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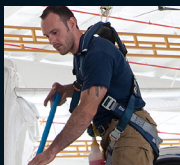
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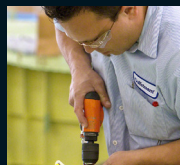
SAFETY

EVEN THE MOST
NIMBLE MECHANIC
CAN SLIP - SECURING
PEOPLE NEEDS
CAREFUL THOUGHT



TOOLS

THE INSIDE STORY ON
HOW TOOL MAKERS
MODERNISE TOOLS
THAT WE ALL TAKE
FOR GRANTED



EXPERT OPINION

A CLOSER LOOK AT
AIRWORTHINESS,
APPROVAL TAGS, AND
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TESTING METHODS

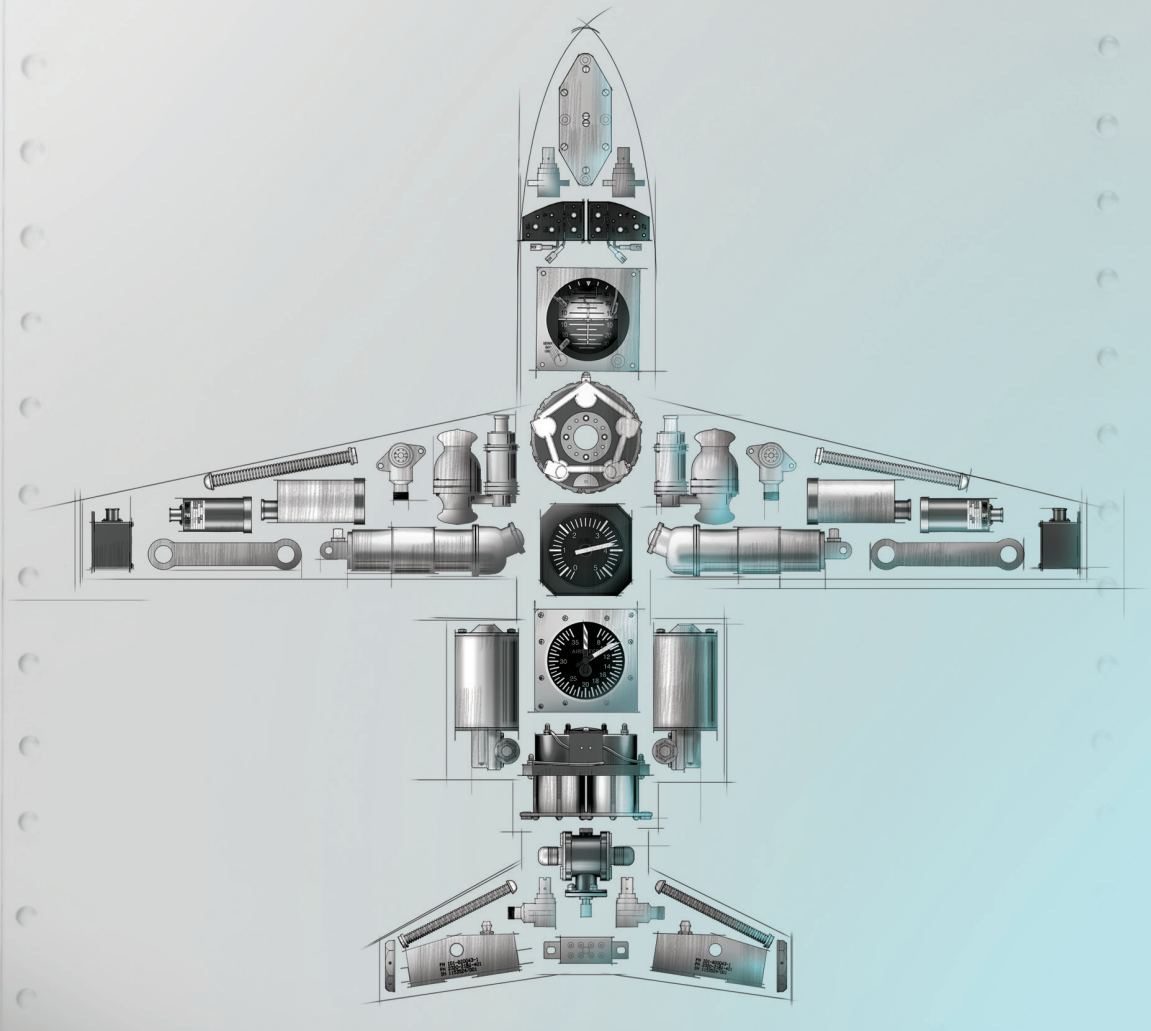


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COVER STORY

Engineers by Degrees

A trend developing among MRO organisations is the recruitment of engineers with degrees and management skills awarded by academic institutions such as Embry-Riddle, both in the classroom and online.



On the cover: Professor Eric Jones, Department Chair of Aviation at Lewis University, (center) explains some of the high performance characteristics of an engine to undergraduate students in the Bachelor of Science program in Aviation and Aerospace Technology. *Lewis University image*

28 MRO Safety: Look out Below

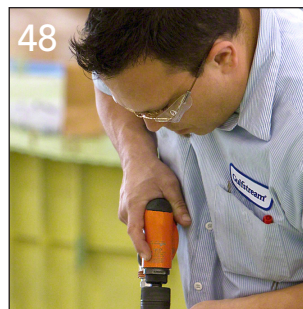
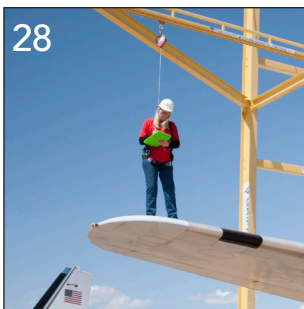
Protecting employees by investing in fall safety equipment needs to be a serious consideration, particularly when there is a danger of serious injury.

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48 AVM Tool's Evolve With Every Twist and Turn

The humble toolkit gradually changes to take into account of ergonomics and to make the engineer's actions just a little easier.



CATEGORIES

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

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Opportunity Knocks

BY ANDREW DRWIEGA
EDITOR-IN-CHIEF



The international MRO market has strong and sustainable growth ahead of it.

Boeing has revealed that the Chinese market will need 6,810 new aircraft over the next 20 years, over 5,000 of which will be single-aisle aircraft. All those aircraft need maintenance and engineering expertise, not all of which can be provided to the level required internally.

The need for good engineers now has an added dimension. The Embry-Riddle story in this issue tells of engineers now embarking on degree qualifications, some of which are combined with (could it be true?) management courses. As the military has discovered over the last couple of decades, aircraft are a system of systems and the days of a few good men skilled in the use of their toolkit is growing smaller in the rear view mirror.

Look at most commercial aircraft: they boast digital avionics, health and usage system (HUMS), passenger entertainment, satellite communications - they are akin to flying digital and electronics hubs.

The data collected by each aircraft runs into gigabytes for every flight. Multiply this by the amount of data collected by each airline across its fleet and add in the additional data scooped up by the MRO servicing that airline. The next step would be to share all that data among airlines and MROs (yeah - that's going to happen) which would provide a substantial picture that could be beneficial to everyone. Even small advances in cooperation could provide significant advances for many.

Airlines might be able to benefit from best practice techniques when analysing flight and maintenance procedures and patterns, and perhaps refine optimum maintenance times that would be best suited for their own company's strategic service offering.

Predictive maintenance has become very important for every airline looking to secure

profits and ensure their aircraft keep flying.

The economics of running airlines is hazardous enough, and keeping to schedules has been made difficult by having to deal with everything from terrorism and the necessary security checks, through to what seems to be an increase in adverse weather around the globe.

The Global Village

Taking care of smaller detail can pay bigger dividends. Pratt & Whitney Canada (P&WC) has been conducting trials on over 1,800 of its customers engines. The technology being used can detect minute particles within engine oil that can then be extrapolated to predict a deterioration in oiled components - all without the need to remove the engine. The aim is to drive aircraft availability and reduce MRO costs through this type of predictive maintenance.

Aftermarket support has been a global requirement for some years. As ever, customers want the least amount of down time for their aircraft, a minimum amount of inventory on their shelves, and the expertise to identify and solve problems quickly. Inventory management has been made much easier through the internet, but a regional presence is still a major requirement, especially in developing markets. Whether this be distribution centers or maintenance hubs, giving the customer piece of mind and over-delivering on service and support is still a good mantra to live by.

As the new face at *Aviation Maintenance* magazine it is my responsibility to lead the direction of the editorial within it, identify issues that cause concern in this sector of the aviation industry, and to uncover innovation where it can make a real difference to those conducting MRO activities worldwide. I will be pleased to receive your comments, suggestions and news at: adrwiega@avm-mag.com. **AM**



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Thai Airways Invests in Regional Maintenance at U-tapao Rayong Airport



In June, General Prayut Chan-o-cha, Prime Minister of Thailand, together with some of his staff made a visit to Thai Airways International's Aircraft Maintenance Center at Utapao Airport, in Rayong to be briefed on plans to develop the airport into a regional aircraft maintenance center. At the meeting was Areepong Bhoocha-oom (far right), Chairman of Thai Airways board of directors. Photo: Thai Airways

Areepong Bhoocha-oom, chairman of the Thai Airways International's board of directors has announced a joint investment for aircraft maintenance in the Rayong province in Thailand. The project aims to establish a regional aircraft maintenance centre at U-tapao Rayong Pattaya International Airport.

The idea is that regional aircraft within Thailand will be able to rely on a local maintenance facility. It will also offer MRO facilities to international customers.

While no investment budget figure has been released, this enterprise is expected to increase the profitability of Thai Airways.

Chairman Areepong Bhoocha-oom said that the company was beginning the process of identifying qualified partners to participate in the MRO venture.

U-tapao Airport in Revong province is working towards a significant expansion of its facilities to include a new passenger terminal and over 20,000 square metres dedicated to commercial activities.

Sabena Technics Supports Hunnu Air's ATR 72-500s to 2021



The delivery of the first ART72 to Hunnu Air. Photo: Hunnu Air

Mongolian domestic airline Hunnu Air and Sabena technics have agreed a five-year global support contract.

Sabena technics will support Hunnu Air's ATR 72-500 aircraft through to 2021. The agreement includes comprehensive component solutions including pool access, repair and overhaul of rotatable components and on-site stock to support regular operations.

Work will be conducted at Sabena technics' new repair facility at Seletar in Singapore, supported by its Dinard's facility in France.

"We are extremely pleased to have earned Hunnu Air's trust and proud to support the first operator of ATRs in Mongolia," said Frédéric Dumont, Chief Operating Officer of Sabena technics Asia.

Sabena technics currently has more than 160 regional aircraft under PBH contracts, including 35 in the Asia-Pacific region.

GE To Acquire Two 3D Printing Companies for \$1.4 Billion

Additive manufacturing companies Arcam from Sweden and SLM Solutions Group based in Lübeck, Germany, are to be acquired by GE for \$1.4 billion.

"Additive manufacturing is a key part of GE's evolution into a digital industrial company. We are creating a more productive world with our innovative world-class machines, materials and software. We are poised to not only benefit from this movement as a customer, but spearhead it as a leading supplier," said Jeff Immelt, Chairman and CEO of GE. "Additive manufacturing will drive new levels of productivity for GE, our customers, including a wide array of additive manufacturing customers, and for the industrial world."

GE's expectation is to grow the new additive (also called 3D printing) business to \$1 billion by 2020 as well as initiating \$3-5 billion of product cost-out across the company over the next ten years.

