldier] learns those tasks and becomes proficient in them is going to vary from soldier to soldier,” says Chambers. “We’re not going to put a time





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AT THE Corpus Christi Army Depot, when a UH60 Black Hawk aircraft is structurally finished, it is put into a fixture to line up the tail cone and install dry shaft brackets.

PHOTO BY KIANA ALLEN

limit [on acquisition of those skills]. When they get proficient and signed off” they move on to the next task. Over time the resultant maintenance leaders learn to train the young soldiers who follow them.

Advancement through the ranks is the goal. You don’t want to go before the Army promotion board without being proficient in your particular MOS.

Perhaps the most critical task of all is perfusing this new training program through the ranks of the 19,000 or so enlisted soldiers that maintain Army helicopters across all three Army components — Active, National Guard, and Reserve.

RECAPITALIZING THE FLEET

The operational tempo of commitments in Iraq, Afghanistan, and other theaters in the Global War on Terrorism means there are lots of helicopters awaiting recapitalization — essentially zeroing out the aircraft’s powerplants, transmissions, and other critical components. Waiting to induct them are about 1,100 mostly civilian specialists working the Recap line at the Corpus Christi Army Depot (CCAD).

Overseeing that line, as well as managing the 3,400 people across the depot itself is Colonel Allan Lanceta, the facility’s

commanding officer. Last year CCAD worked on 38 aircraft for the Army. “Between crash battle damage and what we do for the Air Force last year we did 41 helicopters total,” says Lanceta.

Before his arrival at CCAD it took, on average, 500 days to recap the average helo. His goal was to cut that to 350, and his commanding general said to shoot for 275. The depot complied, turning out one aircraft in a lean 274 days. The overall average now is “about 350 days,” says the colonel. “That’s a huge improvement,” almost cutting the days spent in Recap in half.

While the Army Aviation Center for Excellence focuses on presenting the big picture to young maintainers in an effort to save money and boost aircraft readiness, CCAD’s prime mission is to rebuild them. And that means getting the right parts to the right place at the right time.

“Parts take a long time to get here,” says CCAD’s commander. “The way it was before, when the aircraft got here we would see what parts, what materials they needed to get rebuilt.” It was a classic case of hurry up and wait. Now the depot adheres to the 80/20 rule. Because the CCAD has rebuilt hundreds of helicopters of a particular type before, it “should know the common parts that we’ve typically used in the past,” says Lanceta. “I have my team planning ‘left of induction.’ I have them looking [ahead] about 120 days at gathering the material.”

The result is to dramatically shrink “non-value added time.” It’s been cut in half. Pivotal to the overall nine-gate (phase) Recap effort is Gate 4, the structures station. Lanceta says by having the proper parts and tooling already set up and waiting CCAD’s been



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ROTORCRAFT

able to reduce the non-value added time at this gate “from 160 days to 120 days.”

Giving a sister service its due, Lanceta says he borrowed the program from the United States Air Force, and then tweaked it to fit the Army’s way of doing things.

Lanceta’s effort dovetails nicely with the Army’s Storage, Analysis, Failure and Reclamation program, or SAFR. According to a press release written by Kelly A. DeWitt, a public affairs representative with the Army’s Aviation and Missile Research, Development and Engine Center (AMRDEC), a pull-a-part shop at CCAD is saving money and boosting aircraft readiness.

DeWitt says, the program works by gathering specifically identified candidate parts from airframes being overhauled at CCAD. She quotes Michael E.

Vourcos, a SAFR program engineer, “We select parts based on critical supply need, complexity to manufacture, raw materials availability, [and] long procurement lead times” typically those parts that no longer meet current repair criteria limits or are beyond economical repair. Engineers look at those parts and put together repair development solutions. Most common candidates to be returned to duty as usable are gearbox housings, transmission gears, engine blades, and rotor heads. Vourcos says, “Our repair development solutions typically reclaim 50 to 75 percent of the parts. This results in an average of more than 2,000 parts repaired and returned to service annually.”

CCAD’s mostly civilian workforce is looking to get the helicopters back to warfighters more quickly by speeding

up access to needed parts and components. But there’s a teaching component to CCAD too. Sergeant Matthew Magreta, a CCAD public affairs contributor, penned an article that noted how Utah National Guardsmen of Company D, 2-211th General Support Aviation Battalion honed their pre-deployment skills “alongside seasoned depot-level aircraft mechanics and engineers.”

Magreta quotes Sergeant 1st Class Jesse Martinez as saying, “Our new soldiers need to get their hands dirty and expand their knowledge of aircraft maintenance before our deployment. We don’t get these kinds of opportunities back home.” At CCAD soldiers concentrate on engine assembly, composites, rotor blades, and structural and skid repair on the UH-60 Black Hawk, AH-64 Apache, and CH-47



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LEFT: PV2 Thomas Braune, B Co. 640th ASB, 15D, aircraft power train repairer, performs disassembly of main transmission for UH-60.

