BUSINESS AVIATION: EBACE2017 REVIEW **PAGE 13**

JULY 2017

AMT AIRCRAFT MAINTENANCE TECHNOLOGY

MANAGEMENT • OPERATIONS • INSIGHT

GENERAL AVIATION

3-D SCANNING AS A BENEFICIAL TOOL

Why you should be using it for your aircraft inspections

PAGE 30

AIRLINE:

OEMS LEVERAGE TECHNOLOGIES TO LOWER AIRLINE OPERATING COSTS

PAGE 6

INDUSTRY OUTLOOK:

FEMALE AVIATION PROFESSIONALS ARE IN DEMAND

PAGE 26

www.AviationPros.com

CONFIDENCE IN THE COCKPIT.

When the Phillips 66® Aerostars take to the skies, they bring more than acrobatics. They also bring the engine oil they count on. Each high-flying performance relies on the unmatched, year-round protection of multiviscosity aviation oil. Faithful starts. Smooth oil flow. Clean engine operation. Everything a pilot demands.

PHILLIPS 66

PHILLIPS66LUBRICANTS.COM

AMT AIRCRAFT MAINTENANCE TECHNOLOGY

CONTENTS: JULY 2017

ON THE COVER: Stefan Hokuf from Aeroscan performs portable 3-D laser scanning on a current restoration of P-51C "Lope's Hope III" at AirCorps Aviation.

AT LEFT: Utilizing 3-D laser scanning to capture adjacent contours supplies excellent reference for creation of CAD models and tooling for fabrication of perfectly fitting wing fairings.

JOHN LATOURELLE

AVIATIONPROS.com

CONGRATULATIONS MY FRIEND

AMT Magazine writer Jerry Chandler received a Lifetime Achievement Award at the 2017 Aerospace Media Awards Dinner held the evening before the opening of the 2017 Paris Airshow

One of the really great parts of my role as chief editor for *Aircraft Maintenance Technology* is that I get to both meet and to work with a whole lot of great people. I first met Jerome (Jerry) Chandler over dinner in the Atlanta, GA, area some five years ago.

Last month Jerry received one of the prestigious Lifetime Achievement Awards at the 2017 Aerospace Media Awards Dinner held at the Aero Club de France in Paris. I was honored to accept this award on Jerry's behalf.

JERRY CHANDLER

Three Lifetime Achievement Awards were presented at this year's event and all of us here at *AMT* Magazine are extremely proud that Jerry's life-long career as an aviation journalist was recognized.

In addition, Jerry's article titled "Despite Concerns MRO Is Still On The Grow" published in March of 2016 in *AMT* Magazine was on the short list of nominees for the Best Aerospace & Defence Business Submission category.

Jerry's had a long and interesting aviation journalism career. He's written two aviation books, has written regular aviation feature articles for a long-list of aviation publications, as well as being called on by television news networks to comment on some of our industry's tragedies. Jerry says that each crash tells a story; each accident imparts important lessons. It's the communication of those lessons that drives him to this day.

In parallel with his aviation writing career he taught journalism for 30 years at Jacksonville State University in Alabama, retiring earlier this year.

Jerry has since become not only one of *AMT*'s primary writers but also a friend. Congratulations Jerry from all of us here at *Aircraft Maintenance Technology*.

Ron

AMT AIRCRAFT MAINTENANCE TECHNOLOGY

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

Volume 28, No. 7, July 2017

Brett Ryden, *Publisher, Aviation Group*
brett@AviationPros.com, (847) 454-2738
Ronald Donner, *Editor*
ron@AviationPros.com, (800) 547-7377 Ext. 3315
Barb Zuehlke, *Senior Editor*
barb@AviationPros.com, (920) 563-1641
Marino Boric, International Correspondent, info@aeronauticmedia.de
Contributors: Pete Bunce, Jerome Greer Chander, Jerry Hansard, Ken Heath, Stefan Hokuf, Dr. Bill Johnson, Kelly Murphy, Ryan M Poteet, Bob Saia

Julie Whitty, *Art Director*
Carmen Seeber, *Media Production Representative*
cseeber@southcomm.com
Debbie Dumke, *Audience Development Manager*

SALES
Michelle Kohn, *National Accounts Manager*
michelle@AviationPros.com, (224) 324-8529
Greg Szatko, *National Accounts Manager*
Greg@AviationPros.com, (920) 568-8314

SOUTHCOMM, INC
Chris Ferrell, *CEO*
Bob Mahoney, *CFO*
Blair Johnson, *COO*
Eric Kammerzelt, *VP Technology*
Curt Pordes, *VP Production Operations*
Gloria Cosby, *Executive Vice President, Transportation and Aviation Group*
Gerry Whitty, *VP Marketing*
Lester Craft, *Director of Digital Business Development*

SouthComm Business Media

SUBSCRIPTION CUSTOMER SERVICE
(877) 382-9187; (847) 559-7598
circ.amt@omeda.com
PO Box 3257, Northbrook, IL 60065-3257

ARTICLE REPRINTS
Brett Petillo
Wright's Media
877-652-5295, Ext. 118
bpetillo@wrightsmedia.com

Aircraft Maintenance Technology (USPS 004-989; ISSN 1072-3145 print; ISSN 2150-2064 online) is published 9 times annually in January/February, March, April, May, June, July, August/September, October and November/December by SouthComm Business Media, LLC, 1233 Janesville Ave, Fort Atkinson, WI 53538. Periodicals postage paid at Fort Atkinson, WI 53538 and additional mailing offices. POSTMASTER: Send address changes to *Aircraft Maintenance Technology*, PO Box 3257, Northbrook, IL 60065-3257. Canada Post PM40612608. Return undeliverable Canadian addresses to: *Aircraft Maintenance Technology*, PO Box 25542, London, ON N6C 6B2.

Subscriptions: Individual subscriptions are available without charge in the United States, South America, Europe, Asia and the Middle East. Complimentary electronic subscriptions are available to subscribers worldwide. Please visit www.aviationpros.com and click on "Subscribe". Publisher reserves the right to reject non-qualified subscriptions. Subscription prices: U.S. Students $25.00 per year. Non-Industry related subscribers $36 per year, $72 two years; Canada/Mexico $62 per year, $120 two years; All other countries $88 per year, $165 two years. All subscriptions payable in U.S. funds, drawn on U.S. bank. Canadian GST#842773848. Back issue $10 prepaid, if available. Printed in the USA.

Keep your aircraft operating at peak performance with unmatched technical expertise. On your schedule. On your terms.

Learn more at **service.txtav.com**.

Beechcraft | Cessna | Hawker

TEXTRON AVIATION

SIGNIFICANT MAINTENANCE cost savings will be realized with new aircraft such as the Bombardier C Series as the engine OEMs continue to improve system reliability and durability.
BOMBARDIER

OEMS LEVERAGE TECHNOLOGIES TO LOWER AIRLINE OPERATING COST

Next generation products lower fuel consumption 10 to 16 percent and offer double digit savings in maintenance cost representing as much as $1M per airplane per year for a typical operator

By Robert Saia

Technology is providing airlines significant savings in maintenance as the next generation single-aisle airplanes begin revenue service operation. Airplane and engine OEMs have leveraged advances in materials, part designs, and electronic monitoring systems to improve fuel efficiency and reliability while extending service intervals to lower overall operating cost. Both Airbus and Boeing have established record-setting backlogs as airlines upgrade their fleets with their next generation models to take advantage of the lower fuel consumption and greater maintenance efficiencies.

Airplane manufacturers have leveraged advanced technology to extend maintenance intervals by as much as 40 percent. Today's single aisle airplanes require A check and C check maintenance be performed at 600 hours and 6,000 hours, respectively. The airplane OEMs have made improvements to their new models extending service intervals and lowering maintenance requirements.

EXTENDED INSPECTION INTERVALS

Landing gear components on both the Airbus A320neo and Boeing 737MAX models have been upgraded as a result of the larger, heavier engines on these new airplanes. As a result, both airplane manufacturers are extending inspection intervals and lowering maintenance requirements. For an example, Safran Landing Systems' new carbon brake system on the A320neo incorporates improved designs giving it higher performance while improving reliability at lower maintenance cost. The

brake system has fewer pistons and more carbon to improve operational efficiency and lower maintenance. The braking system ventilation is reported to have been increased 48 percent to improve cooling and dispatch reliability. Airbus has announced that it is working to extend major airframe checks on the neo models with many of the A and C check maintenance procedures being extended to 750 hours and 7,500 hours, respectively.

BOEING

Boeing has upgraded the data recording and monitoring capabilities of the 737MAX by providing an onboard network system. This system improves the recording of key data and integrates this data with troubleshooting onto a single system. The improved monitoring system includes onboard tire pressure and brake temperature. The onboard network file server performs many of the aircraft's self-diagnostics providing a more comprehensive overview of the aircraft's components. This system increases data availability and communication for the airline's ground personnel improving maintenance efficiency.

The Bombardier CSeries models have increased A check and C check intervals to 850 hours and 8,500 hours, respectively, enabling airlines to extend service intervals and lower operating cost. There are only seven maintenance tasks under 850 flight hours. These tasks can be completed during routine overnight activities. The advanced health monitoring system of the CSeries integrates airplane and engine monitoring systems providing line maintenance personnel the ability to quickly service and troubleshoot problems to minimize flight disrup-

AN AIRBUS A320neo aircraft, powered by Pratt & Whitney's PurePower® PW1100G-JM engines.
PRATT & WHITNEY

tions. The CSeries monitoring system reports the status of 34 main systems with approximately 5,000 parameters allowing maintenance personnel to review and service the airplane quickly. Over 70 percent of the line replaceable units, LRUs, can be replaced within 15 minutes. The monitoring of these LRUs and other aircraft systems will significantly improve the airline's maintenance capability thus improving dispatch reliability and operational efficiency.

NEW FUEL-EFFICIENT ENGINES

The combination of these airplane systems advancements with the new engine designs of Pratt & Whitney's Geared Turbofan Engine®, the PW1000G, and CFMI's LEAP models significantly lower airline operational cost by improving fuel efficiency, lowering airport fees associated with noise and emissions, and reducing maintenance and repair cost. Both engine OEMs have enhanced their engine electronic controls to improve reliability. The engine manufacturers have expanded data monitoring including the ability to validate and synthesize engine measurements should a measurement sensor fail. These new powerplants have up to 40 percent more sensors enabling a significant increase in parameter recording. Enhanced troubleshooting with the addition of prognostic capabilities improves fault detection and engine maintenance action effectiveness. Airlines are using this monitoring capability to optimize maintenance programs including performing preventative maintenance to improve dispatch reliability.

Other engine design features to improve maintainability include improved inspection and expanded on-wing repair capabilities, improved resistance to foreign object damage (FOD), and optimized designs for the line replaceable units (LRUs). As an example, the designs of the fuel and oil systems as well as electrical harnesses have been optimized for maintainability. LRUs are more accessible allowing removal and replacement under 30 minutes.

What do these OEM technologies provide to the airlines in terms of savings? For the typical 150- to 200-passenger jet operating in North America, fuel cost represents ~35 percent of the airline's operating cost while maintenance represents ~15 percent. These next generation products lower fuel consumption 10 to 16 percent and offer double digit savings in maintenance cost. These savings can represent as much as $1M USD per airplane per year for a typical operator.

Is there more to come? OEMs are providing comprehensive support to the airlines leveraging their product design knowledge and engineering expertise to develop improved repairs and maintenance procedures. Leveraging the use of "big data" and other leading-edge tools to better understand operational characteristics will allow the OEMs to improve reliability and tailor maintenance procedures for regional influences and specific operator utilization rates. They continue to invest in advanced technologies with the goal of lowering cost of ownership while being a good steward of the environment and improving flight safety. ***AMT***

ROBERT (BOB) SAIA began a consulting company after retiring from Pratt & Whitney Aircraft in June 2014. Bob's last position at P&W was VP, Commercial Engine Development Programs. Bob led an interdisciplinary team that developed and brought to market the company's next generation of commercial engines, the Pratt & Whitney PurePower® PW1000G engine with Geared TurboFan™ technology. Bob began his career with Pratt & Whitney in Engineering and later moved into Business and Program positions. Bob's consulting company specializes in providing technical services, strategic business development and marketing services. He can be reached at robert.saia@comcast.net or (860) 874-9323.

BROWN TOOL SPOTLIGHT

Feature products and special deals on quality tools you can use!

FREE SHIPPING!
For orders over $95 that are paid with a credit card and shipped to ANY address in the USA!

Any sale prices shown are guaranteed good thru September 30, 2017.

CHICAGO PNEUMATIC RIVET GUNS – OUR BEST RIVET GUN!