Arcam's revenues in 2015 were \$68 million and has sites in Canada and the United States in addition to Sweden. SLM generated \$74 million in revenues in 2015 and operates out of Germany.

Both companies are specialists with Arcam having invented the electron beam melting machine while SLM Solutions produces laser machines, both of which are for metal-based additive manufacturing. Both companies have aerospace customers.

Arcam and SLM will bolster GE's existing material science and additive manufacturing capabilities. As GE has invested around \$1.5 billion in manufacturing and additive technologies since 2010, the acquisition of Arcam and SLM will serve to further strengthen the company's position. GE has already developed additive applications across six of its businesses.

David Joyce, president & CEO of GE Aviation who will lead the integration of the new acquisitions into the GE business said: "We love the technologies and leadership of Arcam AB and SLM Solutions. They each bring two different, complementary additive technology modalities as individual anchors for a new GE additive equipment business to be plugged into GE's resources and experience as leading practitioners of additive manufacturing. Over time, we plan to extend the line of additive manufacturing equipment and products."

3D printing involves taking digital designs from computer aided design (CAD) software, and laying horizontal cross-sections to manufacture the part. Additive components are typically lighter and more durable than traditionally-manufactured parts because they require less welding and machining.

about people

Changes at Lufthansa Technic - Malta, Overhaul and Media Relations



Motschenbacher

Marcus Motschenbacher is the new CEO of Lufthansa Technik Malta, taking over from Stephan Drewes who is moving to head the production network aircraft base maintenance.

Motschenbacher is moving to Malta from his position as director Network Sales

& Customer Service for Lufthansa Technik in Hamburg.

"Marcus Motschenbacher is an internationally experienced manager, and his career to date makes him ideally suited for this demanding task, commented Thomas Rueckert, Head of Aircraft Overhaul at Lufthansa Technik.

At the overhaul division, Drewes will take responsibility for the overhaul and



Drewes

cabin modification of commercial customers' Airbus and Boeing aircraft. The division has sites in Germany, Ireland, Malta, Hungary, Bulgaria, Puerto Rico and the Philippines, and carries out more than 600 overhaul operations on the C-Check scale or higher every year.

Finally, Wolfgang Reinert is announced as Head of the newly restructured media relations department. In this role, he will continue to guide the national and international press activities of the Lufthansa Technik Group. Other team members include Thomas Erich Theja Treppke. In November they will be joined by Malaika Postberg.

Schafer Becomes Director of Avionics at Trine Aero

Trine Aero has appointed Sean Schafer as Director of Avionics. Schafer has over 22 years experience in the avionics world. Following his service in the U.S. Navy, he began his career in business aviation at West Star Aviation. Hired as an avionics installer, he progressed to avionics installation sales and was involved in several STC projects.

In his most recent position at Mid-Continent Instruments and Avionics as an Avionics Program Manager, Schafer successfully increased fleet and avionics programs in the company's overhaul business as well as new product integration into various aircraft. >>>

about people

» "Trine Aero is proud to have Sean join our team. He is well known and respected in the industry and comes to us with all the experience, vision, management and technical experience we need in a Director of Avionics," said Andy Olson, General Manager, Trine Aero.

AJW Group appoints Henry Game as Chief Strategy Officer

In-depth commercial and operational knowledge of the aviation sector and extensive international business experience positions Henry Game as the lynchpin of AJW's new global management team

Henry Game has accepted the new role of Chief Strategy Officer within the AJW Group. Game will help define and deliver that strategy, ensuring that the diverse AJW organisation meets its strategic objectives. He will foster and enable change where necessary to nurture and support AJW's business ethos of flexibility and innovation within the complex and dynamic aviation environment.

Game was previously Chief Executive Officer of Bland Group Holdings, a diverse privately owned family group with businesses and investments in the UK (manufacturing, precision engineering, travel and transportation, and property), as well as internationally in the US, Gibraltar and the Western Mediterranean.

Prior to this, Game was Managing Director of Hovertravel Ltd., managing all operational, financial and commercial aspects of the business. His operational roles within the airline industry include Regional General Manager for easyJet, spearheading the integration and transition of the GB Airways personnel into the combined operation predominantly at Gatwick Airport, and responsible for the UK operation of easyJet.

Christopher Whiteside, President – AJW Group, said: "Henry's ability to offer broad transferable experience and understanding, combined with his excellent communication and interpersonal skills, and a reputation for meeting new challenges, will fit with AJW's adaptive nature within the aircraft component support world and the ever-changing demands of the business."

Game will report directly to AJW Group President, Christopher Whiteside and the Group board and will work alongside Boris Wolstenholme, CEO of AJW Aviation. He joins the organisation on September 5th and will be based at AJW's corporate headquarters in the UK.



QTA Gets STC Approval for Gulfstream G200 Carbon Graphite Inlet Upgrade



Quiet Technology Aerospace (QTA) has received STC (Supplemental Type Certificate ST04261AT) approval for its second carbon graphite inlet upgrade program for Gulfstream G200 aircraft and their PW305 engines.

QTA states that its Carbon Graphite Composite Barrel is a solution to aluminum inner-barrel inlet corrosion and acoustic screen degradation on the G200's PW305 engines. When installed, the inlets appearance is the same as originally manufactured. It is supplied with a lifetime structural warranty.

The company has also implemented a low cost inlet 'loaner and exchange program' that keeps aircraft free from extended AOG conditions. The first set of 'loaner' inlets will be available in October 2016.

"Our engineering and manufacturing team has worked very hard to bring this terminating solution and exchange program to affected G200 operators. Aside from the permanent fix our graphite composite inlets offer, we have throttled up our production, cleared out any remaining backlog and put in place a loaner and exchange program which for the G200 will be up and running in October," said Martin Gardner, QTA's vice president engineering and customer support,

MTU Maintenance Extends V2500-A5 engine service with LATAM Airlines Group



MTU Maintenance has extended its existing cooperation with the LATAM Airlines Group (LATAM) by five years to 2024. The contract covers the maintenance, repair and overhaul of V2500 engines and is a tribute to the long-standing cooperation between the two companies.

LATAM is the largest airline group in Latin America and operates 126 A320s and A319s fitted with V2500 engines. It also has a fleet of A321 aircraft.

MTU Maintenance has performed close to 400 shop visits on the TAM Linhas Aereas (now part of LATAM) fleet since 1999. The extended contract expands on this cooperation and includes coverage of engines from the whole group of airlines' fleet.

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about people

» FlightSafety International Announces New CIO and Deputy CIO



Bowlds

FlightSafety International announces that Ted Bowlds has been named Chief Information Officer (CIO) and Joe Warakomski has been promoted to Deputy CIO.

Bruce Whitman, Chairman, President and CEO said of Bowlds: "His extensive experience

in IT and outstanding leadership abilities will help to ensure this critically important function performs at the highest level."

He added: "Congratulations to Joe on his promotion to Deputy CIO. His contributions to the development and support of our IT systems, and efforts to design and deploy innovative programs and applications that enhance the services our customers receive, are most appreciated."

Bowlds over 30 years of experience leading strategy, planning, administration and organizational development for commercial and military organizations. Prior to joining FlightSafety, he worked as a consultant to the aerospace industry. His mandates have included strategic planning, working as a subject matter expert for major program proposals, and performing business case analyses on critical software capabilities. He served in the United States Air Force for over 30 years and retired as a Lieutenant General.

Warakomski joined FlightSafety in 2005 as Business Systems Security Manager. He was promoted to Director, Information Security in 2008. Joe became Managing Director, Business Systems in 2012 and has led FlightSafety's



Warakomski

technology and digital strategy as Executive Director of Information Technology since 2014. Prior to joining FlightSafety he was Co-founder and President of yNetworks, a professional service organization providing enterprise information security services.

Additionally, Bryan King has been promoted to Manager of the HondaJet Learning Center in Greensboro, North Carolina.

Executive AirShare Hires Thorson as Senior Sales Director

Executive AirShare has appointed Andrew Thorson as senior sales director for Kansas, Nebraska and Missouri. He previously spent »

Pionair Australia chooses OASES to support its new airline operations



Commsoft's MRO IT system OASES has been chosen by Australian air charter and air freight firm Pionair to support the three BAe 146-200 regional airliners it will be using for its new airline freight operations.

Pionair will be Commsoft's second active customer in Australia and this new contract represents the eighth deal won for OASES in 2016.

To allow for scalability, the system is structured in a modular format and for its new operations, Pionair has selected the Core, Airworthiness, Planning and Materials modules. Warranty and Line Maintenance modules may be added at a later stage.

The system will be hosted on Commsoft's OASES Private Cloud service.

Nick Godwin, Commsoft Managing Director, said: "This contract win is excellent news for us and confirms yet again – for the eighth time this year – the technological, operational and commercial benefits that OASES can deliver. It also confirms that the OASES community is a truly global one and we're looking forward to working with Pionair to ensure a speedy and successful implementation."



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about people

» 15 years in equity and commodities trading. The move follows a major recapitalization of the firm by Kansas City-based family investment firm, Curran Companies, and the relocation of its headquarters to Lenexa, Kan.



Thorson

“Andrew is coming to Executive AirShare at a time where we’re poised for significant growth,” said J. Michael McMillan, Executive AirShare’s senior vice president of sales and marketing. “With the improvements and investments we’ve made throughout the region, we needed someone who will use his experience to show businesses our advantages.”

Thorson holds a bachelor’s degree in aviation maintenance management from Lewis University and an airframe and power plant license. He is also working on a private pilot’s license.

Neuper Appointed CEO at MTU Maintenance Canada

Helmut Neuper took over the role of president and CEO of MTU Maintenance Canada at the beginning of September. His previous position was as chief operating officer of Airfoil Services, a post he held for nearly three years. This is a joint venture company between MTU Maintenance and Lufthansa Technik.

Neuper holds a degree in aeronautical engineering as well as an executive MBA and has worked in various positions within MTU and related companies throughout his career. He has gained extensive knowledge of the company’s location in Vancouver, Canada, most recently during his time as director of accessory business from 2007-2013.



Neuper

“Helmut Neuper has twenty years’ experience in the MRO industry and we are delighted that he is taking on the challenge of running such a key location for MTU,” said Rainer Martens, chief operating officer (COO), MTU Aero Engines.

Baines Simmons Contracts with BAE Systems over Typhoon IOS



Air Partner’s aviation safety consultancy division Baines Simmons has contracted with BAE Systems to provide Integrated Operational Support (IOS) consultancy services, with a focus on the Typhoon aircraft.

Baines Simmons is supporting BAE Systems’ strategic aim to become the leading global IOS provider by 2021 with the belief that this will help to reduce costs to customers as well as improving efficiencies and aircraft availability.

In July, BAE Systems secured a 10-year partnership arrangement with the Ministry of Defence (MOD) to support the UK Typhoon fleet, working with the Royal Air Force (RAF). The deal is reportedly worth around £2.1 billion.

Justin Scarborough, managing director of Baines Simmons, said: “It is testament to the experience and expertise of the Baines Simmons team to have been chosen to consult on such an important initiative for one of the world’s leading defence contractors. A world-leading IOS system should place the customer first in all decision-making activity.”

Martin Blaze, director of Aircraft Maintenance at BAE Systems, said: “At BAE Systems, our customers are our first priority and we are committed to reducing costs and maximising efficiency wherever possible. This project will be a strategic focus for us going forward and we are confident that the Baines Simmons team are the right people to guide us on the journey to becoming a world leading global IOS provider.”