ABOVE: SPC Peter Sztaravics, B Co. 640th ASB, 15B, aircraft power plant repairer, performs APU installation and fuel control replacement in preparation for engine testing in the Engine Run Cell department.

PHOTOS BY ERVEY MARTINEZ

Chinook. The idea is to boost maintainers' confidence when they hit the ground overseas — to help young soldiers destress at least one challenge they'll face by working things out ahead of time on

the nurturing shop floor of CCAD.

The environment in which these men and women deploy is anything but nurturing. Like Vietnam, it's a helicopter war this Global War on Terror. These days,

"We're either training or deployed," says Colonel Lanceta. Those who fly these aircraft deserve the most reliable aircraft the Army can humanly provide. Nothing less will do. **AMT**



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REVISITING THE FAILURE TO FOLLOW PROCEDURES CHALLENGE

While intentions are honorable, too often the “Heat of Battle” to meet time and production pressures overrides ideal application of written procedures

By Dr. Bill Johnson

JOHNSON REVISITS THE ISSUES associated with failure to follow procedures (FFP). What’s new? Not a lot! It’s the same people doing the same maintenance

tasks, on the same familiar aircraft, with the same OEM procedures or company job cards, committing the familiar FFP sins. Here’s an update.

KEY PLAYERS

OEMs strive to develop useable and understandable instructions for those who maintain their products. It is in their best commercial and safety interest to get the technical instructions right. They have systems in place for users to make suggestions on document improvement, as necessary. The same is true for operators, who convert OEM instructions into company-specific job cards. There is no reason that they would purposely make the instructions difficult to use. This author does not believe that the complexity or inaccuracy of technical instructions is the primary cause of FFP. Of course, it is a very good and often used excuse from users.

Mechanics and those that maintain aircraft continuously strive for quality and safety. The same is true for those who manage maintenance activity. All parties benefit from doing every task properly with no requirement for rework; no compromise in operational safety; or for any regulatory noncompliance. While intentions are honorable, too often the “Heat of Battle” to meet time and production pressures overrides ideal application of written procedures.

Regulators and corporate lawyers are often blamed for the complexity and redundancy in written procedures. There is no reason that regulators or lawyers would purposely make instructions difficult to use. Perhaps there is a well-intentioned culture to be thorough and safe vs. being simple and maybe risky. In any case

BEST PRACTICES

Here are example best practices categorized using TAPES

T TASK

- Perform all tasks in the specified order
- When a procedure is problematic correct it at the working level
- Formally recover from any distractions or interruptions in the task
- Be sure to sign off each subtask

A ACTOR

- Ensure training and qualification for the task
- Be committed to following the procedures

P PROCEDURE

- Have a clear procedure that identifies task completion
- Immediately communicate irregularities in the procedure
- Know that “tribal knowledge” is not necessary in a procedure

E ENVIRONMENT

- Recognize present risk from issues like lighting, temperature extremes
- Address adverse environmental conditions as possible

S SOCIAL

- Everyone must address time pressure, always
- Stop and ask if unclear on task or procedure
- Rely on and apply positive safety culture among peer group

there are certainly many examples of the complexity of potentially simple instructions because of cautions from overzealous regulators and lawyers.

Whether it's the OEM, the document users, the regulators, or the lawyers there are many opportunities for improvement. FFP is among the largest safety issues in aviation maintenance, actually in every aspect of aviation. It leads to errors from the landing checklist of Piper Cub to the diagnostic procedures of a Boeing 787.

ASKING QUESTIONS

When trying to address the FFP challenge some say the solution is based on "who you ask." So FAA researchers asked various industry segments about following procedures. Applied Ergonomics Group (AEG), led by Dr. Colin Drury,

conducted the work under an FAA contract. Drury has been working on the human factors of technical instructions since the format went from hieroglyphics on stone to parchment paper to I-pads (actually for only about 50 years). Using hundreds of event reports from the National Transportation Safety Board, the FAA-NASA Aviation Safety Reporting System, FAA technical reports, and the extensive AEG experience, they created a classification scheme, a listing of best practices, and a structured interview form for maintenance personnel and management. They went to eight diverse organizations that write and use written technical instructions. At each location AEG conducted extended private one-on-one interviews, totaling over 150 personnel (all extensively documented in the FAA

report to be published in 2018). These interviews focused on FFP incidents and on best practices to ensure that procedures are followed. They helped ensure that our team fully understood the challenges to generate excellent samples of best practices.

CATEGORIZING AREAS OF OPPORTUNITY FOR ACTION

In order to address FFP the broad term must be broken into categories. There have been many classification breakdowns to categorize challenges and solutions. Readers are likely familiar with PEAR that addresses People, Environment (Physical and Social-Cultural Environment), Actions performed, and Resources necessary to complete the job. For this project AEG created the term TAPES.

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FROM THE FAA

TAPES stands for five critical areas that affect the FFP challenge. T represents the kind of FFP errors that are made during a given maintenance task. A stands for actor, everything about the person who is using the procedure. P stands for the procedure itself. E refers to the physical environment in which the procedures are used. Finally, S refers to social including all of the operational and cultural characteristics of the work location and/or the total organization. AEG focused TAPES not only on the maintenance personnel using the procedure but also procedure developers.