The gold standard in the aerospace industry! CP rivet guns have been used by professional aircraft technicians around the world for over 60 years. The teasing throttle trigger is superb and allows for smooth and precise control. Industry standard .401 shank opening, retaining spring included.

Model	Size	BPM	Length	Weight	Price	Sale Price
CP4444-RURAB	2X	2580	6.7"	2.2 lbs	~~$789.95~~	$689.95
CP4444-RUSAB	3X	2160	7.3"	2.3 lbs	~~$789.95~~	$689.95
CP4444-RUTAB	4X	1740	8.3"	2.75 lbs	~~$799.95~~	$699.95

SAVE $100!

V-DRILLGUIDES® - DRILL STRAIGHT EVERY TIME!

STANDARD V-DRILLGUIDE®

17 fractional sizes: 1/8", 9/64", 5/32", 11/64", 3/16", 13/64", 7/32", 15/64", 1/4", 17/64", 9/32", 19/64", 5/16", 21/64", 11/32", 23/64", & 3/8". 5-1/2" long X 9/16" wide X 7/8" high. **MADE IN THE USA!**

BAT-VDG17 ~~$29.95~~ $24.95

METRIC V-DRILLGUIDE®

NEW PRODUCT

17 metric sizes: 3, 3.3, 3.5, 4, 4.2, 4.5, 5, 5.5, 6, 6.5, 6.8, 7, 7.5, 8, 8.5, 9, & 9.5mm. 5-1/2" long X 9/16" wide X 7/8" high. **MADE IN THE USA!**

BAT-VDGMET ~~$29.95~~ $24.95

LARGE HOLE V-DRILLGUIDE®

NEW PRODUCT

9 Fractional sizes: 3/8", 25/64", 13/32", 27/64", 7/16", 29/64", 15/32", 31/64", & 1/2". 5-1/4" long X 1" wide X 7/8" high. **MADE IN THE USA!**

BAT-VDG9 ~~$31.95~~ $27.95

MINI V-DRILLGUIDE®

NEW PRODUCT

Includes 21 sizes: #10, #21, #25, #29, #30, 1/8", #33, 7/64", #36, #37, #38, #40, 3/32", #43, #45, #47, 5/64", #50, 1/16", #53, & 3/64". 3-5/8" long X 5/8" wide X 1/2" high. **MADE IN THE USA!**

BAT-VDG21 ~~$28.95~~ $24.95

CYLINDRICAL CLECO TOOL FOR TIGHT AREAS

NEW PRODUCT

This new patent-pending tool was recently created by an aircraft technician and solves the problem of not being able to easily install or remove cylindrical body clecos in areas where you are up against aircraft structure like bulkheads or ribs. It is about half the diameter of the common "donut" tool. Head diameter is only 7/8"! 3" overall length. Bearing is imported, but all machining, assembly, and powder-coating is done in the USA!

BAT-CBHT-03 ~~$29.95~~ $25.95

browntool
brown aviation tool supply company

1.800.587.3883 | WWW.BROWNTOOL.COM

KNIPEX TOOLS

KNIPEX industrial-grade tools are made in Germany and are intended for the professional aircraft technician. All models on this page feature durable non-slip dipped handles. And now you can save money on some of the very best hand tools in the industry because all in-stock KNIPEX tools are on sale!

KNIPEX SMOOTH JAW PLIER WRENCHES

A revolutionary and ergonomically-designed tool for gripping, holding, and bending. Unique cam action ratcheting system for easy and incredibly fast operation. 13 position push button ensures a perfect fit and the cam action design provides enormous leverage. Made in Germany. Choose from five sizes.

Model	Length	Max. Jaw Opening	Price	Sale Price
86-03-125	5"	7/8"	~~$52.95~~	$47.95
86-03-150	6"	1"	~~$52.95~~	$47.95
86-03-180	7"	1-3/8"	~~$55.95~~	$50.95
86-03-250	10"	1-3/4"	~~$59.95~~	$54.95
86-03-300	12"	2-3/8"	~~$72.95~~	$67.95

KNIPEX CANNON PLUG/CONNECTOR PLUG PLIERS

Super quality! Features 25 different adjustment positions for a huge range – works with connector plugs from 3/8" all the way up to 3" in diameter. Pads are positively secured in place with screws. 9.85" long.

81-11-250 ~~$69.95~~ $62.95

KNIPEX CABLE SHEARS

Cuts aluminum and copper single and multiple strand without crushing or deformation. 15mm (.59") capacity. 6-1/2" long.

95-11-165 ~~$37.95~~ $33.95

KNIPEX 6-1/4" END-CUTTING NIPPER PLIERS

Super high-quality - special hardened cutting edges (approximately 61HRC hardness!) are perfect for cutting both soft and hardened wires. 6-1/4" long.

68-01-160 ~~$25.95~~ $22.95

KNIPEX ALLIGATOR® PLIERS

Nine adjustment positions offer superb output and comfort. The KNIPEX design gives you up to 30% more gripping capacity than conventional grooved pliers. Made of chrome vanadium steel and oil hardened for durability and long life. Choose from two models.

Model	Length	Max. Jaw Opening	Price	Sale Price
88-01-180	7-1/4"	1-3/8"	~~$29.95~~	$26.95
88-01-250	10"	1-3/4"	~~$31.95~~	$28.95

KNIPEX DUCK BILL PLIERS

Excellent, high-quality pliers are 6-1/4" long and have a 55mm (2-11/64") jaw length. Manufactured from chrome vanadium steel and oil-hardened for durability.

33-01-160 ~~$42.95~~ $38.95

KNIPEX 70° NEEDLE NOSE PLIERS

8" overall length. 2-7/8" jaw length. Diamond-pattern serrated jaws for max grip.

38-71-200 ~~$42.95~~ $38.95

MILBAR SAFETYTWIST® PLIERS

From the world's leading safety wire tool manufacturer, our Milbar Safety Wire Pliers feature a diagonal nose design and an automatic spring return with industry standard right hand twist. Choose 6" or 9" model. **MADE IN THE USA!**

11WS 6" Plier ~~$98.95~~ $78.95
1W393 9" Plier ~~$99.95~~ $79.95

STARRETT® 8 PIECE PIN PUNCH SET – USA MADE!

Super high-quality Starrett® Pin Punches with knurled handles. 4" overall length. Includes sizes 1/16", 3/32", 1/8", 5/32", 3/16", 7/32", 1/4", & 5/16". Fitted pouch included. **MADE IN THE USA!**

S565PC ~~$59.95~~ $54.95

STARRETT® 8 PIECE BRASS PIN PUNCH SET – USA MADE!

Brass is useful in many areas because it is softer than standard steel and has non-sparking properties. 4" overall length. Includes sizes 1/16", 3/32", 1/8", 5/32", 3/16", 7/32", 1/4", & 5/16". Fitted pouch included. **MADE IN THE USA!**

SB565Z ~~$64.95~~ $59.95

STARRETT 5 PIECE 8" LONG PIN PUNCH SET – USA MADE!

8" overall length – "punch" portion is 3-1/2" long. Includes sizes 1/8", 3/16", 1/4", 5/16", & 3/8". Storage pouch included. **MADE IN THE USA!**

S248PC ~~$56.95~~ $51.95

SIOUX™ ENGRAVING PEN

Carbide tip operates at 13,000 cycles per minute and will easily scribe metals, plastics, woods, or just about any material. 5 ft "no-twist" hose included. High quality stainless housing.

5980 ~~$79.95~~ $72.95

THREADED PAINT CUTTERS – 5 PIECE KIT

Save your paint job and make the job of removing painted over screws easier than ever. Awesome quality and unlike competitive tools, ours are color coded for easy size selection and are **MADE IN THE USA!** Choose this five piece kit which includes cutters for #4, #6, #8, #10, & 1/4" screws, or, visit our website to buy individual sizes.

BAT-PC5PC $89.95

5 PIECE BONDING BRUSH SET

1/2" OD stainless steel brushes are used to remove paint & primer to ensure electrical continuity. Choose this five piece kit which includes 3/32", 1/8", 5/32", 3/16", & 1/4" piloted brushes, or, visit our website to purchase individual sizes. **MADE IN THE USA!**

PBB-SET $64.95

6 PIECE DRILL BUSHING KIT

Drill straight every time! Kit includes one "Egg Cup" Bushing Holder and five different 1/2" Diameter Slip Bushings (#40, #30, #21, #10, & 1/4"). You would pay $64.70 if purchased individually – **buy this kit and save $19.75!**

BHSB-6PC $44.95

4 PIECE LONG RIVET GUN PUNCH KIT

"Punch" portion is 1-3/4" long, 3-1/2" overall length. .401 shank. Includes sizes 1/8", 5/32", 3/16", & 1/4".

BAT-LG4PC $29.95

METAL MINA-VAC BY SNAP-ON SPECIAL PRODUCTS !

This is NOT the cheap Chinese clone sold by our competitors, ours is the real deal and is **MADE IN THE USA!** Extremely well-made tool – manufactured for Brown Tool by Snap-On Special Products Division in the USA. Operates off of standard shop air. 12" flex hose included.

AT560M ~~$53.95~~ $41.95

SAVE MONEY WITH OUR CUSTOM KITS!

10 PIECE MASTER HOLE FINDER KITS

Save by buying our standard and inverted Hole Finder Kits at once. Kit includes one standard bushing style and one inverted style hole finder in each of the five popular sizes: #40, #30, #21, #10, & 1/4" – 10 pieces in all! Choose 8-1/2" standard length or the extra-long 13-1/2" length. **Or, buy both 10 piece kits at one time and save even more!**

Part Number	Description	Price
HFSTIN-10	10 pc 8-1/2" Master Hole Finder Kit	$46.95
HFSTINEL-10	10 pc 13-1/2" Master Hole Finder Kit	$59.95
HFSTIN-20PC	Both kits – 20 pieces in all!	$99.95

12 PIECE NUTPLATE JIG KIT

A BrownTool exclusive! Save over $60 off individual prices. Kit includes our 12 most popular Nutplate Jigs (double wing & single wing in both standard and space-saver spacing for #8, #10 & 1/4" screws). **MADE IN THE USA!**

BAT3518-KIT12 $319.95

9 PIECE COUNTERSINK CAGE & CUTTER KIT

Kit includes model CC01 Standard Duty Countersink Cage and eight 100° Piloted Countersink Cutters in sizes #40, 1/8", #30, 5/32", #21, 3/16", #10, & 1/4". Stored in a custom fitted case.

BAT-CSK-9 $69.95

19 PIECE RIVET SQUEEZER KIT

Includes assortment of 3/32", 1/8", 5/32", 3/16", 1/4", & Flush Rivet Squeezer Sets. Stored in a custom fitted storage box. **MADE IN THE USA!**

BAT-SQZ-19 $97.95

DELUXE TATCO RIVET SQUEEZER KIT

Includes TATCO Rivet Squeezer Handles with three yokes – 1-1/2", 2", & 3". Also includes 4 cupped squeezer sets (3/32", 1/8", 5/32", & 3/16") and 2 flush squeezer sets. Completely **MADE IN THE USA!**

DTATK-9 $329.95

ECONOMY HAND SQUEEZER KIT

Our light/medium duty rivet squeezer is comparable to the tools offered by our competitors and is perfect for many squeezing applications. You get squeezer handles with a 1" and 3" reach yoke. Also includes 4 cupped squeezer sets (3/32", 1/8", 5/32", & 3/16") and 2 flush squeezer sets. Imported.

BAT-HSKIT8 $124.95

3 PIECE MULTI STEP DRILL KIT

With this comprehensive kit, you can easily drill holes from 1/8" thru 3/4" in diameter. Contains one each of all three of our Step Drills. Complete with a custom fitted case for easy storage when not in use.

BAT-SDK3 $67.95

browntool
brown aviation tool supply company

TOLL FREE **800.587.3883** LOCAL **405.688.6888** FAX **405.688.6555** E-MAIL **information@browntool.com**

STATIC DISPLAY at EBACE 2017 in Geneva, Switzerland.

IMAGES COURTESY OF MARINO BORIC

EBACE2017

IS BUSINESS AVIATION **COMING BACK ON TRACK?**

By Marino Boric

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

AMT WAS AT EBACE 2017 IN GENEVA TRYING to find the direction the business aviation market — not only in Europe — is heading to. The voices collected on-site were dominated by a hope in a better tomorrow. Hope is difficult to quantify and hope is definitively not a valid system so the outlook is kind of sluggish but despite everything, many market subjects see the light at the end of the tunnel. The show clearly benefited from spring-like weather, but also from the first encouraging signs that European business aviation is returning to growth.