Baines Simmons, which was acquired by Air Partner in August 2015, has a long history of working with international military and government organisations, including the UK Military Aviation Authority (MAA), the Royal Navy and the Ministry of Defence (MoD).

LM Partners with Derco Over F-16 Support

Lockheed Martin is expanding its Global Supply Chain services and support to international F-16 operators through a partnership with Derco Repair Services.

The company recently named Derco Repair Services, part of Derco Aerospace, as an authorized F-16 Hologram repair center. The Lockheed Martin Hologram designation is only awarded to repair and overhaul facilities that meet or exceed strict quality assurance criteria. Only two existing F-16 repair centers have been recognized worldwide.

“Our global supply chain and sustainment solutions provide unprecedented mission readiness,” said Laura Frank, vice president of Integrated Test and Logistics with Lockheed Martin Rotary & Mission Systems. “We are excited to expand our F-16 repair center operations in partnership with Derco Repair Services, ensuring the highest quality standards consistent with the Hologram products program.”

Derco Repair Services owns a 80,000 sq. ft. FAA/EASA certified component repair station carrying Accessory Class I, II, and III ratings with limited landing gear and instrument ratings.

Said Jason Wiedoff, director of Derco Repair Services: “We are excited to expand our services and support to the F-16 operational community and customers across the globe.”

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U.S. Army Appoints Bainbridge Aerospace Partner in UH-60 Repair



The Department of the Army has appointed Bainbridge Aerospace, a TAI-Global Group company, to overhaul vaneaxial fans on the Army's UH-60 Black Hawk helicopters

"We understand the importance of perfection in the systems that keep Black Hawks in the air," said Thomas W. Nokes, president and CEO of TAI-Global. "We have extensive repair experience on vaneaxial fan assemblies and driveshafts. Our team members receive ongoing training so that they are up-to-date on the most recent technology and techniques. The request was one of only two approved in the United States.

French SIMMAD Renews Sabena technics Falcon 20 Contract

On September 1, the French SIMMAD (Integrated Structure in charge of maintenance in operational condition of the Defense's aeronautical equipment) announced that Sabena technics will keep supporting the whole fleet of Mystère 20 aircraft belonging to the French Defense (DGA/EV).

This contract renewal is focused on Sabena technics Dinard site and covers a fleet of five aircraft for five years. Sabena will provide: heavy checks; logistic support; and component MRO.

Rodolphe Marchais, chairman and CEO of Sabena technics, declared: "We are proud to have kept the SIMMAD's trust on this contract for 15 years. This renewal reaffirms our Group's expertise as an MCO solutions provider and positions us as an important partner of the French Defense on projects such as this one as well as the entry into service of the Fokker 100 flying testbed (ABE-NG) modified by our teams."

Cobham Seals Supply Orders for F-35 RF Microelectronics

The company has received a series of orders worth tens of millions of dollars for radio frequency (RF) microelectronics that support the F-35 program. The work will be performed by the San Diego, California location of Cobham Microelectronic Solutions, part of Cobham Advanced Electronics Solutions.

"Our portfolio of microelectronic components and assemblies enable electronic warfare (EW) and radar system sensitivity, helping pilots achieve mission success by maintaining situational awareness and staying safe," said Jill Kale, president of Cobham Advanced Electronic Solutions.

More than 100 Cobham components are on board each F-35 Lightning II, including microelectronic components, microwave systems, motion control solutions for the Electro-optical Targeting System (EOTS) gimbal, communications chips, pilot survival products and aerial refueling equipment.

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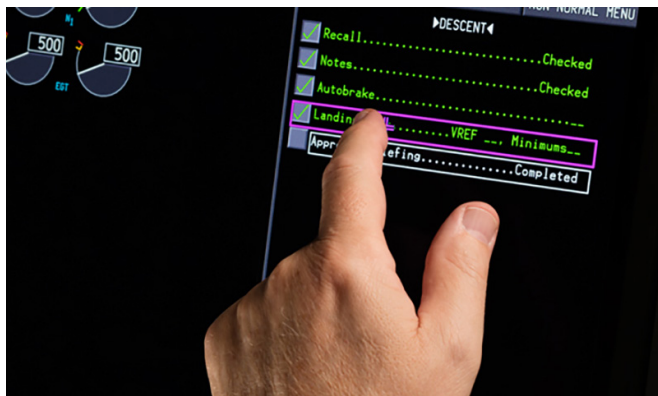


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Boeing Selects Rockwell Collins for 777X Touchscreen Flight Displays



Boeing has selected Rockwell Collins to provide its industry-leading touchscreen flight displays for all five flight deck displays on the new Boeing 777X. The advanced touchscreen capability will make the flight deck more intuitive for pilots and more efficient for flight operations. This is the first time a commercial air transport aircraft will be equipped with touchscreen forward flight displays.

"Touchscreens are everywhere in our lives and we applaud Boeing for taking the bold step to embrace this next evolution in flight deck technology for an advanced aircraft like the 777X," said Kent Statler, executive vice president and chief operating officer, Commercial Systems for Rockwell Collins. "A touch-controlled flight deck environment makes it easier for pilots to manage information and do their jobs, and speeds up the process to complete tasks."

The 777X touchscreen flight displays will be multi-touch, so two pilots can touch the same screen at the same time. In addition, the touchscreens will utilize resistive technology (firm touch versus light) for avoiding unintentional interaction with the displays. The touchscreen bezel will provide bracing features for operation during turbulence.

As Boeing's display provider on all of its next-generation aircraft, including the 777X, 787 Dreamliner, 737 MAX and the 747-8, Rockwell Collins is delivering a common graphical foundation for pilots across all of these platforms.

Boeing has 300 orders and commitments for the 777X, with first deliveries planned for 2020.

Thomas Global Receives FAA STC for EFIS Upgrade

Thomas Global Systems has received a Federal Aviation Administration (FAA) Supplemental Type Certificate (STC) for its TFD-8601 Electronic Flight Instrument System (EFIS) upgrade on Embraer EMB 120 aircraft. The STC was achieved as part of a collaborative effort with leading EMB 120 operator Ameriflight, and is available now through Thomas Global and Thomas Global authorized dealers. The Company has entered into a multi-year Preferred Supplier Agreement with Ameriflight covering these products.

The TFD-8601 display is a pioneering plug-and-play, Active Matrix Liquid Crystal Display (AMLCD) replacement for legacy cathode ray tube (CRT) displays. Incorporating a high-performance, high-resolution AMLCD, the TFD-8601 provides improved reliability and reduced costs compared to legacy CRT displays, with lower weight, less heat and reduced power consumption. The product retains the use of all existing cockpit systems and makes provision for additional functionality to be included to suit current and evolving mandates, technology and operator requirements. The upgrade can be completed quickly with no changes to existing cockpit panels

or wiring, and no crew retraining or changes to flight simulators – minimizing disruption to aircraft operations.

"Thomas Global's TFD-8000 family of AMLCD displays has been developed based on operator requirements for a cost effective, practical solution to aging CRT issues," said Andrew Hutchinson, vice president of Business Development, Thomas Global. "The TFD-8601 eliminates the issue of CRT obsolescence risk, helps drive down maintenance costs and allows operators to avoid expensive full cockpit retrofits – without compromising capability or compliance. The TFD-8601 displays are increasingly recognized as the obvious choice for long term sustainment of regional and business aircraft cockpits."

"We're excited to be flying this upgrade for EMB 120 flight decks," said Brian Randow, CEO, Ameriflight. "Having reviewed the options to manage CRT display obsolescence and long term EMB 120 cockpit sustainment, we concluded the TFD-8601 was the practical solution — and importantly will lead to more reliable and more efficient operations. We look forward to flying our EMB 120s with these new displays well into the future."

The TFD-8601 AMLCD display was developed in partnership with Regional Express, one of the world's leading regional airlines and the world's largest operator of Saab 340 aircraft. The display was designed with specific objectives to be cost effective, truly plug-and-play and with very high standards of fidelity to the existing CRT display. Thomas Global is now leveraging its Adaptive Display Architecture 2.0 technology embedded in the TFD-8601 to address CRT obsolescence in an increasing range of narrow and wide bodied aircraft.

Kymeta and Tecom Team Over mTenna



Kymeta has announced a development agreement with Tecom to incorporate its mTenna technology into an aviation terminal to demonstrate connectivity to a Ku-band satellite.

The flat panel satellite antenna is light and has a low profile which, the company states, helps to reduce drag, weight, and maintenance when in position. The Kymeta satellite antenna is being sold on its ability to deliver high-speed, global connectivity.

Bill Marks, chief commercial officer, Kymeta said that the agreement meant that the company was "one step closer to delivering the benefits of Kymeta's satellite antenna technology to our aviation market customers."

Greg Lackmeyer, director, Business Development at TECOM stated: "Coupling Kymeta's mTenna antenna technology with our next generation RF transceiver is transformational for the global IFC marketplace. We consistently get requests for flat panel solutions from airlines and IFEC providers. The combination will provide our customers with unique technology that will enable lower operational costs while delivering high quality data throughput."