NEXT FAA ACTIONS ON FFP

The work related to FFP is endless. That is due to the nature of the aviation maintenance environment and culture. First,

FAA will get all the reports published. The writers and editors are keenly aware of at least two separate and different audiences for this FFP research. One audience is the research community, who wants to see the data collection, how it was analyzed, and how it can be transferred to other R&D and to applied solutions. The FAA technical reports will satisfy that audience.

The most important audience is the users/writers of technical procedures. FAA is aware that mechanics know the regulations and the importance of using the written technical procedures. However, the practical products from the research project must alter daily attitude and behavior about explicit use of the procedures. That change must permeate the culture of maintenance from the top executive to the new hire. FFP is not a technical

issue. It is a culture issue about attitude and commitment. Our next deliverable will be part two. At press time we are building a training system that focuses on the culture of following procedures. We'll supplement the web-based training system with job cards and workplace signage as a constant reminder to all. We proceed with full knowledge that changing the culture of FFP won't be easy. However, we are certain that the next step in our continuing safety efforts centers on following the procedures. Stay tuned in 2018!

The author acknowledges all who contributed to this project including but not limited to the FAA Civil Aeromedical Institute Human Factors Division, the Cherokee CRC, the Applied Ergonomics Group, the 160 mechanics and supervisors, and their eight companies. **AMT**



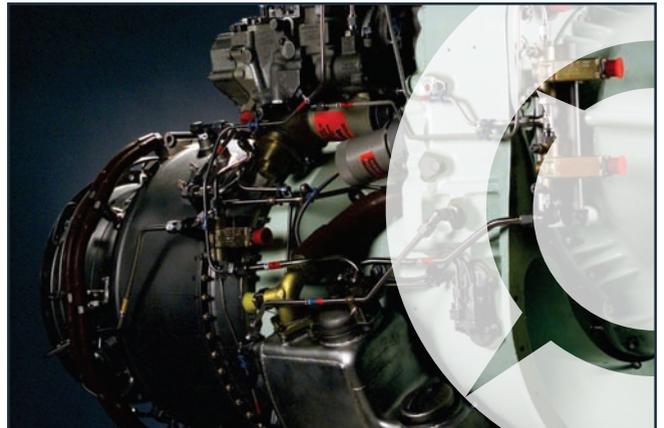
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DO WHAT YOU LOVE AND LOVE WHAT YOU DO

Susan Dusenbury, president of the Vintage Aircraft Association, describes her career in aviation

By Barb Zuehlke

SUSAN DUSENBURY

with her dog, Taylor. That's her 1953 Cessna 180 in the background. COURTESY OF SUSAN DUSENBURY

SUSAN DUSENBURY'S CAREER IN AVIATION started early in South Carolina. She received her private pilot's certificate during her senior year in high school. And while in college she earned her commercial, multi-engine, instrument, and flight instructor certificates.

Dusenbury graduated with a degree in accounting and business administration from Francis Marion University, and went on to receive her Airframe and Powerplant Mechanics Certificate.

To pay for her training and education she worked as a mechanics helper at H.A. Springer

Aircraft Repair and in the cafeteria and library at school. While at Winthrop College (now Winthrop University) she earned her FAA Flight Instructors Rating. Ray Clark, owner and operator of Aero Flight in Florence, SC, told her if she wanted a job after graduation to come back, and she did.