Just after the end of the 2017 European Business Aviation Convention & Exhibition (EBACE2017), organizers declared that the show was one of the most successful in recent memory, with more than 400 exhibitors from 40 different countries and over 10,000 attendees. Some 450 journalists covered the event being able to see 56 aircraft on static display on Geneva International Airport and three more located inside the Palexpo exhibit hall. According to Brandon Mitchener, the new CEO of EBAA, many more aircraft would have come to Geneva but the space this year was limited because of the construction work at the airport. This year attendees could not just walk out to the static display, as in previous years, but it wasn't a real problem as the organization of the short and frequent bus commuter link was perfect. And all attendees in Geneva received a free "Geneva transport card" valid for all public transportation services.

EBACE is jointly hosted by the National Business Aviation Association (NBAA) and the European Business Aviation Association (EBAA). This year's show took place from May 22 to 24 at Geneva's Palexpo conference center and Geneva International Airport. Well, some journalists remember the times when the EBACE was big-

ger and more crowded, but frankly said, EBACE2017 was big enough to be the most important event in Europe of this kind, but small enough so one can attend most of conferences and workshops not having to neglect the personal contacts in the exhibition halls.

As usual at this kind of event, one day prior to the opening of the show, many press conferences took place in a well-organized manner and conveniently located in a single hall.

The EBACE2017 week kicked off with the full up Opening General Session led by the solar aviation pioneer, Dr. Bertrand Piccard, Solar Impulse chairman and pilot, the first pilot to fly around the world entirely on solar power aboard the Solar Impulse aircraft. He described in his inspiring and motivating speech his challenging experience, predicting that only innovation can and would lead aviation toward a more sustainable future. Piccard encouraged the audience to start thinking in a non-conventional way, because that's the only way we could find solutions for a better future.

Panels and education sessions held throughout the show covered timely and important issues, such as the possible disturbances created by the Brexit, growing opportunities for young professionals, and security and top advocacy priorities across Europe. EBACE2017 also included two, really well-attended, day-long seminars where experts analyzed and advised aircraft transactions and business aviation safety. The first edition of Careers in Business Aviation introduced more than 250 students, from about 120 schools across Europe, to the broad range of opportunities in the industry.

An important number of OEMs held maintenance and operations sessions, and EBACE showcased business aviation's sustainability. Bombardier brought the entire fleet to Geneva using biofuel. We could see several new aircraft models, such as the Airbus ACJ330neo, and new partnerships, including a teaming between Bombardier, Nextant, and Rockwell Collins on the Challenger 604. Similar news came from joint actions between Aerion and GE Aviation.

BREXIT DEBATE

This was one of the extremely well attended debates at EBACE2017. The situation is still not clear as the British government has not yet started the Brexit negotiations. Most panelists and insiders were worried that

this process will take too long, possibly too long for some active subjects in the field, and possibly some damage to the industry may occur. The common wish and hope, specially on the British side — was that, somehow, the status quo may be preserved. This was marked by a big question mark by other EU-non British-panel members.

According to Giulia Mauri's, law partner at Pierstone, calculation, it will take about six to eight years to negotiate a trade deal. For British negotiators looking to preserve access to the European market after Brexit, "there's about 18 months." The situation could become even worse if there will be a need to negotiate 27 trade deals in 18 months (27 is the number of remaining countries in the EU). Mauri added: "Imagine a Europe where we go back to country-by-country, bilateral trade negotiations. ... that's the worst-case scenario."

ANALYSTS SEE FUTURE GROWTH IN EUROPE

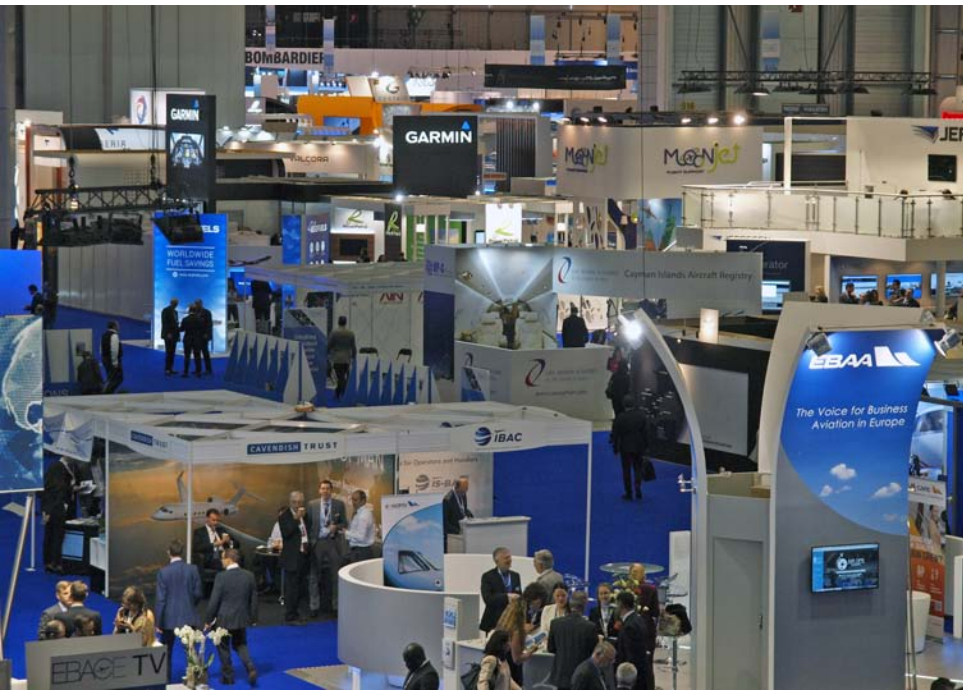
After a decade of stalled recoveries, this year business aviation has posted a steady growth across Europe for the six months prior to April 2017. But does that portend a full recovery, or just another blip? "If you look at the trend lines for the business aircraft fleet and GDP, we probably had overbuilding from about 2005 to 2008, but after 2008, we probably under-built aircraft," said Richard Aboulafia, vice president of analysis at Teal Group. "We will return to growth, but we might not return to the 2007 market peak until 2021."

BRANDON MITCHENER, current CEO of the European Business Aviation Association during EBACE2017 opening ceremony.

Marc Bailey, the CEO of the British Business and General Aviation Association (BBGA), assured EBACE2017 attendees that the industry was united, and committed to advocating for preserving as much of the status quo — and the single market in aviation — as possible.

TOO MANY PLATFORMS?

Analysts at the panel admitted forecasting was as difficult as ever. The stock market



PANELISTS DISCUSS the possible implications of Brexit on air transport in Europe.

is often a leading indicator for aircraft deliveries, and global markets are up in the last six months. However, investors have shown signs of skittishness. The oversupply of pre-owned aircraft is exacerbated, the panelists agreed, by OEMs rolling out new platforms and cutting prices to keep factories open.

"OEMs are spending heavily on new models. That's a reason to be concerned," said Aboulafia. "We're seeing some aircraft platforms end. We better have the growth we're forecasting, otherwise we're going to see some pain."

DIGITIZATION. COMMODIFICATION?

Against those concerns, based on fleet and delivery data, Richard Koe, managing director of WINGX Advance, pointed to aircraft utilization data for signs of optimism specially considering the growth for on-demand charter of 10 percent.

Richard added that the aircraft inventory is being digitized and charter is being digitized — those effects should not be underestimated.

According to Oliver King, acting CEO of Avinode Group, "Charter is definitely on its way to becoming a digital product. 'Do people want to book aircraft online?' According to King that discussion is over and the clear answer is "yes." The question is now if an operator can make money that way. At the lower end of the market, with turboprops and light jets, the panelists agreed operators could grow a successful business model based on digital booking.

SET — THE RISE OF THE SINGLES

The market is commodifying and expanding, and there is now a realistic hope that the demand for simpler products will rise. The approval by EASA and the European Union in March for commercial single engine turboprop (SET) operations in instrument meteorological (IMC) conditions and at night, seemingly came at the right moment.

COMMERCIAL SINGLE Engine Turboprop (SET) operations in instrument meteorological conditions and at night, has seemingly come at the right moment.

This change of long-standing rules in Europe seemingly is going to provide a breakthrough for single engine turboprops and — some strongly hope — those aircraft might compete with small jets. There are several appealing choices in this field like the freshly announced Cessna Denali or a brand new Piper M600 (was on static display) but in this field even European manufacturers are well placed. Here we have to mention the proven workhorse from Switzerland, Pilatus PC-12NG and the French Daher TBM 910/930. Nicolas Chabbert, senior vice president of Daher, said at EBACE: "This is a major milestone," laying out a case for Daher's TBM 910 and TBM 930 as the platforms best suited to serve this new European market. According to Chabbert, TBM aircraft can access more than 1,300 airports in Europe, 44 percent more than light jets, opening new destinations to commercial operations. This was already proven by the French charter operator Voldirect which has been providing charter service since 2013 with a TBM, under an exemption granted by the French government, and has logged more than 1,200 charter flights without any safety issues. Simon Caldecott, Piper CEO, who was present at EBACE, was more than pleased with the development in Europe.

Even the GE new Advanced Turboprop (ATP) fits almost perfectly in this positive SET — operations frame. GE has selected Europe as hub for its ATP — this powerplant will be manufactured in Czech Republic and is being prepared for its first run. Stay tuned, *AMT* will report from the factory.

Brandon Mitchener, who attended his first EBACE as the new CEO of EBAA, was pleased by his debut saying "We could easily sell more static display if we had more space, but we don't." Mitchener, who is used to conventions and exhibitions in other industries, said, "the cool factor of business jets and business helicopters ... is just how small and close-knit the community is." Adding: "Everyone knows everyone. There is a sense of family." I can subscribe to this statement — it is probably the best definition of EBACE you can get.

Next year's EBACE will return to Palexpo and Geneva International Airport on May 29-31, 2018. ***AMT***

DEICE BOOT MAINTENANCE 101: THE WHY AND HOW OF PNEUMATIC DEICE BOOT CARE AND REPAIR

By Jerry Hansard and Ken Heath

While maintaining a plane's airworthiness involves complex electronic and mechanical systems, it also requires attention to seemingly simple inspection and maintenance routines. One of the systems requiring vigilance is the pneumatic deice boots found on a wide variety of general aviation and business aircraft and regional carrier turboprops.

JUST PRIOR to installation, connect the air/vacuum supply to the deicer; apply vacuum while installing deicer.

IMAGES COURTESY OF UTC AEROSPACE SYSTEMS

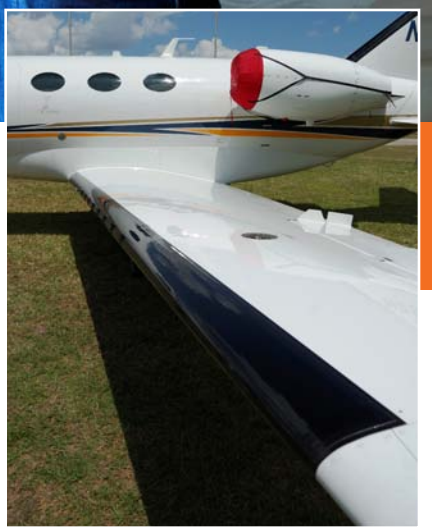
Unlike engines and other mechanical systems — where maintenance is often scheduled based on flight hours — deice boots can be subject to wear or damage whether an aircraft is in the air, on the tarmac, or even in a hangar. This means the boots used in pneumatic deicing systems require ongoing attention and care.

The most constant threat to the boots is ozone, which can cause neoprene (a popular synthetic rubber boot material) to crack along exposed or stretched surfaces. A plane doesn't have to be in the sky to be exposed to ozone; ozone is everywhere. Even "normal" air can have up to 0.01 ppm of ozone, but the presence of electrical equipment or lighting, both of which abound at airports and in hangars, can increase ozone exposure.

In addition to ozone, deice boots are subject to in-flight risks like storm damage and contact with debris or birds, plus on-the-ground accidental damage due to bumps and pokes by people, objects, and even other planes. Taken together, it's easy to see why maintenance technicians at service centers and FBOs need to pay careful attention to boot inspection and preventive maintenance, along with repairs or replacement as needed.

Invented by B.F. Goodrich more than 80 years ago, pneumatic deice boots and their method of operation haven't changed significantly, but their performance and longevity have been gradually enhanced through the use of newly engineered materials and manufacturing methods. While a high percentage of today's deice boots are still made from the familiar black neoprene, boots are also available in an engineered polymer called Estane®, and in a silver-colored urethane material that offers better aesthetics and durability. Regardless of brand or materials, pneumatic boots continue to be popular for small- and medium-sized aircraft due to their low cost of ownership, low weight, low energy burden, and dependable performance.