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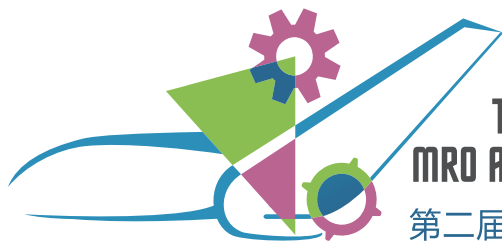
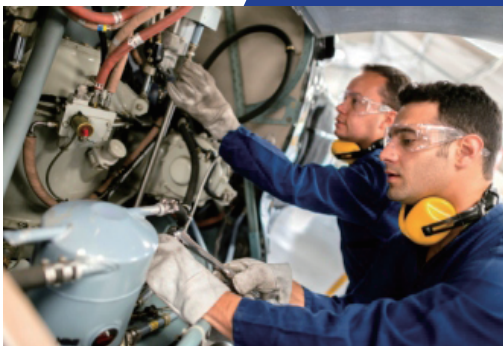
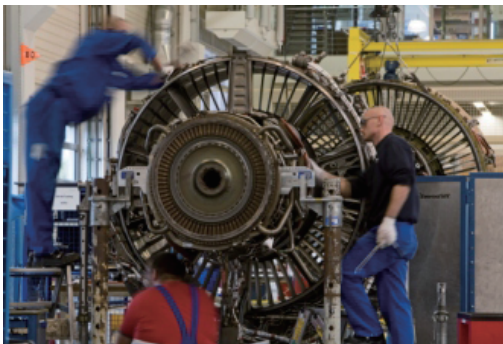
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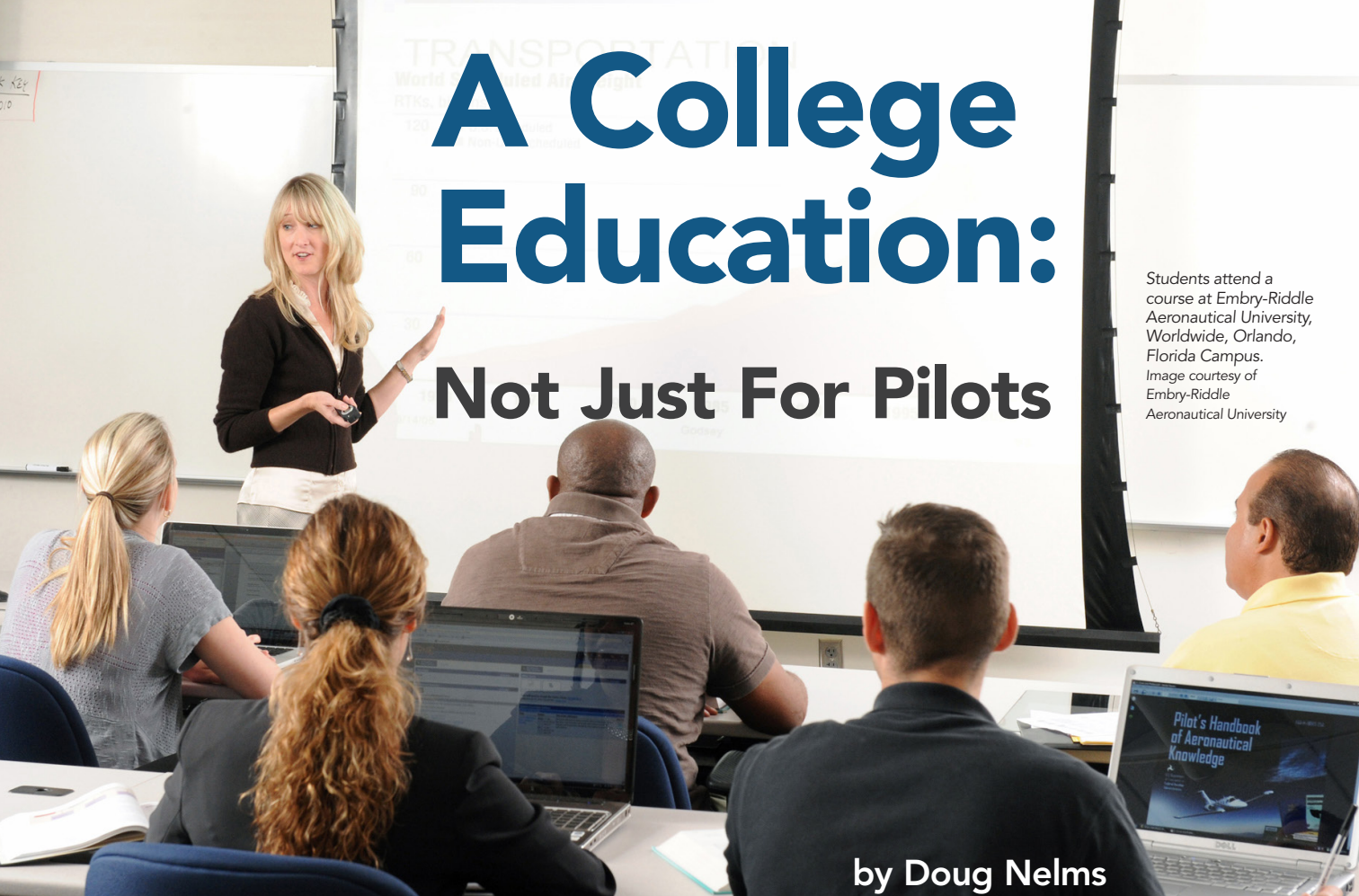


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A College Education: Not Just For Pilots

Students attend a course at Embry-Riddle Aeronautical University, Worldwide, Orlando, Florida Campus. Image courtesy of Embry-Riddle Aeronautical University



by Doug Nelms

The evolutionary and revolutionary changes in today's aircraft technology is transforming maintainers from wrench-turners into degree wielders.

There will always be a need for a good, experienced A&P mechanic on the shop floor flanked by a large tool box on wheels and - in today's world - a cart with a laptop computer taking the place of stacks of aircraft maintenance manuals.

But now MROs, aviation operators and major OEMs are looking as much at a mechanic's educational credentials as at his or her experience levels. With the new incursion of more complex, digital technology into aircraft maintenance, "mechanics are now managing systems as much as maintaining those systems," said Kenneth Witcher, Dean at the College of Aeronautics, Embry-Riddle Worldwide. "That has increased the desire in the industry to want some type of formal education."

Witcher underlined the fact that over the past 30 years the aircraft industry has changed from analogue to digital. "If you think about today's high bypass engine, such as a Trent 9000, that engine is part of the system that is interactive with all the components within the aircraft. All the skill sets we had years ago that involved turning wrenches and reading dials has been taken over by electronics, by technology that is managing the systems and integrating those systems into a larger system.

"So now your average maintainer doesn't just have to know how to go out and take off a fuel control and put a new control

on. The likelihood is that the maintainer now has to go out and understand how this system within the engine fits into the larger aircraft system. You don't just need somebody who can identify what tools are in his toolbox. You need someone who can see the entire system and understand how the systems integrates into, and manages, those systems."

Also impacting this growing need for a college degree is the number of multi-million dollar - or multi-billion dollar - aerospace programs. Military contractors such as Lockheed-Martin and Northrop-Grumman are demanding mechanics with college degrees simply because of the price for their products.

"The government necessitates (these companies) to require so much higher education before they can recruit anyone," said Embry-Riddle's Mark Kanitz, Assistant Professor College of Aeronautics Program Chair for the Master of Aviation Maintenance (MAM) degree program. "They can't have people walking around with just a high school diploma when they are demanding top dollar."

This is becoming more apparent as aerospace corporations start to see maintainers more in the light of problem solvers rather than just basic mechanics.

R. Eric Jones, Department Chair, Aviation and Transportation Studies at Lewis University in Illinois, said they have found "that a lot of the new aerospace companies such as SpaceX, Blue Origins or Virgin Galactic are not really pursuing engineers to the same degree as they are pursuing pragmatic, critical thinking practitioners."



Professor Eric Jones, Department Chair of Aviation at Lewis University, (center) explains some of the high performance characteristics of an engine to undergraduate students in the Bachelor of Science program in Aviation and Aerospace Technology. Image courtesy of Lewis University.



Students entering aeronautical schools for maintenance training are equally split between those wanting to earn an A&P certificate to work on the shop floor and those wanting to move onward for the higher education of a college degree. Image courtesy of Embry-Riddle Aeronautical University.

He noted that traditionally engineers and aviation maintenance technicians (AMTs) act independently of each other. An AMT would take a digital photo of some ramp damage to the aircraft's structure, then send it to the engineer for evaluation. They would then conference call and collectively evaluate the extent of the safest and most effective repair. Then the AMT would perform the repair.

"So we're now seeing more companies saying they want the best of both worlds, and are willing to pay for it."

From fly-by-wire to fly-by optics

Founded in 1932 as an aviation school, Lewis University is now in the first year of its BS in Aviation & Aerospace Technology program. During a two-year study to develop the degree program, they looked at a situation where if it's fly-by-wire now, it's soon going to be fly-by-optics, and will technologically be down to a one-man cockpit and an increasing reliance on Unmanned Aircraft Systems (UAS) technologies by 2035.

"So who's going to fix those new technologies? It's going to have to be someone who is a master of all these skills."

Jones said that those requirements have been packaged into their new BS program. "There's a computer science component in it, there's upper level aviation physics and advanced aerodynamics, even rocket technology - single and multiple booster - all the way up to a capstone experience where the student is required to incorporate multiple disciplines to graduate with this degree."

Embry-Riddle has been offering a Bachelor of Science in Aviation Maintenance Science at its Daytona Beach campus for over 10 years and will launch an online program next year. The Worldwide Campus has over 130 locations and teaching sites around the globe.

Other universities have also started undergraduate degree programs for aviation maintenance including Liberty University in Lynchburg, VA; Pennsylvania College of Technology in Williamsport, PA; and the University of Central Missouri in Warrensburg, Mo.

However, these vary in some degree. Whereas Liberty University and the University of Central Missouri offer a BS in Aviation Maintenance Management, Pennsylvania College of Technology - part of the University of Pennsylvania - offers a BS in Aviation Maintenance Technology.

Jones noted that at Lewis University, "50 percent of our enrolment went into the aviation and aerospace technology degree and 50 percent went into the management degree."

Bradley Blank, Chair of Aviation Maintenance and UAS at Liberty, said that they started out with a simple A&P certification course back in 2009. That was turned into an Associates Degree program a couple of years later, in which "a student can come in and take 12 months of A&P training, then take another year of general education courses and walk away with an Associate's Degree. That doesn't really give training in maintenance management. It just gives them the basic first two years of college courses."

However, the university's aeronautical department talked to aviation organizations, which all said the same thing - that the people coming out as mechanics have zero management abilities.

"We also kept hearing that new mechanics were weak in trouble-shooting and electronics. So we took that information and built our first Aviation Maintenance Management degree program," he said. They started offering the Bachelor's degree in 2014. This is offered online, although a residential program will be offered starting this fall.

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Aviation safety, focusing on human factors, mechanical and structural factors, and system safety and maintenance-related safety practices are an integral part of Embry-Riddle's MAM program. Image courtesy of Embry-Riddle Aeronautical University.

Witcher noted that Embry-Riddle's online BS in Aviation Maintenance program has doubled in size over the past five years, going from 800 to 1,600 students. "This is doubling without any marketing effort on our part, suggesting a change in the value of formal education by the industry," he said.

The growth is partially caused by a rapidly increasing global demand for aviation maintenance personnel. A recent Boeing forecast showed a worldwide market demand for 679,000 new maintenance technicians between 2016 and 2035; with Asia Pacific leading the list with a requirement for 268,000, followed by Europe needing 127,000 and North America a further 118,000 maintainers.

Growing into Globalization

Blank noted that the increase in globalization will require managers who have studied and understand the global market. "Globalization will become increasingly complex, particularly at the large MRO level."

He also pointed out that one MRO executive told him that over the next five years, about 60 percent of the company's maintenance work force will be retiring. He added that of the students entering the schools aviation maintenance programs, there is roughly a 50/50 split between those who just want the A&P certificate to work on the shop floor and those who want the higher education of a BS degree.

While an A&P certificate is still the primary goal for a large number of students, and the lack of a degree is not yet necessarily a deterrent for getting hired, the recognized desire in the industry for personnel with degree-based educations is driving the expansion of degree programs in aviation maintenance.

Candace Goodpaster, VP, Human Resources, MRO for AAR, a major international provider of MRO services, said that AAR does not envision a college degree as a requirement for a mechanic position. But while a degree is not required, "those individuals who express an interest in advanced career development with AAR are encouraged to pursue academic degrees and higher education, as it will benefit their growth and development."

She noted that AAR has a very robust Education Assistance Program to support employees obtain degrees and/or specialized certifications to prepare for career growth opportunities. "AAR also encourages utilization of the internal Learning Management

System, made available to all employees which further reinforces the development of communication and leadership skills."

AAR continually identifies innovative ways to attract and retain the key talent required to sustain high performance levels to meet customer requirements, she said. "We have seen many technical schools either expanding their curriculum or partnering with local colleges to offer degree options to supplement their A&P certifications. This reinforces providing supplemental career path options."

She also noted that in developing leaders within the company, "it is critical to acquire non-technical skills to further enhance success, such as supervising individuals, communicating effectively with customers and obtaining business acumen allowing for a more thorough understanding of the overall business operation."

With the growth in universities offering BS degrees in aviation maintenance, these institutions have also started looking at post-graduate degrees, particularly overseas. In the U.K., universities offering Master programs in aviation maintenance include City University London and the University of Liverpool.

Lewis University offers a Master's Degree in Aviation and Transportation Studies, with a fast track allowing a student to go right from the Bachelor's degree to the Master's program. While their graduate degree program is not maintenance specific, "it offers an aviation maintenance technician much better writing and communications skills - a much more sophisticated level of research skills," Jones said. "We try to take everything (the students) have done at the undergraduate level and sharpen it to where it is going to really impact their careers over the long term." This program is offered both on campus and online.