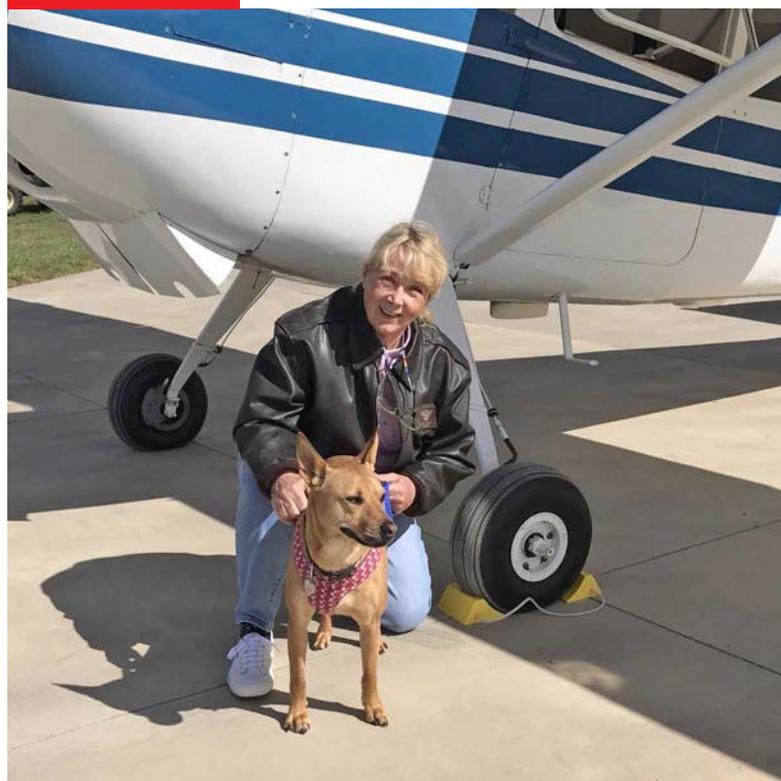
FLYING

She wanted to fly. And that was accomplished; first with Aero Flight, then as a free-lance flight instructor and then as a part-time co-pilot flying Twin Beeches and a DC-3 for Fiber Control out of Gastonia, NC. Dusenbury also had a weekend job flight instructing for Red McCord's FBO also in Gastonia. At one point Susan instructed out of Charlotte Douglas Municipal Airport (now Charlotte/Douglas International Airport) for Cannon Aviation. It was at that time that Dusenbury used a portion of her flight instructor earnings and took aerobatic instruction from Dwight Cross Jr. in his Citabria at Bradford Field near Charlotte. Susan recalled that she could only afford 30 minutes of aerobatic training one day per week.

During her time at Winthrop College, Dusenbury also earned both a multi-engine and instrument rating. It was then that she transferred to Francis Marion College (now University) and Florence-Darlington TEC. After graduation from Francis Marion she instructed in the Airframe and Powerplant program at Florence-Darlington TEC working under her former instructors Homer Roberts and Homer Pointe.

During her time in Florence, Dusenbury owned and flew both a Luscombe 8A and later an experimental one-of-its-kind Rogers-Gibson Acrocraft. She also bought an Aeronca 7AC Champ project which she restored to flying condition.

The next step was flying a Navajo Chiefton for a small commuter airline named Air Carolina that operated a shuttle service from Florence to Charlotte Douglas Airport, and later an upstart commuter airline by the name of Air Virginia also flying Navajo Chieftons. Eventually she transitioned to the twin engine turboprop Swearingen Metroliner, and about five years later took a job with the State of Virginia flying a Beechcraft King Air 200. Her duties included flying then Governor Chuck Robb. Susan applied for a pilot position with Airborne Express (now ABXAir) located in Wilmington, OH, and was hired initially to fly the Nihon YS-11 and later the McDonnell Douglas DC-9 series aircraft. Dusenbury retired from ABXAir after nearly 25 years of flying night freight.



RESTORATION

And then there was the maintenance side. Dusenbury loved building aircraft, and started with experimental aircraft and then moved to antiques. She won an award at Oshkosh for her efforts on a Culver Cadet. Aircraft she has owned or restored include an Aeronca 7AC Champ, a Luscombe 8A, an Island Sport, and a Culver Cadet. She currently owns and flies a 1953 Cessna 180 and a 1937 Taylor J-2 Cub, and is restoring a 1935 Stinson SR-6 Reliant. She was inducted into the Vintage Aircraft Association Hall of Fame in 2013.

Susan decided to get her Inspection Authorization, and later received a phone call from FAA Headquarters telling her she was the first licensed female in the United States to do so. The FAA published an article in its monthly magazine on the milestone.

She worked with the Experimental Aircraft Association as a volunteer director for 20 years and currently she is president of the Vintage Aircraft Association (VAA).

ASSOCIATION PRESIDENT

Dusenbury has been president of the VAA since February of 2017. Before her presidency she and fellow VAA board member Ron Alexander (now deceased) were composing a five-year plan for VAA. At this time, Dusenbury is working to finish the plan while implementing some of its components. She along with the VAA board and other VAA volunteers are busy updating policy documents, expanding the programs in VAA's Vintage Village and working on landscaping plans to enhance the areas surrounding the VAA grounds at Oshkosh. In 2017 VAA completed a much-needed structural restoration as well



SUSAN DUSENBURY with friend, Walt Weaver, drilling the rear spar on her Stinson Reliant — Model SR-6. Weaver is also an A&P mechanic. They flew together at ABXAir and retired on the same day. He lives in Concord, NC. The new spar to be drilled is under the original one.

COURTESY OF SUSAN DUSENBURY

as an addition to VAA's flagship building, the Red Barn, which resulted in a re-dedication ceremony at EAA AirVenture in 2017.

To encourage future pilots and mechanics, forums at VAA have been developed after consulting with EAA's head of KidVenture, Dan Mitka. One forum teaches children how to use small basic hand tools. VAA also has programs involving older students where the students have the opportunity to meet and greet pilots as they arrive at AirVenture in their airplanes. VAA also holds a Youth Day every year where young pilots are the featured attraction in VAA's Vintage in Review at Interview Circle.

Dusenbury lives on an 80-acre farm in Walnut Cove, NC, that includes her aircraft, work shop, and a 2,700-foot runway.