When properly installed, maintained, and operated, the function of deice boots is to help maintain control of an aircraft under icing conditions. A critical factor in maintaining this performance is a regular schedule of inspection, repair, and/or replacement. Although typical neoprene boots last from three years to even a decade or more with



PROPER DEICER installations require the use of rollers, following the manufacturer's instructions.

CESSNA MUSTANG with Goodrich deice boots is shown at right.

proper care, the best time to detect problems with deice boots is on the ground.

INSPECTION

Deice boot inspections should be performed before and after every flight. As a first step after landing, wash the boots with mild soap and warm water to remove insects and other debris before it dries. After boots are cleaned and dried, perform a visual inspection for damage of any kind. It is relatively easy to detect even minor surface imperfections by looking along the length of the boot's leading edge under a good reflecting light source.

While pilots or aircraft owners may perform visual inspections, it is common and often prudent to have deice boots inspected by an FAA-certified technician who holds an Airframe and/or Powerplant (A&P) certificate — especially if remedial action, such as corrosion repair, is needed. Following are types of deice boot wear and tear often encountered during inspections.

Abrasions or erosion: Abrasions can occur from accidental damage during storage or maintenance, in prop-wash areas, or during high-speed flight in dust-prone regions. Mild abrasions or erosion can be treated to restore boots to a serviceable condition, but surface damage that exposes stitch-line threads or allows excessive air leakage will require removing and replacing the entire deice boot.

Cracking: Contrary to popular belief, cracking is not caused by UV light but by ozone. As already mentioned, cracks in neoprene rubber are generally caused by an accumulation of ozone damage over time. Boots without proper surface conditioning treatments can crack even if hangared. Excessive cracking mandates removing and replacing deice boots. Also, don't confuse surface cosmetic treatments with conditioning treatments, as they may not provide any protection from ozone damage. Aside from neglecting proper maintenance, using unauthorized solvents, adhesives, waxes, or polishes can also cause an entirely different type of surface damage. For instance, waxes and polishes not endorsed by the manufacturer can themselves crack due to the typical harsh conditions to which aircraft are exposed. This type of surface cracking, no matter how minimal, may actually increase ice accretion, as the cracks create anchor points for ice to bond to. The best advice is to follow the manufacturer's recommendations and maintenance manuals.

Deice Boots Inspection/Maintenance Schedule		
ACTION	CRITERIA	FREQUENCY
Visual inspection	Look for cuts, pinholes, cracking, etc.	Before and after every flight
Washing deice boots	Use approved materials	Very frequently, especially after flight
Rubber preservative for neoprene deicers	Use approved materials	Every six months
Cosmetic treatments	Use approved materials	As needed, 2–3 times/year
Ice adhesion inhibitor	Use approved materials	Every 50 flight-hours during icing season

MAINTAIN AND extend deice boot life and performance by using specified care products.

Pinholes: Generally defined as holes 1/16 inch or less in diameter, pinholes can be common occurrences on deice boots. The holes are not caused by physical damage, but by the discharge of static electricity that builds up on the boot's leading edge during flight. If pinholes have occurred but are not too numerous, the holes can be repaired. Goodrich's pinhole repair kit (P/N 74-451-AE) consists of a two-part adhesive; the application of the adhesive results in a controlled amount of material that repairs the displacement of the static discharge and is aesthetically pleasing. Installing a boot with a conductive edge sealer that properly grounds the boot to the metallic wing can reduce or eliminate pinholes.

Cuts and tears: Usually caused by foreign object debris (FOD), cuts and tears can be repaired if they are small and widely dispersed. There is an upper limit to both the size of a repair patch, and the number of repairs that can be made in a given area. Damage that exceeds these limits requires boot replacement. Also, if boot damage results in a cut or broken stitch line, then the boot must be replaced.

Delamination and debonding: Raised or swollen areas of a boot may indicate delamination between the internal fabric and the rubber boot layers. Alternatively, raised areas may indicate the boot has debonded from the wing's surface due to adhesive failure (due to unapproved thinning or improper application) or improper installation. Both delamination and debonding can be caused by water or fuel getting trapped between the boot and the wing, leading to corrosion of the aircraft's metal skin. Debonding can also occur if boots are installed over a faulty fuel-tank seam in wet-wing applications. If delamination or debonding are found, the deice boot must be removed, the underlying corrosion repaired, and a new boot installed.

RAPCO, inc.

REPLACEMENT AIRCRAFT PARTS CO.

Rapco, Inc. can help you reduce maintenance costs...this is good for you and your customer. With the impact fuel prices have had on general aviation flying, and the resulting impact on maintenance facilities, everyone needs to find a way to decrease their operating costs, without sacrificing quality or safety. Rapco can help.

All Rapco parts are FAA-Approved, warranted better than the OEM, to save you and your customers money. Call now to see how we can help you - 1-800-527-2726

Vacuum Pumps

Easily check vane wear

Brake Discs

Over 80 direct brake disc replacements

Electroless Nickel plating

Fuel Pumps

De-Ice Components

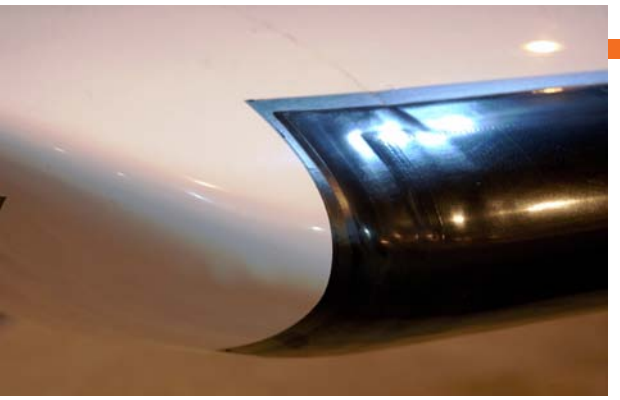
Leads, boots, modules, brushes & more

Visit: http://www.rapcoinc.com
for product information, application guides and distributor information

Request an e-card
at www.rapcoinc.com

www.rapcoinc.com

1-800-527-2726



LEFT: PHOTO shows a completed deicer installation with Conductive Edge Sealer P/N 74-451-11 applied.

RIGHT: PHOTO shows deice boot with cosmetic treatment applied.

Air leaks: Whatever their cause, air leaks prevent deice boots from operating at optimum efficiency, which can in turn damage the entire deicing system. Because the boots operate under a vacuum when in normal flight, leaks allow moisture to be drawn into the boot and potentially into the system's control valves, creating a risk of system operation damage. Before inspecting for leaks, boots should be inflated to operating pressure. It is often possible to hear or feel the air leaks during inspection, but a tried-and-true technique is to simply brush a mixture of mild soapy water over the inflated boot and look for bubbles.

PREVENTIVE MAINTENANCE

While physical damage to pneumatic deice boots can happen at any time, most age-related deterioration affecting longevity or reducing deicing performance can be forestalled by proper preventive maintenance. In addition to frequent cleaning and inspection, regular preventive maintenance consists largely of using manufacturer-approved care products and boot treatments. These treatments protect the neoprene from ozone damage, reduce cosmetic UV fading on both neoprene and Estane boots, or even enhance the release of ice from the boot during operation.

Approved cleaning agents: Among the approved cleaning agents for all types of deice boots are mild soap and water, a mixture of one part 5 percent vinegar to one part water, a mixture of one part household ammonia to one part water, or a proprietary cleaning agent such as Goodrich Aerospace Cleaner™ (P/N 74-451-238) or equivalent.

Neoprene rubber preservative: When applied every six months, a rubber preservative offers good protection from weathering, ozone, and UV rays, which helps extend the useful life and performance of the deice boot. Rubber preservatives soak into the rubber, rather than coating the boot surface, and are not to be confused with a cosmetic or UV treatment. Wipe on a manufacturer-recommended preservative such as Goodrich AgeMaster® No. 1 (P/N 74-451-127) after masking off the boot to prevent staining adjacent surfaces.

High-luster cosmetic treatment: To maintain a like-new appearance, coat deice boots with the solution recommended by the boot's manufacturer two or three times per year. Before recoating, be sure to remove any residual treatments with the recommended cleaner.

UV and dust protectant: When applied as needed, a water-based cosmetic coating such as Goodrich Aerospace Protectant™ (P/N 74-451-237) or an equivalent recommended by the boot manufacturer can make the deice boot resistant to dust, soiling, and staining, and also help minimize UV-caused slow fade.

Ice adhesion inhibitor: This coating enhances performance by lowering the adhesion strength between ice and the surface of deice boots. Wipe on a thin coat of the manufacturer-recommended ice adhesion inhibitor every 50 flight-hours during the icing season.

CONCLUSION

A program of frequent inspections and regular maintenance is critical to the proper performance of pneumatic deice boots and their contribution to overall flight safety. By identifying problems early and effecting immediate repairs or boot replacement, the airworthiness of the aircraft can be assured. Always follow boot manufacturer's recommendations in terms of procedures and products. And be sure to maintain careful records of inspections, maintenance, and repairs in accordance with FAA regulations. ***AMT***

JERRY HANSARD, senior product engineer, has 31 years' service with UTC Aerospace Systems (Goodrich Corporation). He has extensive background in manufacturing and fabrication of metallic, composite, and elastomeric materials. Jerry frequently advises the Goodrich Business Development group on all on-aircraft deicing components and specialty heated products.

KEN HEATH, business development manager, has nine years' service with UTC Aerospace Systems (Goodrich Corporation), having responsibility for regional, business, and general aviation aftermarket deicing and specialty heated products. Ken works with OEM, distribution, and end-use customers globally to identify and fulfill customer needs, conduct training and participate in industry events as a subject-matter expert.

CONNECT WITH MAINTENANCE EXPERIENCE

At West Star, our maintenance experience is your asset. And, like any asset, it's only valuable when accessible. Our priority is to make it easier than ever to literally "Connect" directly to our aircraft maintenance capabilities, technical information, and facilities. More importantly, it means easier access to the right people, at the right location, right when you need them.

This ensures that as a customer of West Star Aviation, you get the full benefit of our maintenance experience in everything from structural repairs and modifications to inspections and upgrades.

We are building an open communication, no run-around approach that allows you to be confident in your decision to choose West Star Aviation for the highest quality maintenance services.

To learn how to Connect With Maintenance Experience, visit www.weststaraviation.com

#1 2017 2016 2015 2014 PREFERRED MRO PRO PILOT PRASE SURVEY

weststaraviation.com

WEST STAR AVIATION

CONNECT WITH EXPERIENCE™

FALCON	HAWKER	KING AIR
CITATION	CHALLENGER	CONQUEST
GULFSTREAM	GLOBAL EXPRESS	PIAGGIO
LEARJET	EMBRAER	OTHER

WITHOUT GENUINE LYCOMING TAPPETS, IS IT EVEN A LYCOMING ENGINE?

CHOOSE INNOVATION, NOT IMITATION.