The newest and perhaps most intensive Master's program in aviation maintenance is from Embry-Riddle. The first class of its new Master of Aviation Maintenance program started on August 8 this year. This is a 30-hour program, consisting of 10 courses and offered online as well as face-to-face supported by technical videoconferencing, Kanitz said.

"The growth in the number of students over the past five years is what got us thinking about what the industry really needs," Witcher said. We went out and looked at the industry - large MROs that were hiring people. We looked at their position descriptions to see what the knowledge and skill sets are that



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“Like the BS in Aviation & Aerospace Technology degree at Lewis Univ., the Embry-Riddle Master’s program splits the line between technology and management.”



(Above) Professor assists students in AMS electricity lab.
Image (c) Nicole Hester Embry-Riddle Aeronautical University.

(L-R) Kenneth Witcher, Dean at the College of Aeronautics, Embry-Riddle Worldwide and Mark Kanitz, Assistant Professor College of Aeronautics Program Chair for the Master of Aviation Maintenance (MAM) degree program.
Images courtesy of Embry-Riddle Aeronautical University

they are expecting candidates to have, even to make it into their selection process.”

That information was then used to develop “program outcomes,” or what Embry-Riddle would expect a graduate of the program to be able to do. “We built those program outcomes, then asked ourselves how we could put together a curriculum that will guide, or develop, the student into being able to achieve those program outcomes,” he said. “We turned that into an academic program that is going to produce graduates who are going to have those skill sets to meet the position descriptions from the MROs around the globe.”

Like the BS in Aviation & Aerospace Technology degree at Lewis Univ., the Embry-Riddle Master’s program splits the line between technology and management.

Witcher said that while their MAM program does deal in management, “we are a bit more on the technical side. Management is not the key focus.” However, teaching subjects such as Maintenance Resource Management (MRM), like Crew Resource Management (CRM), is important. “What does a typical maintainer in a large MRO see at the top leadership level in these multi-diverse cultures they are working in? They are leading these very diverse teams in the MROs to get the stuff done.”

The 10-course program will delve into the “why” as much as the “what.” Whereas an undergraduate degree basically calls on a student to regurgitate the information taught, “at the graduate level we are talking critical thought rather than simply being able to say what something is,” Kanitz said. The students are taught to understand the philosophical and academic fundamentals and concepts. “Then whatever (the projects) the students end up working on, they can apply (that learning) to that specific application.”

As an example, the program offers two safety courses: the first deals with “the complex regulatory and legal settings surrounding occupational safety, health and environmental management - how they affect industry, legal responsibility and accountability, ethical considerations within and external to the organization, and the international environment and how it may affect projects.”

The second safety course is more like MRM, Kanitz said. “The

way you manage can cause safety problems; so in that aspect, that is what we are looking for.” It’s designed to allow the student to understand the principles of risk management and tools and techniques used in a Safety Management System.

Other courses include areas such as integrated logistics, managerial accounting in decision-making, leadership in global maintenance organizations, global maintenance resource management and strategic management of global MRO operations. The first course, Aircraft Maintenance Management, deals with an analysis of how maintenance programs are managed in commercial and general aviation aircraft organizations, while the last two “basically wrap up the entire program and focus on it,” Kanitz said.

All of the first eight courses can be taken in any order. The last two - Project Management for Aviation Maintenance and Aviation Maintenance Graduate Capstone - must be taken at the end of the program.

Embry-Riddle’s description of the MAM degree program is that it is designed to provide the students “with the knowledge and skills to function as competent supervisors and managers of aviation maintenance programs in a dynamic and highly complex aviation global industry. Students develop a practical and analytical approach to problem solving that will meet the challenges of managing and leading aviation maintenance organizations across the globe. This program will provide knowledge, skills and abilities necessary for students to become effective professional leaders team members, managers, and undertake lifelong learning for continuing professional development.”

“While the 30-hour program does have a research component because it is a graduate level program, it is not that focused on research and research methodology. From what we’ve heard from the industry and industry advisory boards, we believe that this is what the industry needs and wants from this point. The MAM program is a strong tool that will give the students what they need to be successful in the maintenance industry,” Krantz said.

Each course runs nine weeks. A student could therefore complete the program and have a Masters within two years—or one year if they double up, Witcher concluded. **AM**



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MRO Safety:

LOOK OUT BELOW

by Dale Smith



Whether it's a simple lanyard or sophisticated gantry system, protecting your technicians from fall injuries should be the first order of business for any MRO.

As "safe" as today's workplaces seem, simple slip and fall accidents still account for way too many injuries and deaths every year. In fact, according to the U.S. Bureau of Labor Statistics an average of 3.3 out of every 100,000 workers will die from a slip and fall accident. And that's not counting how many sprains, bruises and broken bones the other 99,996 workers suffer or the total cost of medical payments, OSHA fines and lost revenue due to these injuries.

"Overall, 41 percent of the accidents are slips and 11 percent are attributed to lost balance," explained Adam Ballester, national sales manager for Rigid Lifelines. "It's also interesting to note that the average height for a fatal fall injury is between six and ten feet."

"I think the reason for this is typically when workers get up higher they are a lot more cautious and take more steps to prevent a fall. They want to be attached to something," he said. "At six to

Rigid Lifelines Wheeled Griffin system provides mobile fall protection for outdoor aircraft inspections. Rigid Lifelines image (c) Balfour Walker.

ten feet or so they don't want to be bothered with fall prevention equipment. That's where they get into trouble."

But you say, six feet isn't that far to fall. Well, not distance wise anyway. But when you consider something called vertical acceleration, which is part of Newtonian physics: a little something Sir Isaac cobbled together after being bonked by an apple. Anyway even a fall from six feet can lead to a very quick and painful stop.

How? It's all in the physics. As Sir Isaac explained it during a free fall, gravity accelerates you at 9.8 meters (32.15 feet) per second, per second. So, after two-seconds, you're falling at 19.6 m/s (64.30 fps) and so on.

More simply put, let's say you weigh 200 pounds and fall off a fuselage that's 10 feet in the air. Well, in round numbers you'll be traveling over 17 miles-per-hour when you hit the concrete. Ouch!

"I can calculate the motion of heavenly bodies, but not the madness of people."
Sir. Isaac Newton, English physicist and mathematician



This low headroom hangar suits a system like the Gorbeltwo person Tether Track.
Gorbeltwo image.

"At that height, you not only need fall equipment, you have to have the right fall prevention equipment," Ballester said. "Many systems are not designed to react fast enough to stop you during a fall from those lower heights."

While the OSHA regulations clearly require that workers must wear fall protection any time their feet are elevated above four-feet off the ground, they don't specify exactly what kind of fall prevention equipment you have to use.

Assessing Fall Protection

The OSHA regulations require some kind of fall protection or restraint any time a worker's feet are four-feet above the working surface. But they don't specify what kind of protection you need. For that you need to do a fall risk assessment.

"The best way to start a risk assessment is to look at your facility and the typical types of jobs that are done at various elevations," Kevin Duhamel, product sales manager for Gorbeltwo explained. "Do your technicians need to be mobile to do the job or do the work in a specific area before moving around? Do they work indoors or out? Is it wet or slippery? At what heights do they work? Knowing these

things is key to identifying what type of system you need."

Duhamel also stressed that to meet OSHA requirements, your company's risk assessment has to be performed by a 'competent person.'

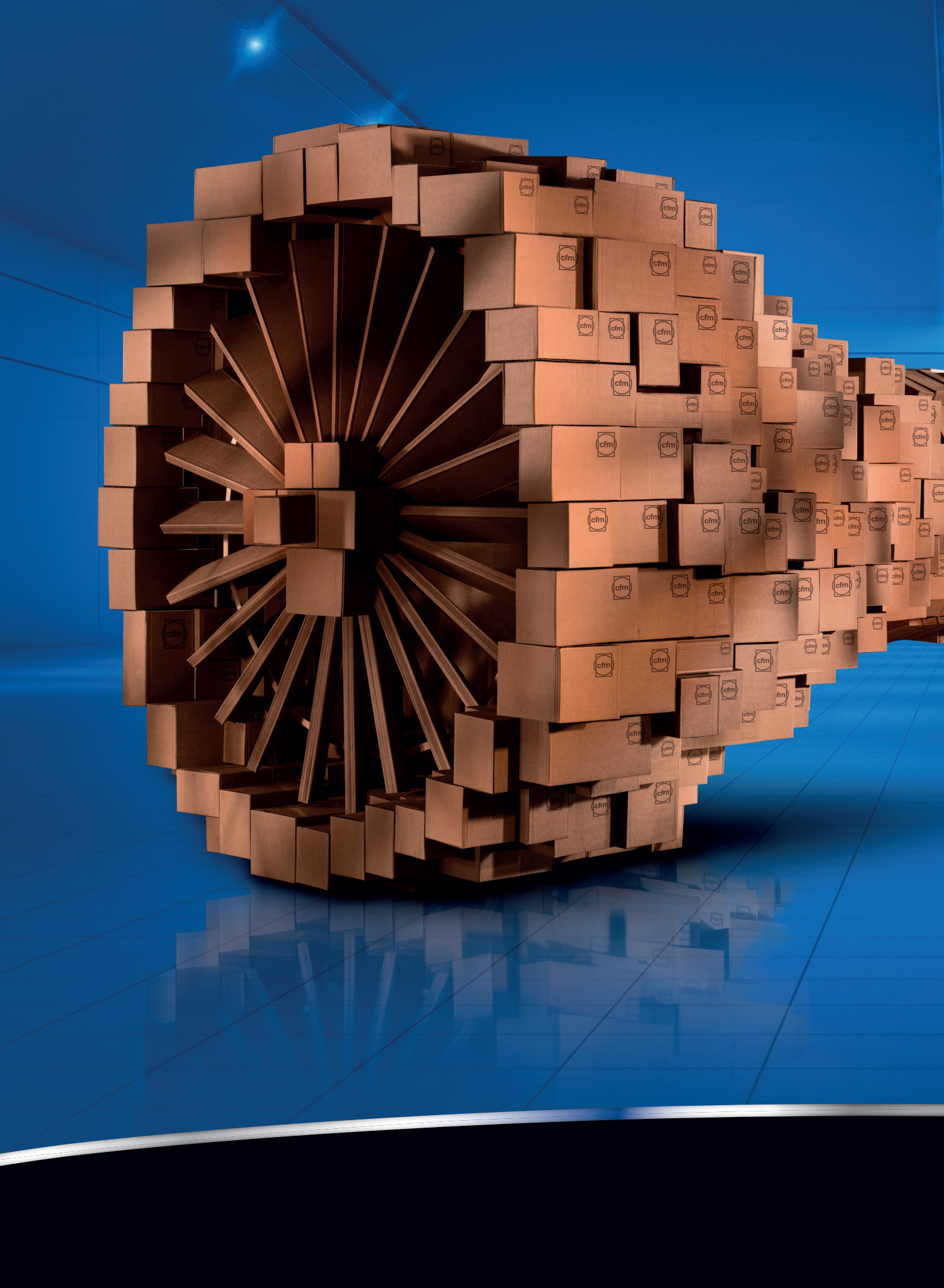
"A competent person is someone who is trained and is capable of identifying hazardous or dangerous conditions requiring personal fall arrest systems," he said. "They are also qualified in both the application and use of related safety equipment."

If you don't already have a such a person on staff, Duhamel said that OSHA approved training is available through a variety of online sources. Or you could hire someone to do it for you.