"All pilots (and mechanics) have one thing in common," Dusenbury says. "They have a passion for flying and can not imagine doing anything else for a living or as a hobby." **AMT**

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WHY TEAMWORK TODAY IS MORE IMPORTANT THAN EVER BEFORE

Refine the process. Reduce the choices. It will make stronger decision making and a stronger team.

By Bob Hobbi

FIRST A LITTLE BIT OF BUILDING THE case and understanding the challenges.

The business and work environment is changing fast. This has a profound impact on how we do things both at work and at home. We'll focus on work. Technology is an important part of this impact. All around us technology is influencing every aspect of life. The cultural and sociological influences are all around us. This has gone to the extent that some folks like to take vacations away from technology. More and more people seek out the tech-free getaways "getting totally off the grid." This is telling as we are seeing the impact of fast-paced change and 24/7 overload of information.

There are literally weeks where the very same thing, maybe a process, a policy, procedure, or an aircraft part can change a couple of times or more. There are times when people are trying to get used to the changes from last week and here this week, it changes again. It's

important to understand the why and the impact of all this.

TECHNOLOGY AND DECISION MAKING

Technology is a terrific tool to solve problems and sometimes solve problems that we didn't even know we had. We have a love/hate relationship with it. However, from a human factors point of view, technology is providing choices. Choice is something we were all told "it is always good to have choices, the more choices the better." And boy, did technology ever prove that right. We have many choices these days. There used to be three ways to do things, now there are 300 ways. Maybe a little exaggeration but you get the gist. Think of it with this example: Take orange juice. There used to be a choice to drink orange juice. You got oranges or someone did and you had yourself some good old-fashioned OJ. Today, you have OJ with pulp, without pulp, small pulp,

big pulp, with calcium or without, sugar free (yach!!), or you can have orange and grapefruit or mixed with pomegranate. You can have OJ that's good for your joints or good for your cold or good for your eyes and on and on and on. They should have one OJ choice for headaches that you get just reviewing all these choices.

So yes we got what we wanted, lots of choices. Now we are tasked with making the decisions about the choices. Recently I heard about a study that a really smart person did. They put a few people in a room and asked them to choose two items out of 15. Then they put a similar type group in the same room and asked them to choose two items out of four. Guess who was faster? By far the folks that had less choices. They were not stressed out and they had more time together because their decision making was simple and fast; they were done before the time was up. So they spent it chatting. (No smart devices were allowed in the room, by the way!)



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Some will argue that choices have made things more complex and stressful. The decision-making process is full of anxiety and stress. We are always worried that we made the wrong choice, that we missed the one option that might have been better that we'll get second guessed on Monday about for what we chose on Friday.

HOW DO ALL THESE CHOICES AFFECT TEAMS?

OK, by now you're wondering what the heck does all of this have to do with teams at work and business aviation and aircraft maintenance? It has a lot to do with it. In our industry we have not been spared from the advances of technology. In fact some would say our industry has experienced an immense influx of technology, along with all of its symptoms and side-effects and cultural and organizational issues. So we have similar challenges. We have old technology aircraft and then we have very old technology aircraft and then we have even older, and then we have very new. We have all sorts of avionics packages, engines, and cabin choices. Lots of new gizmos and tons of options on how to use them or how to fix them when they break. And along with all of that we have different approaches to finding solutions to problems. Someone will go one way and trouble shoot. For some, money is not a big deal which creates faster choices. There are many more influencers. So then, you may have two people who will choose two different ways to solve an issue or a

problem and they both get to the answer and the solution and they will both be right! It can be exhausting.

Then we add the different generations at work into this equation and as they say in New York "Forget about it." Everyone has different ways of doing things and there are many opinions about how to do things and how do you even begin to figure this out or sort out who's doing what or who should be involved in the decision making and what or how they should be doing it? Is this frustrating or what!

Here comes some ideas: Let's reverse think the old ways of doing things, specially at work. There was a time when it was expected that the more complex the issue was, the more impressive it was. People assumed that it must be the person that really figured this out. This may have worked in the past. Today, we need to think "Simplicity is the best form of sophistication." What that means is, in order to improve human factors and human interactions, our role is to take all the choices and ways of doing things and try and simplify them for our respective teams. Refine the process. Reduce the choices. It means dealing with people issues with a different approach. It means working to ensure the team is on the same page. It means reducing too many choices to a few digestible ones which work for you and your team.

Good teams and leaders these days should strive to spend more time with teammates on the human level and dis-

cuss the challenges we face. We need to emphasize communication. Whatever level of communication we were used to doing, we need to increase it 1000 percent. Aim for the result of a better team with a more cohesive focus and understanding of your specific group's or organization's culture and goals. Think of this increase in time with people on your team as an investment.