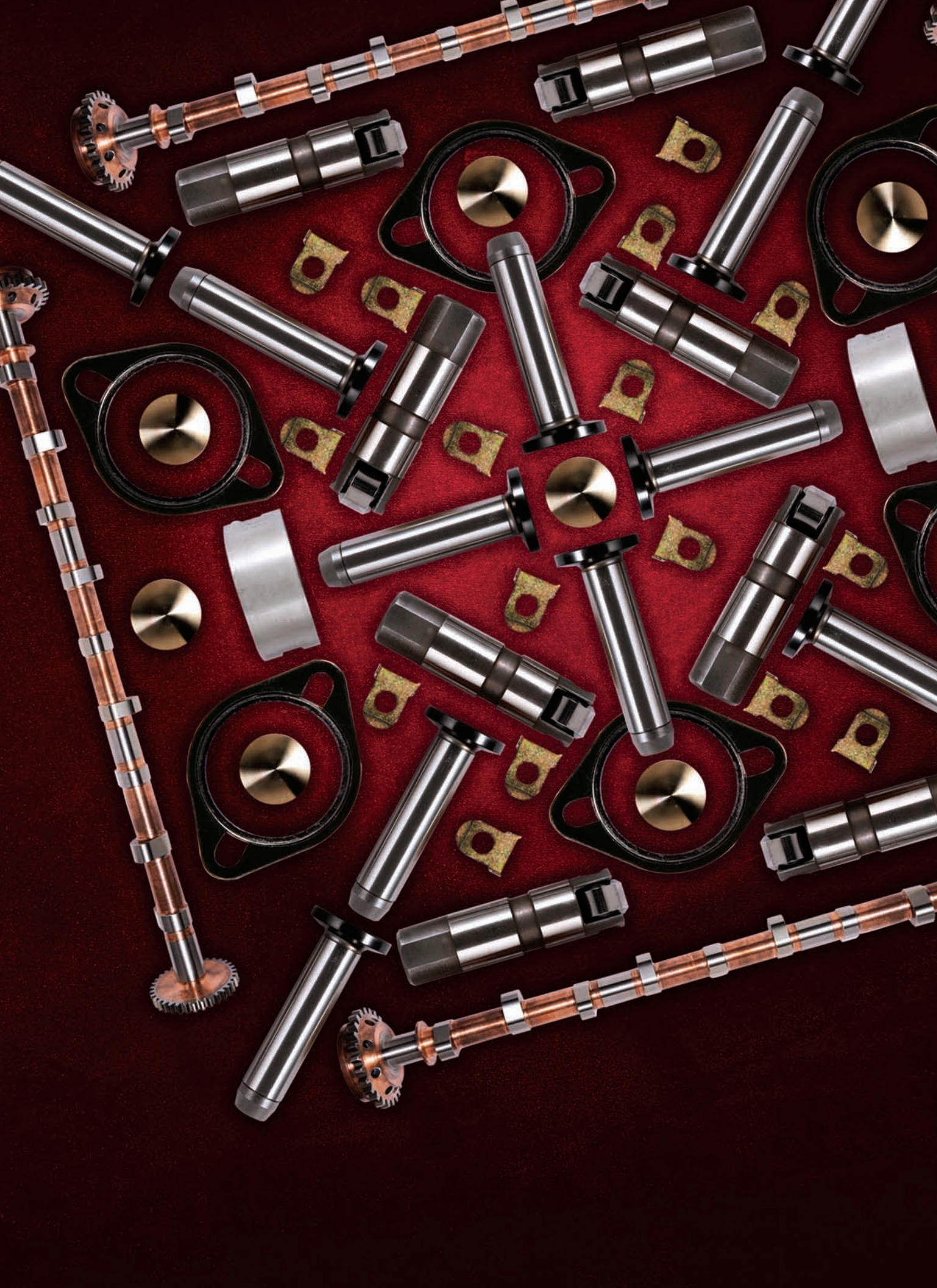
Lycoming Engines has been producing genuine Lycoming piston aviation engines and parts out of our factory in Williamsport, PA since 1929. Lycoming's Materials Laboratory is one of the most advanced of its kind. The specialized proprietary coating on our tappets is but one example of the materials science that goes into genuine Lycoming parts. With extremely low friction and superior wear resistance, this coating decreases tappet wear and improves the durability of Lycoming engines. It's innovations like these that give Lycoming parts—and, thus, Lycoming engines—their reputation for excellence. Because an engine is the sum of its parts, and genuine Lycoming parts make all the difference.

Contact an authorized Lycoming distributor to purchase genuine Lycoming parts.

LycomingParts.com

LYCOMING™

GENUINE LYCOMING ENGINE
INNOVATION
NOT IMITATION
EST. 1929
WILLIAMSPORT, PENNSYLVANIA



FEMALE AVIATION PROFESSIONALS ARE IN DEMAND

The door is wide open for today's young professionals to pursue a host of aviation careers that are in high demand

By Kelly Murphy

WOMEN IN AVIATION INTERNATIONAL (www.WAI.org), a nonprofit organization based in West Alexandria, OH, is dedicated to the encouragement and advancement of women in all aviation career fields and interests. It offers year-round resources to assist with every stage of educational and professional development from students starting their first-time jobs, experienced executives pursuing advancement, and military officers transitioning to civilian or retired life. With 13,500 members around the world, WAI also has a growing network of local chapters in over 111 locations.

Unique to WAI is its diverse membership including astronauts, corporate pilots, maintenance technicians, air traffic controllers, business owners, educators, journalists, flight attendants, high school and university students, air show performers, airport managers, and many others.

SOLID INVESTMENT IN FUTURE GENERATIONS

As a solid investment in future generations of aviation professionals, WAI's scholarship program has awarded nearly $10.6 million since the program began in 1989. Providing financial support and opportunities to young people is key to the industry's demand for more pilots, technicians, and engineers. On July 1, WAI's website (www.WAI.org/education/scholarships) will list over 100 scholarships available totaling more than $540,000 in awards. WAI membership ($45 annually) is a requirement to apply, and new this year, an applicant can apply for up to three scholarships plus an internship.

This year, WAI will mark the third annual Girls in Aviation Day, a worldwide program designed to reach aspiring aviators from ages 8 to 17. On Sept. 23, 2017, chapters and corporate sponsors will hold events for girls to learn more about aviation at airports, museums, and FBOs around the world. Individuals and companies are invited to contact a local WAI chapter to join in the fun, as volunteers are always welcome. Chapter contact details can be found at www.WAI.org/chapters.

Both the scholarships and Girls in Aviation Day programs are key initiatives to help spur young girls to think about job possibilities in aviation both inside and outside the aircraft plus all the supporting careers related to this dynamic industry.

WAI members have access to a wide variety of career and education resources including hands-on activities for classroom, club, and school organizations. In addition, an extensive mentoring program and job postings can be found at www.WAI.org/education/education-resources.

SHELLY SIMI (left) and Ashley Gudzak from Aurora Flight Sciences at the #WAI17 conference in Lake Buena Vista, FL. WAI

WAI President and Founder Dr. Peggy Chabrian says, "While the percentage of professional female pilots is relatively small at about 4.2 percent, the numbers continue to increase every year. In 2015, a total of 13,141 women held commercial and air transport pilot (ATP) certificates, up from 7,290 in 1990, for a total of 10.7 percent, compared with all similarly certificated pilots. The number of female certified flight instructors (CFIs) in 2015 reached 6,669, as compared with only 3,239 female CFIs in 1990."

She also shares that the number of female aircraft mechanics in the United States has doubled over the past 10 years to 8,400, but represents only 2 percent of mechanics worldwide, according to the U.S. Federal Aviation Administration (FAA).

GARMIN G5000

CUSTOM PAINT AND INTERIOR

AUTHORIZED MAINTENANCE

LEADING GARMIN G5000 SOLUTIONS, REDEFINED PAINT AND INTERIOR, AUTHORIZED SERVICE CENTER MAINTENANCE.

At Elliott Aviation, we are leaders in Beechjet 400A/Hawker 400XP services. As the world-wide leader in Garmin G5000 installations, we have done more G5000 installations than all other dealers in the world, combined! We also lead the industry in custom paint and interior with our exclusive weight-savings 400E program. As an authorized service center for the 400A/400XP, we can handle your maintenance, accessories parts needs and more! At Elliott Aviation, you'll land a better experience...

because of our experience.

GARMIN®

ELLIOTT® AVIATION

MOLINE DES MOINES MINNEAPOLIS 800.447.6711 ElliottAviation.com

BLUE ANGELS pose with attendees of the WAI San Diego Chapter Girls in Aviation Day 2017.
FRESH BURST PHOTOGRAPHY

Companies like Airbus, Delta Air Lines, The Boeing Company, and UPS want to hire more qualified women.

With projected needs for aviation maintenance professionals to be nearly 250,000 over the next 20 years, WAI also provides educational resources to encourage students to consider careers in this highly competitive and important career field.

ASSOCIATION FOR WOMEN IN AVIATION MAINTENANCE AND ANNUAL CONFERENCE

The 20-year-old Association for Women in Aviation Maintenance (AWAM) has a close relationship with WAI holding forums, training sessions, and workshops at WAI's annual conference.

WAI's three-day annual conference provides a unique venue for its membership to gather for education sessions, professional development seminars, training workshops and networking — lots and lots of networking. In addition, the exhibit hall features an array of technology displays and places to meet and network with 165 separate companies and organizations. Many exhibitors also attend in order to find suitable candidates for job opportunities with their organizations. "We combine technology and our traditional enthusiasm and variety of backgrounds and expertise of our attendees as the ideal formula for a successful conference," Chabrian adds.

With a nod to the important historical contributions of female aviators, WAI inducts new members to the Pioneer Hall of Fame each year during a special ceremony at each conference. These courageous women with their trailblazing experiences have paved the way for future generations.

Plans are already underway for the 2018 conference to be held in Reno, NV, March 22-24.

Showing the diversity of WAI's membership, this year marked the launch of a new marketing campaign, #IamWAI. Thousands of buttons have been distributed that members can wear at events around the country.

Another initiative launched this summer is a new membership category for women who fly or work with drones, UAS, and UAV aircraft. In late June, Women and Drones (www.WomenandDrones.com) featured a podcast with Dr. Chabrian detailing this program and plans to provide drone manufacturing tours and education sessions about this new endeavor at the 2018 conference in Reno.

Supporting this drone initiative, Sharon Rossmark, founder of Women and Drones, will be a featured speaker at WAI's fall gathering Connect Dayton, Sept. 29-30. Rossmark will focus on new business opportunities in this aviation segment. The two-day event will include tours of local aviation sites, in addition to a reception and book signing and other engaging speakers. For registration and detailed schedule visit www.WAI.org/wai-connect-dayton.

To ensure the expansion of more female aviators and reach the goal of more diversity in the cockpit and maintenance facilities, join WAI and engage, connect, and inspire! ***AMT***

KELLY MURPHY, WAI 2397, is editor-in-chief of *Aviation for Women* and director of communications for Women in Aviation International. She has been a longtime partner in Emerald Media and has recently been elected as board chairman of Angel Flight Mid-Atlantic, a nonprofit utilizing over 550 volunteer pilots to transport patients to specialized medical care.

INSIDER ACCESS. REAL-WORLD EXPERIENCE.

GET HANDS-ON TRAINING FROM THE EXPERTS WHO'VE HAD A HAND IN BUILDING THE AIRCRAFT.

Combining technology-led courses with real-world experience, TRU Aviation Maintenance Academy has created the most robust EASA and FAA certified training program for Textron Aviation equipment. Exclusive access to Cessna, Beechcraft and McCauley gives your technicians the most current and authentic training possible. Let our experts unlock your technician's potential.

TRU SIMULATION + TRAINING
A Textron Company

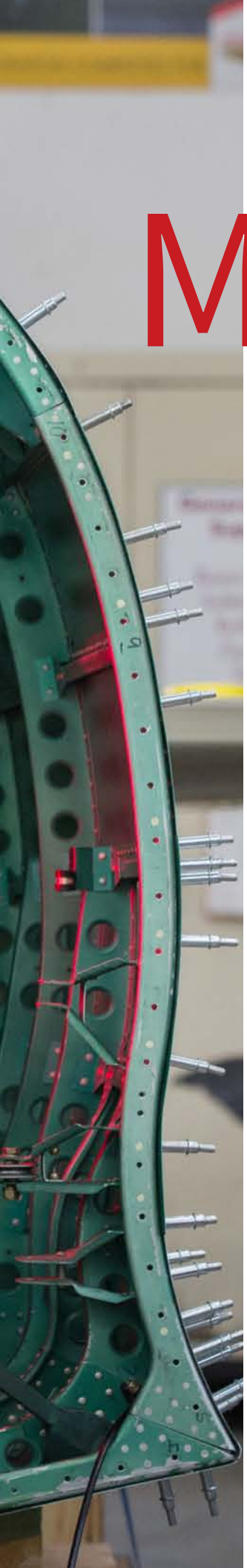
844-217-7324 | TRUsimulation.com

3-D SCANNING AS A BENEFICIAL TOOL

Why you should be using it for your aircraft inspections

By Stefan Hokuf

PORTABLE, HAND held, 3-D laser scanning excels in confined areas and shop floor conditions. JOHN LATOURELLE



Much has been made of a new technology that you've probably heard of or been watching as the future of design and manufacturing unfolds. Yes, I'm referring to 3-D printing (3-DP) or additive manufacturing. There's no doubt that 3-DP certainly is developing impressively and efficiently as a very useful process for the future of manufacturing, however, it has large limitations in its current state of practical applications. Objects physical dimensions, material specifications, and approvals for replacement to traditional processes, not to mention costs are just some of the current hurdles that will take more time to justify 3-DP as a routine process for most manufacturers.

In the meantime, what if I told you there was another 3-D technology available and with just as many applications, if not more, that happen on any given day at your typical aircraft maintenance hangar? The technology to which I am referring: *3-D laser scanning.* What makes this innovation so practical and beneficial for the aerospace industry you ask? One word — measurement.

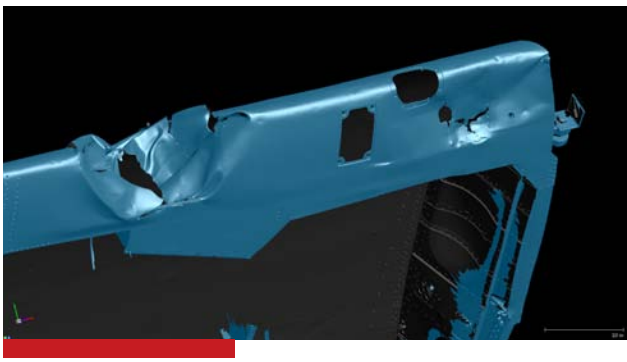
Before we dive right into what I mean by measurement, let's take a step back and quickly define what a 3-D laser scanner is in addition to the various types of scanners that are available for service.