"The variety and quality of the training can be broad, so be sure to look for references or opportunities for hands-on training," he said. "Once someone has completed an approved course, they can examine your facility for potential fall hazards and create a plan."

Following the A-B-C-Ds

While there are a lot of various models and systems, there are four basic components found in a modern Personal Fall Protection System (PFAS).





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A is for Anchors: Anchors are a secure point of attachment and vary by industry, job, type of installation and the structure they are attached to. They must be able to support more than the intended load.

B is for Body Support: Body support is typically in the form of a full body harness that is specifically designed to distribute all the forces over the wearer's upper thighs, pelvis, chest and shoulders.

C is for Connectors: Connectors are what attaches the harness to the attach point and are available in a variety of types including simple shock-absorbing lanyards to self-retracting lifelines (SRL).

D is for Descent and Rescue: These are devices that are used to lower a suspended worker to the ground after they have experienced a fall.

Ballester explained that the self-retracting lifelines are one of the more recent introductions in the fall restraint and safety industry.

"It's basically a high-tech lanyard that attaches to the anchor point on the harness and it's designed to automatically limit your fall distance," he said. "Basically, it works like your seatbelt retraction system. When it senses an acceleration or fall, it automatically locks up tight."

"The benefit of an SRL is it's easier for the technician to wear," Ballester said. "They won't have lanyards any longer than they need. Since everything retracts into the unit, they only have the small restraint box on their back. It gives them some length of maneuverability, but should the worker suffer a fall, it locks up like your car's seat belt. So even at lower heights it can make a big difference in safety."

"When speaking of fall protection in particular, not all lanyards, self-retracting lifelines or even harnesses make sense for every

application," stated Anne Osbourn, industrial and utilities marketing manager, MSA. "The type of work to be performed determines the correct type of fall protection to be used."

When it comes to selecting the right fall protection equipment, one of the biggest and most serious mistakes MRO operators make is basing their equipment on cost alone.

"Often the need to save costs impedes the ability to purchase the correct fall protection system," MSA's aerospace specialist, Carl Cooper said. "For example, a simple single-point anchor system versus a more complex (and expensive) horizontal system limits the amount of space in which users can work."

"A horizontal lifeline system, while possibly more costly, typically offers workers more mobility and flexibility in the work that can be accomplished, which potentially increases job efficiency," he said.

Safe But Stuck

So you've slipped off the top of a G550 fuselage and your fall arrest harness has done its job. Nothing left to do but dangle there 15 feet above hangar floor and wait for someone to come and get you. If only that were the case...

"One of the little-known problems with fall arrest products is suspension trauma. It occurs when the straps of the harness cut off the blood flow from your legs," an industry representative said. "If you hang there too long you will faint. If you're not rescued soon, you risk death due to the brain not receiving enough oxygen."

"Most harnesses today are being designed and manufactured with pads to minimize this problem," he added. "Another practice we recommend uses the buddy system. No one should ever work in an elevated location alone."

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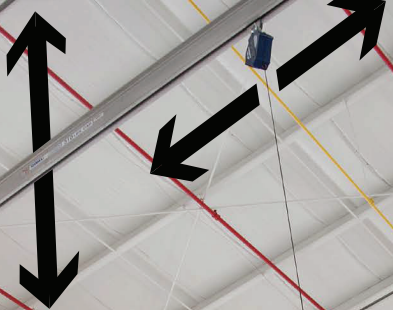
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Even experienced maintenance personnel should be aware of the danger of accidental fall. Rigid Lifelines image.

"These potentially fatal problems can happen in as few as 15-minutes," he added. "Companies are realizing that relying on the fire department to facilitate a rescue is not good enough."

"Planning for rescue after a fall is critical. Most recently, advancements have been made towards rescue devices, particularly self-rescue devices that can be used for lone worker applications," Osbourn said. "This technology allows for controlled descent to the ground for a user after a fall. The rescue device itself is contained within a small 'backpack' attached to a full body harness and is designed to be used in conjunction with a fall protection system or anchor point. It's a great addition to a rescue plan, as it allows an employee to self-rescue, versus requiring assistance of an aided rescue by another worker."

Training: The First Step in Fall Prevention

No matter how you measure it, when it comes to any aspect of MRO services, including preventing slip and fall accidents, the best tool you can provide your employees is consistent training.

"Training is of course, extremely important in not only selecting appropriate fall protection equipment for your application, but also for using it," Cooper said. "ANSI (American National Safety Institute) Z359.2-2007 provides much valuable information and best practices for training using fall protection equipment."

"Proper training is also crucial in regard to correct prevention use. It is always a challenge to ensure that all workers who may face potential fall hazards are not only initially but continually trained, so that they are prepared and comfortable in what actions to take in the event of a fall," he added. "However, fall arrest is only part of the training; a rescue plan for fallen workers is equally critical in avoiding suspension trauma. Too many times, mistakes may be made in that rescue plans do not receive the necessary attention until it is time to actually carry one out."

While many MROs choose to develop their own in-house training programs, there are qualified sources like MedAire, that provide specialized fall and hangar safety training and will ensure your technicians are getting the information they need to make the proper decisions should an accident occur.

"Training is important to increase awareness, understand preventative measures and understand proper use of equipment," stated Richard Gomez, VP of Educational Services and Quality for MedAire. "Our Hangar Safety Programs include training on the most common areas where fall injuries occur; the most common injuries that occur and how to treat them; how to avoid hazards on and around walking and working surfaces; safety considerations when using ladders, scaffolding, and other raised work surfaces; and proper use of fall arrest systems."

Gomez also said that the company's training program covers the critical first steps needed to help the victim of a fall accident before the emergency crews arrive.

"MedAire's training includes the recognition and management of injuries including those to the head, neck and spine," he said. "We also include guidance for fractures, dislocations, sprains, bleeding, injuries to the chest and abdomen, as well as CPR and AED training for cardiac arrest."

"The key to having a safe hangar environment is being prepared, which includes prevention of injury and knowing what to do should an event occur," Gomez said. "MedAire's aviation specific hangar safety training course is designed to focus on using the basic fundamentals of having the proper equipment and training to assist with caring for the ill or injured individual during the first 10-minutes before airport cash-fire rescue arrives. The basics of managing life threatening events such the requirement for teaching AED/CPR skills are included in all of our training courses." **AM**



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Bedek's Aircraft Division is also a world leader in passenger-to-cargo conversions of the B-767, B-737 and B-747 families of aircraft, with more than thirty years of experience and certified STCs from leading civil aviation authorities.

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Heavy Maintenance

With facilities strategically located at London Luton Airport and Birmingham Airport in the UK, MAEL are capable of accommodating up to nine lines of heavy maintenance across Boeing, Airbus, Embraer and Bombardier types including the Boeing 737NG, 757, 767 and 787 Dreamliner as well as the Airbus A320 family, A300, A310 and A330, Embraer 170, 175, 190, 195 and Bombardier Q400.

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Monarch Aircraft Engineering has an incredibly strong reputation as being one of the leading line maintenance providers in the UK and overseas. With permanent year round stations at London Gatwick, London Luton, Birmingham, Manchester, Leeds Bradford, Copenhagen, Malaga, Warsaw and Kiev the company can support, including all levels of maintenance on Airbus, Boeing, Embraer and Bombardier aircraft types.

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Monarch Aircraft Engineering Training Academy (MAETA)

Approved EASA and GCAA Part 147 aircraft type training is delivered by Monarch Aircraft Engineering Training Academy. MAETA has gained a worldwide reputation for its continuing high standards and provides full B1 and B2 theory and practical training on the following types; Boeing 787 Dreamliner, 767, 757, 737, Airbus A320 family, A330, A300 and EASA Part 66 category "A" basic training. Training can be delivered at London Luton Airport, Birmingham and if preferred, at client's facilities worldwide.

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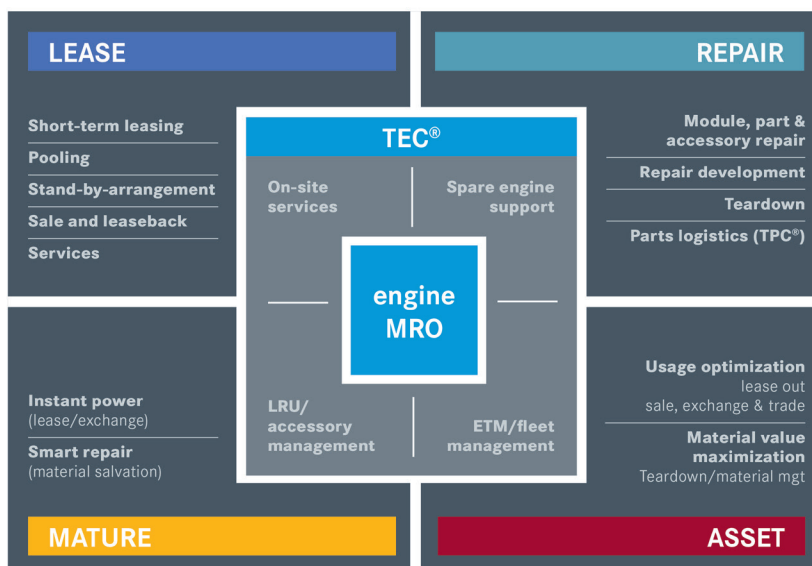
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- Where?** All over the world! MTU Maintenance has its roots in Germany, but operates a global service network with locations in the Americas, Europe and Asia.
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The OASES user community currently numbers 110 organisations in no less than 45 different countries and includes national carriers, 3rd party maintainers,

regional carriers, leasing companies, cargo specialists, charter operators and specialist rotatable stockists in the USA, Europe, The Middle East, Asia, Africa and Australasia. Demand for OASES continues to grow. Commsoft signed contracts with 20 new clients in 2015/16.

Reflecting its client base, Commsoft is a truly global organisation. It has its Head Office in Tiptree in Essex as well as two regional offices in the UK in Derby and Norwich. In addition, the company has support offices in Coimbatore, India and Brisbane, Australia. Adopting a partnership approach to its worldwide business, Commsoft also has an Implementation partner in Romania and CAMO partners in the UK, Poland, Latvia, Russia and Singapore.


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AVM Tools Evolve With Every Twist and Turn

As aircraft evolves, so have the AVM tools that support it.



by Mark Robins

ControlTech (CTECH) claims that its Aluminum Electronic Torque Wrench is suitable for precise and frequent use. It provides instant feedback on the exact torque actually applied – something mechanical wrenches can't do.
Snap-on Industrial image

AVM professionals are faced with a huge range of different tools to service, repair, over haul and maintain many a wide assortment of aircraft to ensure their structural soundness. The size and type of an AVM tool will differ from one aircraft to another because of differences in aircraft size. Engine and hydraulic AVM mechanics will have very large wrenches, while electricians and avionics technicians will have precision screwdrivers.

Regardless of their size or use, as any aircraft evolves, so must the tools that support it. Advances in AVM tools allow AVM professionals to work on the latest materials and newest application specifications while complying with regulations, and troubleshooting, diagnosing and correcting discrepancies. Some AVM tools like hammers and screwdrivers have remained unchanged with only slight alteration; others have evolved to become state of the art.

New advances in tools not only aid overall aircraft maintenance, but also worker safety and ergonomics. "Like any industry, there is a need to work quicker and more efficiently," said Dan Riccio brand manager of hand tools & storage, Stanley Black & Decker. "At the same time, a premium is placed on worker safety to avoid unintended injury by not only jobsite dangers, but overuse injuries. To fill this void, many manufacturers are designing tools to be

more ergonomic. By designing with ergonomics in mind, it helps any industry, including aviation, to improve worker safety, performance, and profitability."