Leadership will play a big role in this. Leaders have to rethink their leadership techniques and tactics. We have to spend more time with people before we can get started on actual work! And while we do this we also need to balance it with "diversity in council and unity in command." Leaders need to listen better and give people the opportunity to be heard. All the while making sure everyone knows and understands that once a decision is made or a choice has been made, we all need to get on the same page and move forward, 100 percent. You'll have a very healthy team if you can achieve this. But it is not easy. It takes time to develop this culture. However, once you do, you'll have a really fun place to work. **AMT**



BOB HOBBI is the founder, president, and CEO of ServiceElements International Inc. Bob has 30 plus years in aerospace and aviation leadership roles with FlightSafety International, Honeywell Aerospace's Aerospace Academy, and MedAire. ServiceElements is an organizational and people development company, now in the aerospace industry for almost 15 years. For more information visit www.ServiceElements.com.

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MAKE IT WORTH YOUR WHILE

Fill your aviation professional calendar by starting at the end:
What do you need to get out of your attendance?

AS THE NEW YEAR GETS UNDER WAY, aviation professionals around the world are eagerly eyeing their calendars; the “busy season” of industry exhibitions, expositions, and conferences looms larger every day. As the northern hemisphere warms into spring and summer, an earnest event attendee (or required booth attendant) will log tens of thousands of travel miles in service of their company and industry.

If you’re participating in this circuit, you’ll come across Aeronautical Repair Station Association (ARSA) team members at a number of these events. When not providing training or leading discussions, the association’s staff walks the exhibit floor, touches base with members, makes new friends, and answers questions about aviation safety. You’ll also see plenty of the association’s member repair stations, manufacturers, and operators — businesses that routinely engage in the sophisticated act of building personal networks at industry events.

What you won’t see is the flurry of behind-the-scenes activity back at ARSA’s HQ in preparation for the association’s 2018 Annual Repair Symposium. The event, first held in 1993, was developed to provide the maintenance community with direct access to regulators as well as a network of insight from the many aviation-related groups working in the nation’s capital. In the intervening 24 years, it has evolved along with the association and the industry it supports: A regular stopping point for FAA officials and their counterparts from foreign NAAs, not to mention inspectors general and key transportation-related personnel from other federal agencies, the symposium is the intersection of the maintenance community and those responsible for its regulation.

Over time, the event expanded beyond its core regulatory focus to include a legislative day — a “fly-in” during which a charged-up group of members crisscrosses Capitol Hill

sharing the good news of aircraft maintenance. This year, it will expand again: The ARSA team has used the formula from its successful Strategic Leadership Conference to produce a day of Executive to Executive (E2E) Briefings, during which industry senior executives will participate in meetings with senior executive branch officials involved in aviation and trade policy at the Departments of Transportation, Commerce, and State. Symposium week has come full circle in providing a full range of engagement between the men and women who keep the world in flight and those who pull the various levers within the U.S. government.

Obviously, my colleagues and I want every member of the aviation community to make time for ARSA’s premier event. Beyond the repair station world, the work we do for a week in March will touch every corner of the industry — each piece of the “regulatory chain,” as we call it. Maintenance, certification, career technical education, doing business with government, oversight, and inspections are all on the agenda. However, in the midst of such a busy calendar, each of us must make careful choices about where, when, and how we invest our time.

With that in mind, how can you prioritize where to place yourself? Start by determining the outcome you need from the trip, then fill your calendar with the stops that will produce that outcome.

Building business relationships?

Seeking out new suppliers or customers? Trying to close a long-elusive deal with a potential partner? A special meeting scheduled during a large exposition — preferably in or around the beautiful floor display of one of the parties involved — will provide the right backdrop for your negotiation.

Developing personal or professional knowledge? Managing a challenging issue with your local inspector? Bringing a new product online but struggling with an

approval? Sharing best practices about how to tackle regulatory compliance, workforce, or business development challenges? Find a content-heavy symposium or set of briefings featuring key officials and industry peers (and be sure to insert yourself into the question-and-answer period of the appropriate panel or talk).

Looking to generate good will? Need to produce media visibility? Want to connect your company with the spirit of the industry or cultivate the next generation of technical talent? Find a challenge, competition, or showcase and figure out how best to participate: field a team, construct a challenge, or sponsor an activity. A great example (and opportunity) is the Aerospace Maintenance Competition (April 10-12 in Orlando). You might also consider sponsoring a competition at your company between teams from local aviation and technical schools.

Your participation in an industry event is an investment of your time and your company’s money. There are lots of ways to make it worth your while. The key is to have a very clear idea of what benefit you want from your participation: new industry contacts, knowledge about regulatory developments and business trends, or heightened visibility for your company.

Of course, you can satisfy many (if not all) of these needs alongside ARSA... check out arsa.org/symposium to see for yourself... but I’m biased. **AMT**



BRETT LEVANTO is vice president of operations of Obadal, Filler, MacLeod & Klein, P.L.C. managing firm and client communications in conjunction with regulatory and legislative policy initiatives. He provides strategic and logistical support for the Aeronautical Repair Station Association.