WHAT IS 3-D SCANNING?

3-D scanners are tri-dimensional measurement devices used to capture real-world objects or environments so that they can be remodeled or analyzed in the digital world. The latest generation of 3-D scanners do not require contact with the physical object being captured. 3-D scanners can be used to capture complete or partial 3-D measurements of any physical object. The scanner produces a digital, high-density mesh or point cloud that measures more accurately when compared to traditional measurement devices (think of rulers, calipers, micrometers, etc.). This data, or scan reference, is typically used for two main efforts: A) Inspections and B) Reverse engineering.

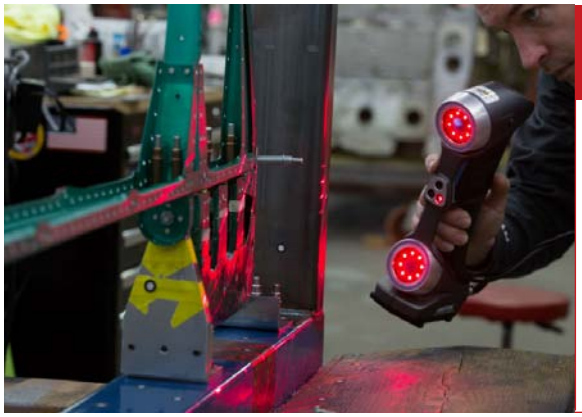
DOES IT MATTER WHAT TYPE OF 3-D SCANNER I USE?

Yes. If you divide the majority of 3-D scanning into two categories they would be defined as contact and non-contact scanning. Early technology: contact scanners have become rather antiquated because of their physical constraints and speed related to capturing data. These scanners are referred to as CMMs or coordinate measuring machines. For that reason I would like to put a larger emphasis on the most improved technology; non-contact 3-D scanning. These types of scanners own the most advanced features in scanning because they use features like structured light or lasers to retrieve and build data at amazing speed and accuracy. This is the point where users need to be aware or educate themselves on what their end goals are. Not all non-contact scanners are created equal. What I mean is, some scanners are well-suited to scanning large objects or areas while others have the precision to scan the depth of a scratch on aluminum. When you have a conversation with whomever is selling you scanning services, make sure they understand what problem you are trying to solve. By educating yourself, you can keep them honest about what their scanner can deliver. Not only may the accuracy of the scan be called into question, but also the physical limitations of the scanner to access an area to scan. That being said, non-contact portable 3-D laser scanners currently tend to be the most impressive technology, not only for their portable environment versatility, but also for their speed and accuracy in capturing data.



A 3-D scan of damage can provide detailed and accurate data that can be exported in a variety of file formats and sent to engineers not on site. AEROSCAN

Alright, let's circle back to that word I mentioned earlier — measurement. Yes, that's what I want to emphasize because 3-D scanning is just very accurate digital three-dimensional measuring or metrology (the science of measurement). When you stop to think of this technology as just another way to measure it's a little less intimidating, isn't it? Measurements are taken for a reason; to inform subsequent decisions about what necessary steps need to be performed. If they are not recorded accurately, and in a timely manner, they can prove



MAJOR FEATURES OF PORTABLE 3-D LASER SCANNING

- **Versatile:** Virtually limitless object type 3-D scanning — no matter the part size, complexity, material, or finish.
- **Metrology-grade measurements:** Accuracy of up to 0.002 in. (0.030 mm), resolution of up to 0.002 in (0.050 mm), high repeatability and traceable certificate.
- **Stand-alone device:** No external positioning system, no arms, no tripod or fixture. Easy access to confined spaces.
- **Calibration:** The scanner is calibrated as often as necessary. Factory verified calibration tools are provided with the scanner and are performed before each new scanning session.

to be costly mistakes. By 3-D scanning, these errors can be vastly minimized to produce tangible savings both on the front end measuring, and at the back end when fabricated replacements fit perfectly the first time.

Now that we've explained why 3-D scanning is such a beneficial tool, let's look at some specific applications in the aerospace industry that can benefit from its use.

AIRCRAFT OR AIRCRAFT PART STRAIGHTNESS/TOLERANCE VERIFICATION

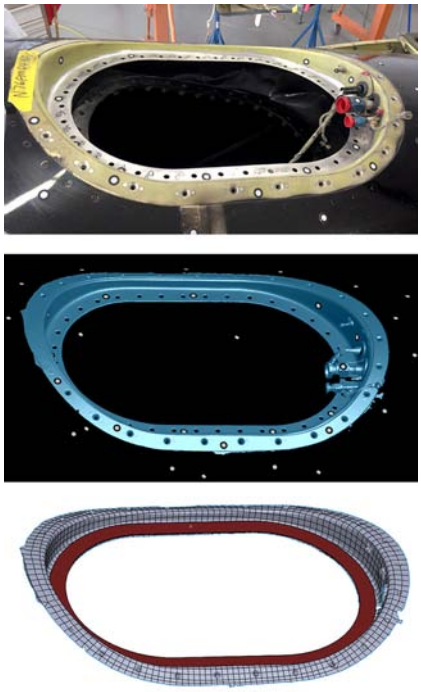
Have you ever been involved in questions about an aircraft's overall straightness? Has an aircraft's landing gear or other parts integrity been called into question after a hard landing? By 3-D scanning these parts, or even an entire aircraft, measurements can be used to compare against known values to verify straightness. Maybe you manage a fleet of aircraft and one underperforms in performance at a given power setting, wouldn't you like to know if it's an aerodynamics issue? 3-D scanning specific areas on the aircraft to then be compared against the specified dimensions could prove very useful to verify that the aircraft is straight. Could 3-D scanning an aircraft for pre-buy inspections/or appraisals be applicable? Absolutely.

CORROSION INSPECTION OR WEAR COMPARISON

Corrosion: The most reviled subject in any level of maintenance. Its detriment to aviation parts is particularly obvious, that's why it is constantly focused on during inspection. Have you experienced situations measuring the corrosion depth only to find it too difficult to access? Or it's at a point where approved repairs include fabricating a doubler or similar mating piece to increase the integrity of the area? 3-D scanning is a perfect solution to aid in the functions of measuring the corrosion depth. 3-D scanners on the market today advertise the accuracy within the scan of measurement to within +/- 0.002 inch. Do your existing measurement tools provide you that level of dimensioning while at the same time digitally documenting and easily formatting the data so it can be shared with engineers?

DAMAGE ASSESSMENTS, INCLUDING HAIL DAMAGE

When damage occurs to an aircraft, it grounds an otherwise airworthy aircraft that was scheduled to be in service. Hail impact damage inspection is a major time consumer for maintenance teams. Visual and manual inspections can be tedious and time-consuming to gather the proper dimensions related to the damage. 3-D scanning can capture the damage both accurately and much faster than traditional means. The MRO Lab, an Air France/KLM affiliate, has suggested inspection time can be cut from four to five hours per square



AN EXAMPLE of an access panel on a King Air where corrosion was found around the mounting flange. A 3-D scan was performed and used as reference to draw a "doubler" in CAD. The drawing was used to laser cut a perfectly fitting piece and save money and otherwise costly replacement effort.
AEROSCAN

meter to just 30 minutes per square meter, shortening inspection time by up to 80 percent. When you can quantify large segments of time it is easy to translate it into cost savings.

REVERSE ENGINEERING SKIN CONTOUR FOR MODIFICATIONS OR REPLACEMENTS

Implementing reverse engineering efforts utilizing 3-D scanning allows you to duplicate the scanned areas contour and convert that reference into a new, perfectly fitting part. We all know that almost everything on an aircraft has contour. Because of 3-D scanning's excellent ability to replicate these contours, tasks that can take hours to carefully measure on these surfaces can be captured in a matter of minutes by scanning.

PROPELLER SHAPE COMPARISON

Wouldn't it be nice to know if overhauled propellers that still have vibrations are caused by balance or aerodynamic issues? 3-D scanning to the rescue. By 3-D scanning the props and comparing them to each other in software, differences in the shape of the props can be identified and specifically dimensioned so that machining efforts can be initiated to perfect the blade shapes.

CABIN INTERIOR MEASUREMENT FOR RETROFITS OR AFTERMARKET PRODUCT PLACEMENT

When equipment that needs to be secured in an aircraft is supplied, rarely are digital models available for design and interference checking. 3-D scanning can provide the level of detail necessary for measuring these objects outer parameters, mounting holes, etc. This information is highly sought after by designers and engineers as a platform in order to launch new designs.

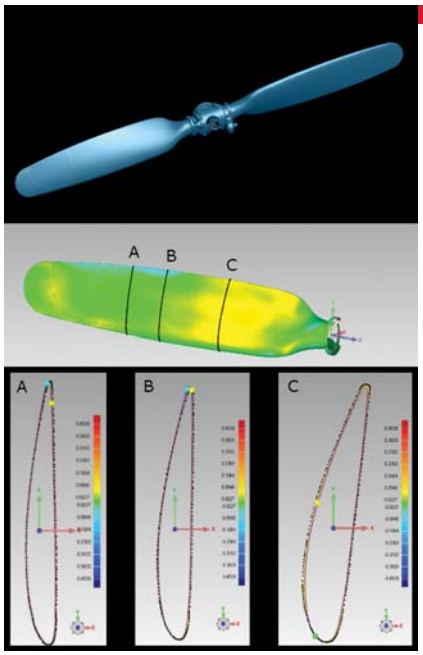
TOOLING — DIE & MOULD DESIGN AND MODIFICATIONS

Do you own tooling but lack documentation or drawings to properly fabricate new pieces once they have exceeded tolerance? 3-D scanning is a great way to capture that tooling and archive its dimensions so that it can be modeled in CAD again. In addition, 3-D scanning provides an excellent way to compare pieces that are fabricated against what was designed and specified in drawings (First Article Inspection).

CONCLUSION

While 3-D scanning does not receive the flashy publication like its 3-DP counterpart, hopefully you have gained insight on its practical applications in present day aerospace maintenance and manufacturing. In fact, it often serves as an efficient supplement to the 3-DP workflow. Remember, typically before you fabricate, manufacture, or 3-D print something, you need a 3-D model. 3-D scanning provides the reference to develop a 3-D model that can serve as a new part made for prototyping, as well as reverse engineering a new replacement.

Investments in accurate 3-D scanning come at a cost premium. Purchasing a metrology grade scanner and training a technician to use it can near the six-digit expense. For this reason, companies



THIS PROPELLER was scanned on the aircraft and then its two blades overlaid and sectioned using software to compare dimensional/aerodynamic differences.
AEROSCAN

have developed in order to provide 3-D scanning expertise as a service, much like other NDT contractors. By contacting them and discussing your potential applications, they can provide proposals for individual scanning projects. Again, these costs are typically higher because of the investment in the scanning equipment they use; however, when you compare OEM replacement part costs, or simple unavailability of parts, this technology is positioned as a perfect reverse engineering solution. When inspection processes are identified as time-consuming, most likely 3-D scanning will prove beneficial because of the time savings in speed of measurement. There's that word again — measurement. Are you ready to start scanning? ***AMT***

STEFAN HOKUF is the operations director for Aeroscan in Blaine, MN. He is an aviation and technology enthusiast. Stefan's goals are aimed at providing others in the aerospace industry with practical approaches to capturing, measuring, and fabricating parts utilizing the latest advancements in 3-D scanning.
Stefan Hokuf email: info@3daeroscan.com
Facebook & Instagram: @3daeroscan

NBAA|BACE
OCTOBER 10–12, 2017 | LAS VEGAS, NV

Join 27,000 industry professionals for the most important three days of business aviation, with over 1,100 exhibitors, 2 static displays of aircraft – one inside the exhibit hall and the other outside at Henderson Executive Airport, and over 50 education sessions. Visit the NBAA-BACE website to learn more and register today.

REGISTER TODAY

www.nbaa.org/2017

PARTICIPANTS IN the 2017 Aerospace Maintenance Competition.
ALL IMAGES COURTESY OF SNAP-ON

2017 AEROSPACE MAINTENANCE COMPETITION

By Ronald Donner

UNITED AIRLINES Team CLE was the overall winner and received the William F. "Bill" O'Brien Award for Excellence in Aircraft Maintenance.

THE 2017 AEROSPACE MAINTENANCE Competition presented by Snap-on was held during the MRO Americas tradeshow in Orlando, FL, April 25 – 27.