"Tools and tool management systems within aviation maintenance are developed to enable the technician to work safer, to improve the quality of the maintenance task, and to do the job with greater ease," said Andy Lobo, director-produce management and development at Snap-on Industrial. "When these developments are adopted widely, the seconds of time saved on a task by using a new tool or system quickly add up to man-hours, man-days, man-months and even man-years (sic) of savings, collectively advancing the whole of the aviation industry."

Ergonomic advances

Fundamental designs in AVM tools are being made to make them lighter and easier to use. For example, the basics of installing and removing rivets have not changed much in 50 years. However, newly designed tools make it easier and safer on the operator to produce better quality riveting more consistently.

"Tooling advancements help reduce the risk of injury for technicians who work on aircraft and can also help decrease the risk of damage to aircraft," stated Paul Dellinger,



Armstrong Aviation Ratchets are designed to help aviation mechanics reach and turn limited-clearance fasteners quickly. APEX Tool Group image

director of environmental health and safety, Gulfstream Aerospace Corporation. "New and better tooling also helps to maximize work efficiency. Many of our advances in tooling come to us internally. This is, in large part, the result of our safety management system and continuous improvement culture at Gulfstream, which encourages technicians to improve a process or suggest the customization of a tool to make it better. We also look at a tremendous amount of data, which helps us identify an issue and gets us to the point where we can begin to design or select a better tool."

Another example is socket usage. Sockets are often called upon to break loose very stubborn fasteners in some very access-restricted areas on aircraft. "For the socket to work in such a confined space, its walls have to be thin and strong," said Lobo. "Thin and strong is a dichotomy unless you pick the right materials and have extremely tight tolerances on your sockets. Snap-on spline sockets are a good example of this, utilizing steel with up to 80 percent greater yield

strength than most other tool steels used to make sockets."

Vibration and abrasive considerations

Hand/arm vibration syndrome is driving AVM tool advances, with specific concern for workers that use powered hand tools like grinders. "A tool that can be used effectively with less force, less repeated movement and less awkward positioning of the body is one less likely to cause injury to the technician that uses it," Dellinger said. "This is the kind of tool that we will give major consideration to using in our maintenance organization."

Not only are tool manufacturers designing advanced low-vibration options, but so are abrasive manufacturers. Rex-Cut Abrasives, Fall River, Mass. provides a specialty cotton-fiber abrasive material with a cushion action that while in use, allows the points or wheels to run smooth without chatter. The smooth operation of cotton-fiber abrasives virtually eliminates vibration, allowing more comfortable and safer conditions for

workers. Bob Costa vice president of sales and marketing at Rex-Cut Abrasives believes in addition to safety training, making sure operators know the maximum operating speed of a tool and the abrasive, wearing correct safety equipment, using appropriate pressure, and keeping safety guards intact, will keep incidents down.

Riccio added that AVM hand tool advances that prompt safety not only include anti-vibrational handles, but also anti-slip grips and non-sparking materials.

Longevity advances

Creating advanced AVM tools with a longer lifespan is one way to help reduce downtime and costs for aviation maintenance.

Advanced AVM tools that last longer than their standard counterparts will reduce costs and inventory. "Abrasive products with longer life will also limit the need for switching abrasive discs as often, decreasing finishing downtime," noted Costa. "Rex-Cut recently introduced Quick Change Disc Max, a premium abrasive disc that lasts four



Regardless of their size or use, as aircraft evolves, so must the tools that support it. Gulfstream Aerospace image

to five times as long as non-woven surface conditioning as well as cloth back coated abrasive quick change discs. These new discs are available with different grits/bonds to fit a wide range of applications. Being delayed by under performing abrasives is a problem many maintenance departments can't afford."

For users to attain longevity advances with hand tools, Riccio suggested selecting tools designed with the durability to endure the constant rigors of industry demands. "Seek high-quality material and product warranties," he said. "Select tools that will help you work smarter, not harder."

Stanley Black & Decker's new Proto Precision 90 Ratchet's compact pear-head design and 4° swing arc provide users access in difficult and tight working areas. "It's a common rule of thumb is that the higher the tooth count, the less degree of arc swing a user needs to move a ratchet before the pawl catches the next tooth (allowing the ratchet to tighten the fastener)," said Riccio. "Tooth count and arc swing are very important in determining the appropriate ratchet based on job demands. With a tooth count of 90, this ratchet delivers high precision while offering high access."

Simple advances

Hammers and mallets are used for striking where the force of the hand is insufficient. Since it's a legacy, mainstay tool, one does not think of these simple tools as being advanced are even capable of being advanced, but companies are still finding ways to increase their productivity and usability. New designs have a top-welded handle-to-head assembly to add extra durability and safety. Handles can



The new Proto Precision 90 Ratchet, available in multiple sizes and polishes, has a compact pear-head design and 4° swing arc providing users access in even the tightest working areas. Stanley Black & Decker image

be reinforced with a solid-steel shaft for strength and safety. Dual-molded grips improve the handling for users.

Screwdrivers were first used in the late 15th century and today are used on aircraft to loosen or tighten screws, or screw head bolts. Apex Tool Group's Power Tools Division's Utica torque-limiting screwdrivers are designed for better ergonomic functionality. Features of the Utica torque-limiting screwdrivers include:

- ▶ Easy-release bit holder for fast bit changes
- ▶ Durable all-aluminum housing to reduce weight
- ▶ Ground and tuned torque spring for repeatability and accuracy
- ▶ Precision ground roller cam to prevent over-tightening
- ▶ Color coded casing for easy reference (TS-series Standard models)

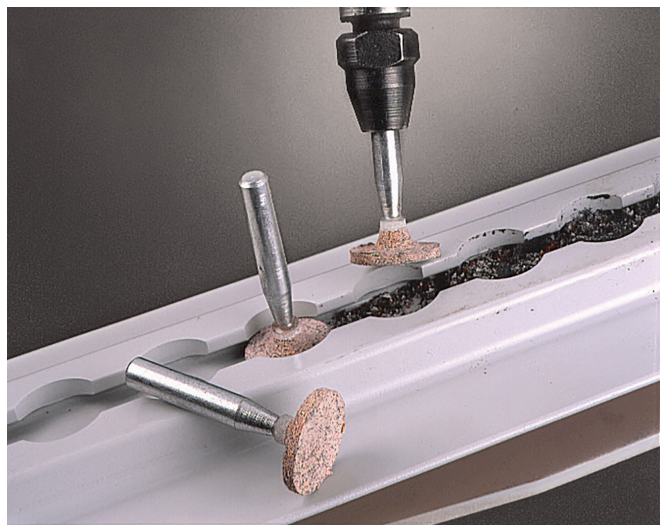
Pliers

Pliers come in various configurations and are used as an AVM tool to crimp metal, hold objects, make adjustments, twist wire, and even remove or install safety wire. "Snap-on's recently launched



(Top) Advances in AVM tools allow AVM professionals to work on the latest materials and newest application specifications.
Gulfstream Aerospace image

(Right) This new seat track cleaner has a specialty mounted point precisely shaped to match the dimensions of inside airline seat tracks to clean the top, bottom and sides simultaneously. This point cuts approximately two thirds of the cleaning time out of the seat track cleaning process.
Rex-Cut Abrasives image



provides a more secure hand tool transfer at height, more natural freedom of motion, and tool accountability,” explained Riccio. “The design includes active attachments that are always engaged during transfer from hand-to-hand, person-to-person, or hand-to-holster.”

one-handed safety wire pliers shave seconds off of each safety wiring task by freeing a technician’s hand to hold the lock wire or fastener better enabling the appropriate twists per inch and lock wire routing,” Lobo commented. “Safety wiring tasks can number in the hundreds on the simplest component replacement, and those hundreds of seconds per task can add up to real savings. In another example, Snap-on’s Level5 Automated Tool Control system can place calibrated items in an optically or RFID-controlled box near where the plane is parked, saving the technician a trip to the tool crib (which could be a 20-minute drive, one way, across active ramps).”

Hands-free advances

There is a new generation of AVM hand tools that optimize safety for the maintenance professional who needs to be hands-free on the job. These new systems help users comply with drop-prevention practices and fulfill safety requirements, while work is done productively at heights. Although it’s possible to use lanyards to eliminate possible dangers, some lanyards can still create a problem because they are either too long or too short, and can get tangled easily. Impractical lanyards also have the potential to cause injuries when working at height and in close proximity to moving objects.

“One of these enhanced systems, the PROTO Skyhook System

Take care of them

Regardless of the AVM tool — simple or advanced — or its application, it must be cared for. Keep your tools in good condition and protect them from rust, nicks, burrs and breakage. Use your tool only for the job it was designed to do. A screwdriver should not be used as a chisel. Avoid placing tools on or above machinery or an electrical apparatus. Never leave tools unattended where machinery or aircraft engines are running. **AM**



FAA 8130-3: Making Export Tags Look Like Domestic Tags

The FAA really is trying to make it easier for industry to use safe aircraft parts. I have been writing blog articles about the FAA's problems with the 8130-3 (Airworthiness Approval Tag), but relatively little press has been given to the FAA's efforts to make the 8130-3 tags better. A recent policy memo from the FAA actually removes unnecessary distinctions and makes it easier to use the 8130-3 tag in parts transactions.

On June 28 the FAA issued a policy memo (AIR100-16-110-PM04) that forbade parties from stating 'domestic shipment only' or "not an export approval" on the 8130-3 tag:

"This memorandum provides clarification on the use of 'domestic shipment only' and 'not an export approval' in block 12 of FAA Form 8130-3 (hereafter, tags). Inspectors, designees, delegated organizations, and persons authorized in accordance with a production approval holder's approved quality system to issue tags are directed to not add 'domestic shipment only' and 'not an export approval' to block 12."

This export-specific language tended to impede subsequent exports. Many people mistakenly thought that this language was meant to prevent a subsequent export. The FAA has removed the export-specific language because it found that the language impeded commerce without adding any safety value.

History

Use of this sort of export-specific language ignored the original purpose of the 'domestic tag.' It was originally meant to create a kludge that made 8130-3 tags available to exporters – at a time when the regulations limited access to the traditional export tag. It was called a 'domestic' tag because it only certified compliance to domestic US standards, and not to any special import requirements of an importing nation.

Years ago, exporters (who were not the manufacturer) were unable to obtain an export tag for parts. The reason for this began in 1963, when the FAA published a Notice of Proposed Rulemaking (NPRM) to establish the rules for export airworthiness approvals (Subpart L of 14 C.F.R. Part 21). They classified the world of aircraft assets into three classes:

(1) A Class I product is a complete aircraft, aircraft engine, or propeller, which:

(i) Has been type certificated in accordance with the applicable Federal Aviation Regulations and for which Federal Aviation Specifications or type certificate data sheets have been issued; or

(ii) Is identical to a type certificated product specified in paragraph (b)(1)(i) of this section in all respects except as is otherwise acceptable to the civil aviation authority of the importing state.

(2) A Class II product is a major component of a Class I product (e.g., wings, fuselages, empennage assemblies, landing gears, power transmissions, control surfaces, etc), the failure of which would jeopardize the safety of a Class I product; or any part, material, or appliance, approved and manufactured under the Technical Standard Order (TSO) system in the 'C' series.

(3) A Class III product is any part or component which is not a Class I or Class II product and includes standard parts, i.e., those designated as AN, NAS, SAE, etc.