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WHY SHARING IS CARING IN THE AVIATION INDUSTRY

By Mark Martin

THE BIG DATA GENERATION IS UPON the commercial aviation industry. According to a 2016 Oliver Wyman MRO Survey, the global fleet of commercial aircraft could generate a massive 98 million terabytes of data per year by 2026. Between the big aviation players — the OEMs, the airlines, and the maintenance, repair and overhaul (MRO) operators — there is a ton of interest not just in gathering data, but sharing it for a number of

different benefits, such as predictive maintenance or health monitoring systems.

DATA SHARING

Some of the leading players in the industry are starting to work on their own data platforms to get in on the benefits of sharing engineering data. GE's cloud-based Predix platform allows third-party MRO operators to download predictive analytical data, store it within their own systems, and share it with customers.

Airbus launched Skywise in June and it collects data such as work orders, spares consumption, and flight schedules for MRO operators to perform predictive and preventative maintenance. Early adopt-

ers include easyJet, Air Asia, Emirates, and Delta.

Like Airbus, many airlines and MROs will have several different customers, partners, locations and, in most cases, use different programs for each one, this leads to data being siloed and sharing programs being more internally focused.

Speaking at a recent MRO Europe panel, David Longridge, vice president services sales for Boeing, said data collaboration between organizations is a key priority in today's aviation landscape.

"Collaborating with data will bring more mutual benefits for airlines and MROs, but how to do this effectively between the parties is the real challenge," said Longridge.



MARK MARTIN, is director, Operator Edition Product Line, Aviation & Defense Business Unit, IFS.

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“No airline wants 50 different applications to look at its aircraft — ideally they’d like to use one or two.”

COLLABORATION AT WORK — CHINA AIRLINES

IFS customer China Airlines is one of the largest airline operators in Asia and provides MRO services for many of the airlines it codeshares with.

Aviation safety is a top priority for the airline and it considers the quality assurance of maintenance work as the best foundation for this. Currently, China Airlines helps support over 40 domestic and international airlines with over 2,300 maintenance engineers working in five different hangars across Asia, North America, and Europe.

The airline’s EMO department found its legacy IT systems were hampering its safety efforts, unable to keep up with

changing maintenance and safety requirements happening in the industry.

Houng Wang, responsible for engineering activities at China Airlines, says, “Our network of legacy mainframe systems often could not deliver the data insights we felt were critical if we wanted to evolve the business and introduce new efficiencies. For the most part, these systems were siloed from each other, and operated by their own set of processes for capturing and storing data. This made it very difficult to access and share timely maintenance information across the organization.”

China Airlines chose to implement IFS Maintainix to help optimize data sharing across the airline and its subsidiaries. Real-time management of line and heavy maintenance events as well as data capture at the point of maintenance was a significant benefit to growth areas of the business — especially third-party MRO services for the

airline’s customers, such as Continental Airlines, FedEx, Korean Air, and Japan Airlines.

In addition to reducing operating costs by \$3.5 million, IFS Maintainix helped China Airlines decrease its aircraft lay-over due to more efficient scheduled and unscheduled line maintenance.

A CLEARER PICTURE

The benefits of data sharing are plain to see. Better visibility into what’s happening at both the company and industrywide level puts organizations in full control of maintenance, giving them a clearer picture of what’s happening around them to help collaboration with other industry players and benefiting from mutual efficiencies.

The gains aren’t just for airlines but for passengers too, as better vision into data will help increase aircraft availability, increase safety, and provide a chance to shift cost savings onto passengers. **AMT**



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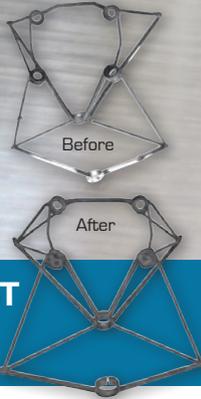
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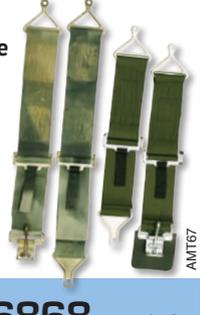


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AMT IA REFRESHER TRAINING COURSE NOW AVAILABLE

AMT Magazine announces the availability of a new Inspection Authorization (IA) refresher training course. The course is similar to previous years and is presented in a similar speaker and slide presentation format. The cost for this course is \$54.

This online course contains nine individual sessions for a total of eight hours of FAA accepted training toward IA renewal.

The sessions in this course are:

- SMS and Human Factors
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- Safety, Operations and Maintenance on Lithium-ion Batteries
- Composite Repair on Cirrus Aircraft
- Piston Engine Flight Management
- Piston Engine Compression Testing
- GE CF34 Turbine Engine Maintenance Update (30-minute session)
- Turbo-Charger V-Band Coupling Concern (30-minute session)
- Tips for The Conscientious

Follow this link to access the course: <http://amtren renewal.litmos.com/online-courses>.

AIRBUS HELICOPTERS DISPLAYS SOLID COMMERCIAL PERFORMANCE IN 2017

Airbus Helicopters delivered 409 rotorcraft and logged gross orders for 350 helicopters (net: 335) in 2017, with a strong commercial performance on the heavy and super-medium segments. The company booked 54 orders for helicopters of the Super Puma family and 19 orders for the super-medium

H175. Bookings also included 168 orders for light-single engine helicopters and 105 orders for the H135/H145 light-twins. At the end of 2017, the overall backlog stood at 692 helicopters.