United Airlines Team Cleveland beat out more than 50 other teams from around the world to take home the prestigious William F. "Bill" O'Brien Award for Excellence in

2017 PLACINGS BY CATEGORY:

COMMERCIAL AVIATION CATEGORY
1st Place: United Airlines Team CLE
2nd Place: Alaska Airlines Team Seattle
3rd Place: FedEx

MRO/OEM CATEGORY
1st Place: Boeing
2nd Place: Flybe
3rd Place: HAECO

MILITARY CATEGORY
1st Place: USCG Clearwater Air Station
2nd Place: Team Apache
3rd Place: U.S. Army

GENERAL AVIATION CATEGORY
1st Place: Flexjet

SPACE CATEGORY
1st Place: Virgin Galactic

INTERNATIONAL TEAM CATEGORY
1st Place: Jetstar Airlines
2nd Place: Flybe Airlines
3rd Place: Qantas Airlines

SCHOOL CATEGORY
1st Place: Indian Hills Community College
2nd Place: Aviation Institute of Maintenance
3rd Place: Utah State

This year's Charles E. Taylor Professional AMT Award went to Chris Chido from Team Apache, and the Charles E. Taylor AMT Student Award went to Shayna Newman from West LA College.

AMT Magazine would like to personally congratulate all of the participants and winning teams in the 2017 Aerospace Maintenance Competition presented by Snap on!

MRO/OEM CATEGORY winning team was Boeing.

MILITARY CATEGORY 1st place winning team was the U.S. Coast Guard Clearwater Air Station.

AMT MAGAZINE chief editor Ron Donner was one of many who addressed the AMC participants prior to the awards presentation.

GENERAL AVIATION Category winner was Flexjet.

CHARLES E. Taylor Professional AMT Award went to Chris Chido from Team Apache.

Aircraft Maintenance. This award is the grand prize for the team with the overall winning score in the Aerospace Maintenance Competition.

The 4-foot tall O'Brien trophy will be on display at United Airlines' Cleveland maintenance facility for the next 12 months. The trophy, which features a bust of Charles E. Taylor, will return to Orlando next year for the 2018 Aerospace Maintenance Competition, and will again be up for grabs by the winning overall team.

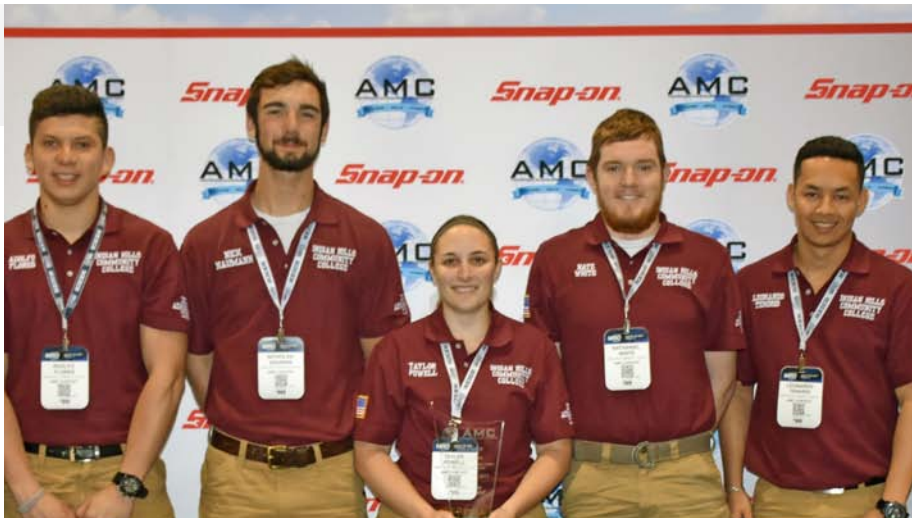
Sponsorship of the William F. "Bill" O'Brien Award for Excellence is only

CHARLES E. Taylor AMT Student Award went to Shayna Newman from West LA College.

SPACE CATEGORY winner was Virgin Galactic.

INTERNATIONAL TEAM Category 1st Place winner Jetstar Airlines.

SCHOOL CATEGORY winning team was Indian Hills Community College of Ottumwa, IA.



part of Snap-on's continued commitment to the Aerospace Maintenance Competition and aviation technicians around the world. Snap-on also provided all the tools and equipment used by the participants during the competition, and donated more than $75,000 in tools and equipment prizes to top finishers in the competition. ***AMT***

RECOGNITION MATTERS

AMT
NEXT GEN
AWARDS

40 UNDER 40

CELEBRATING THE NEXT GENERATION OF MAINTENANCE PROFESSIONALS

Nominate a Next Gen Maintenance Professional

Aircraft Maintenance Technology magazine's November/December issue will recognize 40 individuals from the aircraft maintenance industry for their contributions to the industry and a "job well done." It is not a ranking, but rather a listing of individuals who have shown initiative, a capacity, or have made an impact to the aviation maintenance industry.

Whether you work in general aviation, business aviation, airlines, MRO, rotorcraft, military, or education, let the industry acknowledge you or your colleagues for dedication to the aviation industry. If you or your colleagues will be 39 years old or younger on November 1, 2017, you are eligible to be nominated for *Aircraft Maintenance Technology* magazine's Next Gen Awards.

Criteria for selection include such things as job commitment, industry involvement and contribution, achievement in his or her position and innovation in his or her field. While no candidate may possess all criteria, we are looking to reward those who deserve recognition for their efforts. Upon selection, the winners will be contacted directly by *AMT*.

NOMINATE TODAY!

WWW.SURVEYMONKEY.COM/R/2017AMTNEXTGEN

NOMINATION DEADLINE:
SEPTEMBER 8, 2017

AMT AIRCRAFT MAINTENANCE TECHNOLOGY | AVIATIONPROS.com

A **PHASE CHECK** OF FAA MAINTENANCE HUMAN FACTORS

The FAA Maintenance Human Factors Program must link everything we know about maintenance human factors into evolving safety management systems. We must create tools that will provide explicit step-by-step help with risk-based decision making (RBDM).

By Dr. Bill Johnson

"DR. BILL" JOHNSON has been associated with the FAA's Maintenance Human Factors Program since its inception in the late '80s. He has held a Pilot certificate for over 50 years and is approaching 50 years since receiving his A&P certificate. He is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems.

Like an aircraft and other heavy equipment, a research and development program needs regular light and periodic heavy maintenance. In the research environment that is accomplished with quarterly and annual program reviews. Like an aircraft inspection our program reviews check for worn parts (ideas) and often identify new situations that present a hazard to our schedules and budgets. That sounds just like aircraft maintenance. This article will help readers and this writer to look at some of the components/systems critical for an efficient and effective FAA maintenance human factors program.

CHECK THE RECORDS/LOGBOOKS

If we look at the age of the FAA Maintenance Human Factors program it would classify as an aging aircraft. It started in 1988. That makes it just about 30 years old. However, the program is not "ready for the desert!" It was most influenced by the FAA Safety Act of 1988. That Act and the robust funding that flowed from Congress coincided with the front-page picture of the convertible Aloha 737. That event drew immediate attention to aging aircraft, aircraft design and maintenance, and to the humans that fly and maintain them. The Act explicitly stated, among other things, that the FAA must establish a program that addresses human performance in maintenance. Like an aircraft in design the first response to the Aviation Safety Act was a committee much like an aircraft's Maintenance Steering Group (MSG). I was a member of that committee and helped write the FAA National Plan for Aviation Human Factors, published in 1991.

The National Plan was followed from program inception, when congressional earmarks provided as much as $1.6 million/per for maintenance research, to the late '90s when the Safety Act funding expired. By 2000 Maintenance Human Factors funding had to revert to the normal FAA R&D budget, which was adjusted to about 25 percent of the resources available throughout the '90s. That change, while significant, is a reflection that commercial maintenance organizations, airlines, and consulting companies have assumed much of the activity formerly done by FAA. That is a success story!

The Safety Act of 1988 explicitly stated, among other things, that **the FAA must establish a program that addresses human performance in maintenance.**

OPERATIONAL HISTORY

Like an aircraft historical review, it is good to consider service history. An aircraft operating many daily segments requires different maintenance than one that flies one long segment per day. The nearly 30-year service activity of FAA's maintenance HF has about three life phases. In the first phase, from 1988 to 2000, the program was controlled by the Washington, D.C. Office of Aviation Medicine, with long-term program continuity and tenure of FAA personnel and their pro-

gram contractor. The program had extensive senior management support and lots of congressional earmark funding. From 1988 to 2000 FAA, with industry and other national aviation authorities, conducted 21 international conferences on maintenance human factors. The HF conference size ranged from 70 delegates, in 1988, to nearly 1,000 in the year 2000. At the same time FAA issued multiple research grants and contracts to universities and commercial engineering companies. FAA was extremely diligent about publishing all the conference proceedings, reports, and project tools. The materials were first on paper, then on CD ROMs and DVDs, and finally transferred to the web to include all legacy and subsequent documents. The website, www.humanfactorsinfo.com, continues to be supported and is absolutely the largest and No. 1 maintenance human factors information source in the world.

Phase 2 started during the days after 911. The effects of 911 put the human factors program in a bit of "tailspin," in the early to mid-2000s. A radical reduction in personnel and funding slowed research as well as the annual human factors conference. Industry ability to travel to conferences stopped. About that time, the international partners each embarked on their own HF efforts. Most significant in the time period was the establishment of the European Aviation Administration Agency, with their new human factors regulations.

Phase 3 started about 2005-2006. At that time the management of the program changed, FAA leadership interest increased, and FAA began working with the Civil Aerospace Medical Institute and industry partners to renew the program. A new focus on applied research and on development of tools and processes for industry has led to a prosperous 10-year period. One of the most noteworthy parts of FAA's maintenance human factors program is the past 10 years of human factors training for all airworthiness inspectors. All airworthiness inspectors receive a three-day course in human factors. Many inspectors have repeated the course for recurrent training.

It is worthwhile to list some of the products, see Table 1, that were delivered in the past 10 years of the program.

CURRENT OBSERVATIONS AND PROJECTIONS

Well, we have looked at the logbooks and considered the operational history. The next step is to look at the current condition and determine the results of the phase check.

In the past couple of years, we have collected a lot of data on two of the largest challenges in maintenance. That includes worker fatigue and "failure to follow procedures." During 2016-17 we collected fatigue data from about 175 workers across the United States. We have been actively involved in a variety of operations, large and small, from rotary wing, to large and small airplanes. In a second study we spoke to nearly 200 mechanics and managers about the challenges related to using instructions/procedures. We have a renewed understanding of these challenges and are currently working on the final reports. We are seeing that some organizations have found excellent ways to address the docu-

mentation challenge. However there is significant variance among organizations. We have also seen organizations that are operating safely, with respect to alert workers. It even appears, initially, the risk associated with worker sleep habits has improved since we conducted a similar study in the year 2000. We are doing our very best to ensure that the final deliverables include clear and actionable procedures that are ready for industry adoption to be delivered in calendar 2017.

With respect to projections, I believe that we are transitioning to a new and fourth phase of the FAA Maintenance Human Factors Program. This fourth phase must remain applied. The products must be understandable and useful for all types of industry users. We must link everything we know about maintenance human factors into evolving safety management systems. We must create tools that will provide explicit step-by-step help with risk-based decision making (RBDM). We must provide support to today's workers, new and senior. We believe that we can do that in an environment that is rich with data, reported voluntarily, or collected automatically. We must recognize that there are a variety of new technologies at our fingertips. We must work together in a renewed corporate and regulatory cooperative environment. Human factors challenges and solutions are evolving, not ending. We are convinced that the work related to maintenance human factors shall be an ongoing and important way to support continuing safety. ***AMT***

TABLE 1

SIGNIFICANT HUMAN FACTORS DELIVERABLES IN LAST 10 YEARS
Introduction to FAA Human Factors Video
Maintenance Human Factors Training System
2 Editions of Operators Manual for Human Factors in Maintenance
2nd Edition of The Human Factors Guide for Maintenance and Inspection
Return on Investment Tool Kit
Chief Scientist Workshop Reports
Fatigue Awareness CBT
Fatigue Video (Grounded)
Maintenance and Ramp Line Operations Safety Assessment
FAA MxHF Quarterly Newsletters

REGULATORY REFORM: POLITICS, PRACTICALITY AND PUBLIC RESPONSIBILITY

The renewed interest in regulatory reform provides an opportunity to reflect on industry's responsibilities

EVERY NEW ADMINISTRATION IS FORCED TO reconcile promises made on the campaign trail to overhaul the administrative state with its own regulatory agenda. Politicians demonize administrative agencies as the cause of the nation's woes; the proverbial red tape created by out-of-touch Washington bureaucrats is said to be killing jobs and preventing American businesses from being competitive in the global marketplace.