This three-part distinction can be found today in older versions of the Code of Federal Regulations. But this distinction no longer exists in the modern regulations.

The original 1963 NPRM (Notice of Proposed Rule Making) suggested that export airworthiness approvals would be available for Class I and Class II products. It explained that export airworthiness approvals would not be necessary for Class III products, and that exporters could self-certify airworthiness with respect to those units. This dramatically limited the impact of the proposed rule, because most articles fell into class III.

During the comment period for this new rule, a manufacturer wrote to the FAA and said that it could foresee a possible need in the future to apply for Class III export airworthiness approvals for its own articles. The stated purpose of the rule was to facilitate trade, so when the Final Rule was published in 1964, the FAA added a clause stating that manufacturers could also apply for Class III export airworthiness approvals in order to meet the request of the commenter. No one was asking for these tags for piece-parts, so there was no objection to the additional permission.

Years later, as the export 8130-3 tag became more popular in international commerce, and the FAA signed international agreements promising to provide the 8130-3 tags with aircraft part exports, the aircraft parts distribution community began to see a need for the tags to facilitate their trade. But the regulatory language only permitted manufacturers to apply for the export 8130-3 tag for these 'class III' parts. So the 'domestic tag' was born in order to provide a tag that distributors could seek. The 'domestic tag' only certified compliance to US domestic standards - it did not certify compliance to any special import standards of any importing nation (it was up to the exporter to address such conditions, and at the time foreign trading partners were happy to take this tag because they generally did not have special import requirements for individual parts).

The domestic tag also quickly became popular among domestic users in the US (notably, Northwest Airlines in the late 1990s was an early proponent of the use of the 8130-3 tag for domestic transactions).

For a short time, this limiting language ('domestic shipment only') actually appeared in an earlier version of the FAA's internal orders. I sought clarification from FAA management at the time. I pointed out that the original

purpose was to facilitate export for distributors, and FAA management agreed that this language was inappropriate. FAA management confirmed that the inclusion of that language had been a mistake, because it contradicted the original purpose of the domestic tag.

In order to discern the reason for this errant language, FAA management called in the employee who was responsible for the text of the Order and asked "why did you include this language?" The FAA employee's reply was to shrug his shoulders and say "I don't know ... it seemed like a good idea at the time." The language was removed from the next revision of the FAA's orders, but it continued to find its way into 8130-3 tags, nonetheless.

The Problem with Export Language

The reasons that export-specific language has fallen out of favor at the FAA are many, but one of the most salient reasons is borne out of the recurring stories of transaction interruptus caused by the tag.

Imagine this – you are selling an aircraft part from a warehouse in Singapore to an airline in China. The part bears an 8130-3 tag that was issued at the manufacturer's facility. The tag was issued by the FAA. There is every reason to believe that the part is perfectly airworthy and that it is acceptable in China. But the part is rejected by the Chinese air carrier.

Why was the part rejected? Because the tag said that it was valid for export to Singapore (the first destination) and did not mention China (which was an unknown destination at the time the tag was issued). The failure to mention China becomes the invalidating factor, even though the part is clearly airworthy.

The European Union has overcome this issue by only having one EASA Form One tag (this is the European corollary to the FAA's 8130-3 tag); they do not distinguish on their EASA Form One tags between export tags and domestic tags. This prevents unnecessary impediments to trade.

Over the years, the FAA has recognized that this export-specific language impeded export transactions without offering any redeeming value. The policy memo closes the loop on this language

by forbidding it, so that the United States will no longer undermine its own commercial interests (at least not on this particular point).

The recent policy memo - forbidding the use of the 'export' terminology on the 8130-3 tag - is also consistent with the discussions that current FAA management have been having about the future of the tag. In the past the 8130-3 tag has been treated almost like a magical tag. FAA headquarters wants to change this. They've said that they want the tag to be more like a manufacturer's certificate of conformity. This would be more consistent with the way that documentation has been treated in other jurisdictions, like the European Union.

Another step that the FAA has taken that is consistent with this philosophy is to permit US manufacturers (FAA production approval holders) to issue 8130-3 tags under their own authority, rather than relying on FAA designees to issue the tags.

Exporters who encounter parties who want to print 'domestic shipment only' or 'not an export approval' in block 12 of FAA Form 8130-3, should draw the issuing party's attention to this FAA policy memo and to the changes in FAA 8130-3 tag philosophy. [AVM](#)



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David Westlund holds a BS in composite materials engineering from Winona State University and a master's degree in aerospace engineering from North Carolina State University. He joined the FAA in 2009 and is currently the program manager for the FAA's Maintenance and Inspection Research Program.

Airlines for America Nondestructive Testing Forum: Uniting in the Name of Safety

The corporate climate is highly competitive, the competition fierce; best your competitors or be bested. Narrow margins between profit and loss, urgent deadlines to meet, and logistics are all challenges that corporations face. Perhaps nowhere is this truer than in the airline industry. There is one venue, however, where the airlines put aside their competitiveness in the name of safety: The Airlines 4 America (A4A) Nondestructive Testing (NDT) Forum.

The A4A NDT Forum enables NDT professionals and industry leaders to meet each year and discuss current trends, issues and successes in NDT methodologies. The Forum draws participants from various disciplines, including equipment designers, technicians, vendors, regulatory authorities, Original Equipment Manufacturers (OEMs), Maintenance and Repair Organizations (MROs) and airline personnel. The Forum exhibit hall features displays, including the latest NDT and related equipment, processes and services.

NDT plays a huge role in the safety of commercial and general aviation. Throughout an aircraft's life, there is the potential for damage from numerous sources including: bird strike, hail, runway debris, lightning, ground service equipment (GSE), incursions with other aircraft, and fatigue damage from repetitive loads from normal operation. The role of the inspector is first to determine if there is damage from an event and, if there is damage, to determine the severity of the damage by sizing it. This information can then be used by structural analysis engineers, who use tools like Finite Element Modelling (FEM), to determine the residual strength of the structure. The extent of the damage will determine whether the part needs to be repaired or replaced. NDT even plays a role in making sure the repair is done properly. Regardless of the decision that is made of whether to repair or replace or to bolt or to bond, the airplane must still meet the Federal Aviation Regulations (FARs) in order to be considered airworthy. For example, in the United States, Title 14 (Aeronautics and Space) CFR Part 25 (Airworthiness Standards, Transport Category Airplanes) Subpart C (Structure) contains the regulations that set forth the standard for an aircraft's ability to withstand the loads (forces) that it will experience in flight.

There are many tools that an inspector has available to them to inspect damage on an aircraft. Each tool has a unique purpose and there is really no tool that can do it all. The most basic of all inspections is the visual inspection. This can be as simple as a walk around the aircraft, looking for signs of damage. The shortcoming of this method is that some spots on the aircraft can be difficult to see from a walk around and the human eye isn't always going to catch everything. In some cases, such as on a composite structure, there is no external indication of damage even

though there may be hidden damage beneath the surface of the aircraft. The next simplest inspection is the tap test. The tap test is as simple as it sounds and consists of using some tool, sometimes even a coin but often a specialized tool, to listen for abnormalities in the acoustics of the structure. While the tap test does have the ability to detect damage hidden away below the surface, it is also subject to human error. Ultrasonic Testing (UT) is perhaps one of the most heavily depended on pieces of NDT equipment used in the field. UT uses a transducer to put energy in the form of waves into a structure. In some cases the same transducer, (Pulse-Echo, PE) and in other cases another transducer, (Trough-Transmission, TU) is used to receive the signal. There will be a difference between the signal received from an undamaged part and a damaged part due to any air gap that may be present. This leads an acoustical impedance mismatch which reflects the signal back to the transducer indicating potential damage. Eddy-Current (EC) is another commonly used NDT tool and is very useful in inspecting metallic rivets which can be a source of cracking due to stress concentrations caused by the abrupt shape in geometry that riveting causes. Eddy-Current uses differences in magnetic fields in damage and undamaged parts to indicate for damage. There are many other types of NDT equipment commonly used too including, X-Rays, Thermal Imaging, Holographic Laster, Interferometry, Laser Shearography, and Magnetic Particle Inspection; each with their own uses.

There are challenges with using this equipment as inspections can be complex depending on the type and location of the damage and the equipment being used, not to mention the urgency of needing to get an airplane operational as soon as possible. This is where the A4A NDT forum comes into play. Inspectors from all of over the world come together and share their experiences with inspection in the name of safety. This creates a network of inspectors each benefitting from each other's experiences and learning from one another. Furthermore, since the equipment vendors are also in attendance, inspectors have the opportunity to ask specific questions about the equipment they are using; sometimes even from the inventor of the technology. With the OEMs and regulatory agencies also attending, virtually the whole spectrum of the aerospace industry is there. Of all the things I've had the privilege to be a part of during my career at the FAA; this has always been one of my favorites! **AM**

Note: The 59th Annual A4A/NDT Forum took place September 26-29, 2016 at the Wyndham San Diego Bayside Hotel, San Diego, California <http://a4andtforum.com/>

For questions/comments/concerns:
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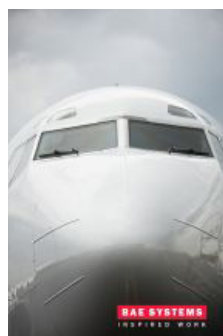
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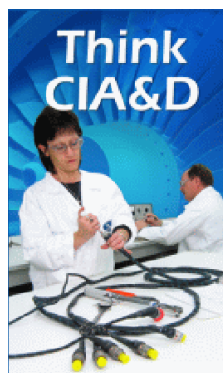
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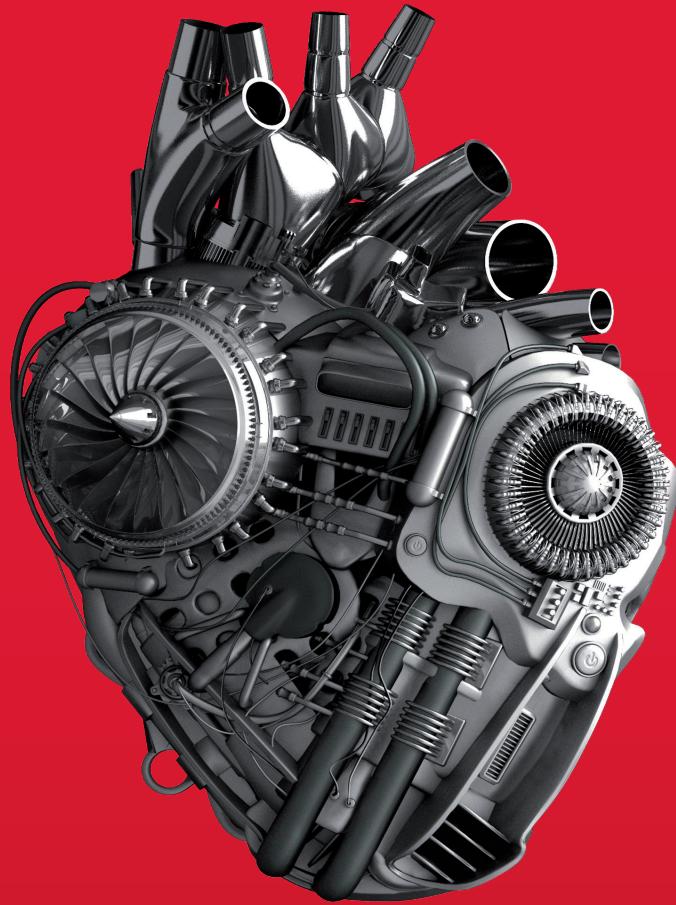
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