In 2017, the company broke ground on its first helicopter final assembly line in China, with initial deliveries expected in 2019.

HAI HIRES NEW DIRECTOR OF MEMBERSHIP

Helicopter Association International (HAI) has hired Anuja Miner as director of membership. Miner is responsible for directing the membership recruitment and retention operations of the association, including the development of membership campaigns, member services, and affinity programs. She will also be involved in HAI's membership study this year that will focus on determining the issues that are critical to the industry.

GLOBALPARTS.AERO EXPANDS FOCUS AS FIRST-TIME EXHIBITOR AT HELI-EXPO 2018

GlobalParts.aero will be exhibiting for the first time at the 2018 Heli-Expo in Las Vegas on Feb. 27-March 1.

Malissa Nesmith, chief operating officer for GlobalParts.aero states, "We have been working for years with many of our partners that also serve the helicopter industry and we continue to identify opportunities to further support our mixed fleet customers. It is a natural progression for us to expand into rotor parts and now we have key personnel in place to help us do just that."

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ROTORCRAFT SEGMENT LOOKS TO MODERNIZE SAFETY REGULATIONS TO FOSTER INNOVATION AND ENHANCE SAFETY

WHILE WE CELEBRATE THE SMALL AIRPLANE design rule rewrites that aviation authorities around the world have implemented or are working toward implementing, industry leaders and representatives are now turning their sights towards a similar goal: to modernize the design standards for rotorcraft to improve innovation, safety, and efficiency of certification approval.

The European Aviation Safety Agency (EASA) and Federal Aviation Administration (FAA) airworthiness design requirements for rotorcraft are published in Certification Specification (CS) 27 and 29 and Part 27 and 29 requirements, respectively. Over the past 20 years, new requirements have been piled on top of old to address safety features that were state of the art, at the time. As a result, many of the rotorcraft requirements are prescriptive methods of design and inhibit innovation and the introduction of modern technologies, which include many safety-enhancing features. Additionally, some requirements lead to reduced certification and validation efficiency, driving up costs without a proportional safety benefit.

The General Aviation Manufacturers Association (GAMA) is collaborating with the AeroSpace and Defence Industries Association of Europe (ASD) to sponsor a working group of rotorcraft manufacturers that is conducting a comprehensive review of the CS/Part 27 and 29 design requirements and developing recommendations to remove outdated prescriptive rules and define performance and risk-based safety objectives. Proposed new requirements will consider safety continuum approaches, which establishes the appropriate level of design requirements and rigor based on a combination of risk factors, such as number of occupants, flight environment, type of operation (Instrument Flight Rules (IFR)/Visual Flight Rules (VFR)), design complexity, and rotorcraft performance.

GAMA/ASD will submit its report to EASA and FAA in April 2018 with a request for harmonized rulemaking. The recommendations to update design requirements for new rotorcraft will stimulate innovation and facilitate the introduction of new technology and safety-enhancing equip-

ment, while also streamlining certification and validation through harmonized and performance based rules.

GAMA is also a strong advocate and actively engaged in initiatives to change rotorcraft design requirements to enable incorporation of new safety standards as retrofit into previously type certificated designs. A current initiative is the FAA Aviation Rulemaking Advisory Committee (ARAC) Rotorcraft Occupant Protection Working Group (ROPWG).

The goal is to enhance rotorcraft safety by harmonization of rulemaking between authorities.

A recent FAA fatal accident study demonstrated that Crash Resistant Fuel System (CRFS) and Crash Resistant Survival System (CRSS) requirements are effective in saving lives. But, there is slow progress to incorporate these new design measures into the current fleet of rotorcraft that were type certificated before the new standards were established. The FAA-industry working group is developing recommendations to accelerate the incorporation of CRFS and CRSS safety enhancements as a retrofit into newly manufactured and current operation rotorcraft.

The ROPWG recommendations will be submitted to the FAA by July 2018. However, there is significant interest in CRFS by manufacturers and operators and these recommendations are already being voluntarily incorporated in nearly all new production rotorcraft and STC retrofit kits are becoming available for large portions of the existing fleet.

GAMA recognizes that any new rotorcraft requirements must be harmonized and globally accepted through participation and commitment to improvement by global airworthiness authorities and industry. This focused engagement, involving key stakeholders will promote improved safety and innovation, strengthen industry and authority partnership and collaboration, and lead to a much stronger rotorcraft industry in the future. **AMT**



PETE BUNCE is president and CEO of the General Aviation Manufacturers Association (GAMA), which represents more than 85 of the world's leading manufacturers of general aviation airplanes and rotorcraft, engines, avionics, components, and related services. GAMA's members also operate repair stations, FBOs, pilot and maintenance training facilities and manage fleets of aircraft. For more info: www.gama.aero.



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