Just 10 days after Inauguration Day, the Trump administration issued an executive order that, among other things, directs each federal agency to repeal two regulations for every new rule it promulgates. Through sheer weight of numbers, the executive order aims to control regulatory costs by reducing the overall size of the rulebook. This approach, however, is problematic for safety-focused agencies because it attacks the very premise of each regulation currently on the books.

The FAA has expansive statutory authority to promulgate rules necessary for safety in air commerce. In principle that means each regulation in 14 CFR should increase aviation safety. If that's the case, then is it really practical to meet a forced promulgation/repeal ratio? There are numerous reasons a rule might be ripe for replacement or modification. Plenty are outdated — superseded by market forces — while others may simply be duplicative. It's great to have discretion to actually consider the impact of existing rules, but it must be done based on their legitimate impact on certificate holders and service to aviation safety.

Outdated regulations can be annoying; even after passing into irrelevance they leave behind compliance-related vestiges that can trip certificate holders. The most vexing, not to mention costly, are duplicative rules. Duplication in the CFR brings us back to the original question: If a rule is truly repetitive how does it enhance aviation safety? It can't.

The FAA is already grappling with how to comply with President Trump's executive order. Thankfully, the agency has enlisted industry: In April, it requested the Aviation Rulemaking Advisory Committee (ARAC) recommend regulations that are good candidates for repeal, modification, or replacement (a subsequent executive order directed creation of task forces to review existing rules and ARSA rightfully prophesied that ARAC could serve this purpose).

ARSA and Airlines for America (A4A) — both ARAC members — jointly submitted a list of rules to the full committee that the associations would like to see eliminated or modified. The combined submission highlights a wide range of areas where existing rules impact job creation, impose unnecessary costs, create inconsistencies, or are otherwise unnecessary or ineffective. ARAC will submit reports to the FAA throughout the summer providing preliminary and final recommendations.

The renewed interest in regulatory reform also provides an opportunity to reflect on industry's responsibilities during the rulemaking and guidance development processes. All too often stakeholders lose sight of the fact that they are only a small part of a vast regulatory system. Rules that negatively affect operators will ultimately have an impact on maintenance providers, and vice versa. Unfortunately, even the organizations that grasp the bigger picture retreat from broader industry efforts out of fear they will draw the agency's and receive unwanted attention from their local inspectors in return.

Industry, not the government, is responsible for keeping the flying public safe. The men and women on the flight line, in the component shops, and engineering labs, and those up in the air are the ones who know how to do their job best. Government's role is to make sure industry lives up to that standard. When stakeholders retreat from policy debates or only oppose rules that directly affect their business, we are left with a book of regulations that is twice as thick, half as effective, and exponentially more expensive for follow.

It's still unclear how the mechanics of the executive order will actually work, but it has the potential to seriously reign in the FAA's regulatory excesses. The premise, purported justification, and cost of each new rule will be subject to greater scrutiny than in the past. Industry — should it choose to take advantage of it — will be better positioned to challenge hostile rulemaking actions. As always, the devil is in the details so we'll have to wait and see whether the executive order can live up to its promise. **AMT**

Keep up to date on the regulatory reform process at arsa.org/reg-reform-2017.

RYAN M. POTEET is senior associate of Obadal, Filler, MacLeod & Klein, P.L.C. advising clients in international aviation safety regulation and government affairs. He serves as regulatory affairs director for the Aeronautical Repair Station Association.

Jeppesen Sanderson is being awarded a $13,846,460 fixed-price contract for the procurement of performance planning software tools in support of the P-8A aircraft for the Navy and the governments of Australia, UK, Norway, and New Zealand.

S.A.F.E Structure Designs has signed an exclusive contract with Landstar to transport and deliver S.A.F.E.'s products throughout the United States and Canada.
www.8-tree.com.

TOOLS & EQUIPMENT

Sealant Dispensing Tool

PPG Aerospace

PPG has introduced a battery-powered aerospace sealant dispensing tool that is easier to use than traditional manual and pneumatic applicators and dispenses at faster rates. The SEMCO model 1250 sealant tool weighs less than 3 pounds and is ergonomically designed with cordless and hoseless operation, compared with a standard SEMCO 250A dispensing tool that weighs about 2 pounds and is typically tethered to a 10-foot hose. It operates on a 10.8-volt rechargeable lithium ion battery and can dispense up to 60 cartridges before the charge is exhausted. With its ergonomic design, it is easy to balance at the center. And a recoil effect reduces sealant drool after dispensing for cleaner operation with less waste. The battery takes about 60 minutes to fully recharge.

For more information visit www.ppg.com or www.semcopackaging.com.

TOOL STORAGE

Flexible Modular Industrial Storage

Snap-on Industrial

The Williams Modular Industrial Storage program offers users flexibility to customize their storage needs that best fit their space and job requirements. Built with heavy-duty steel and incorporating the latest in safety and security features, Williams Modular Industrial Storage are engineered specifically for demanding industrial applications. To provide flexibility in configuring storage needs, users can choose from six cabinet heights (30-inch desk height; 33 1/2-inch bench height; 37-inch bench height; 41 1/4-inch counter height seated; 45 1/4-inch counter height standing; 59-inch eye level) and five different cabinet widths (23 inches narrow-wide; 29 1/4 inches standard-wide; 32 1/2 inches standard-wide plus; 46 inches extra-wide; and 58 1/4 inches double-wide).

Call (800) 446-7404, email industrialbrands@snapon.com, or visit www.modularindustrialstorage.com.

GROUND SUPPORT

TowFLEXX 120e HG

TNA - Aviation Technologies

TNA Aviation Technologies' TowFLEXX 120e HG is an electrical towbarless aircraft tug. The compact tug's design combines functionality with an esthetic look. It is rated up to 28,000 lbs MTOW. It's especially designed for smaller and midsize FBO's and ground handlers that need to handle a wide range of aircraft, all the way up to medium size corporate jets, both with single- or twin-nose wheel configuration. There are no special adapters required and loading the aircraft nose gear is fast and easy. The ergonomic multifunctional tiller steering control can be operated with one-hand. Additionally, visible markers and anti-slip covering allow for improved wheel tracking. The advanced multi-speed transmission drive technology helps further increase the ease of maneuvering.

TNA - Aviation Technologies
A Division of Turwitt, Nielen & Associates, P.A.

For more information call (904) 217-0496 or visit www.website.com

GROUND SUPPORT

Power Systems

Unitron Power Systems

Through an innovative design, Built-In Test Equipment (BITE) and modular construction, Unitron products assure maximum power availability and minimal repair time for the latest military aircraft including the F-22 A Raptor and the JSF F-35A. The PwrKart Series includes lightweight 115/200v AC, 400 Hz, 28v DC, and 270v DC mobile converters for aircraft ground power applications in the hangar or ramp area.

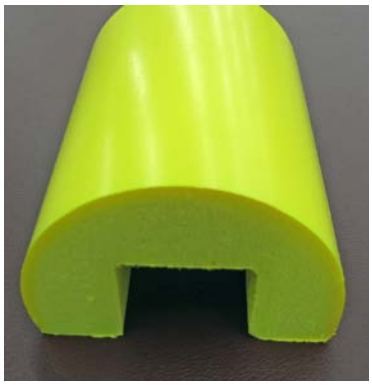
Unitron
POWER SYSTEMS

For more information call (214) 340-8600 or email sales@unitronlp.com.

SAFETY EQUIPMENT

Safety Bumper Cushions

Mantec Services Inc.



Mantec Services offers tough, industrial-grade, self-skinning polyurethane foam that is designed for high-impact applications. It features high tear strength, abrasion-resistance and electrically nonconductive. It is moisture, chemical and solvent resistant and deters Skydrol, MEK and fuels. The cushions meet FMVSS 392 and Cal 117 fire retardant standards.

For more information visit www.mantecservicesinc.com or call (206) 285-5656.

SAFETY EQUIPMENT

Hands-free Light

Streamlight Inc.

The Streamlight Sidewinder Compact II accepts multiple battery sources — CR123A lithium, AA lithium, or AA alkaline — to guarantee power and provide flexibility. The hands-free light features a push-button switch specified to 300K operations, and white, green, blue, and IR LEDs with a range of lumens and runtimes depending on the battery source. The Sidewinder Compact II is lightweight, multidirectional, and multifunctional. Models are available with or without an NVG mount for attachment to HGU-84 rotary wing aircrew helmets.

For more information visit www.streamlight.com.

FACILITIES/FACILITIES MAINTENANCE

EDUCATION & TRAINING

AIRCRAFT/ENGINE PARTS

TOOLS & EQUIPMENT

SOFTWARE

ADVERTISERS' INDEX

SAFETY AND INNOVATION: WITH RULE CHANGES, HYBRID AND ELECTRIC PROPULSION ARE TAKING OFF

From very high voltage systems to specialized cooling and battery monitoring systems, the introduction of hybrid and all electric aircraft will have significant impact on the aircraft maintenance environment

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

I WAS THRILLED TO WATCH HISTORY TAKE PLACE earlier this year, with the first public airshow including an all-electric aircraft at AERO Friedrichshafen in Germany. This year has certainly been an exciting one for innovation in the general aviation industry, particularly in the areas of hybrid and electric propulsion. Helping pave the way for these innovations has been the rewrite of the design rules for normal category aircraft, Part 23 rule in the United States and the CS-23 rule rewrite in Europe, which go into effect in August.

The rewrite of these rules forms part of a global, harmonized effort to develop common design certification standards, removing regulatory barriers and promoting the acceptance of airplanes and products worldwide. As part of GAMA's ongoing commitment to ensuring an industrywide understanding of these rule changes — and highlighting the possibilities of what could be if extended to engines and propellers, rotorcraft, and transport category fixed wing aircraft — we worked with the FAA to create and host a training series about the Part 23 rule rewrite.

The sessions offer interested aviation community members an opportunity to learn about the new design environment of the rules and ensure they understand the immediate benefits. As part of our training series, we hosted the final day of the Uber Elevate Summit, during which we hosted one of our Part 23 workshops.

Uber Elevate, an associate member company of GAMA, is working with manufacturers, regulators, and government officials to accelerate the development of airborne on-demand mobility that is enabled by electric Vertical Takeoff and Landing (eVTOL) aircraft. The summit Uber Elevate hosted was the first of its kind, and the attendance at it indicated the high-level of interest in this fast-growing on-demand mobility sector. Expectations are that new designs like eVTOL, as well as traditional aircraft designs, will be able to take advantage of the reformed standards. Without the new environment created by the Part 23 rule rewrite, there would be significant constraints and even some barriers for these types of technologies.

GAMA is proud to help lead the way in this growing area of our industry through the work of our Electric Propulsion and Innovation Committee (EPIC), assuring the hybrid and electric propulsion sector can shepherd innovation into the traditional regulatory regimes governing the design and operation of aircraft. We created the Electric Propulsion and Innovation Committee and an associate member category of our association in late 2015 to facilitate and represent the general aviation industry's hybrid and electric propulsion efforts as well as focus its ongoing safety improvement initiatives toward simplified aircraft operation. Committee membership has quickly grown, with over 50 companies now represented on the committee, which is collaboratively working toward establishing global standards for the industry. GAMA also intends to support similar Part 23 rule rewrite training sessions in Australia, Brazil, Canada, China, and Europe in the coming year to ensure a global understanding of the rule changes.

The introduction of hybrid and all-electric aircraft will have significant impact on the aircraft maintenance environment. From very high voltage systems to specialized cooling and battery monitoring systems, the excitement of this new area has the potential to re-energize aviation (pun intended). Over the coming year, the GAMA EPIC plans to engage further with the aviation maintenance community to assure that the appropriate information and training is disseminated to allow for the best possible airworthiness support of these new products.

We invite you to come by the GAMA booth at the Experimental Aircraft Association's AirVenture in Oshkosh, WI, this month to learn more about hybrid and electric propulsion, GAMA EPIC, and get an up-close look of all electric aircraft. Among the items we will have on display will be the all-electric Extra 300, powered by a Siemens electric powerplant. ***AMT***

MAKE US PART OF YOUR
OSHKOSH EXPERIENCE!

From Hypoxia Prevention and Gill Battery Training, to Osh for a Cause with Precise Flight and our general corporate reception – make GlobalParts.aero

Main Aircraft Display Booth 175

your destination during Oshkosh for special events, training and to view some amazing featured products including a full line of Precise Flight merchandise, EVO Fire Containment Kits, Gill Batteries and AVOX Zodiac O2 Masks.

EAA AIRVENTURE OSHKOSH 2017

MONDAY, July 24 – 2:00 p.m. and 4:00 p.m.

How to Prevent Hypoxia

Training and Information Sessions Provided By Zodiac Oxygen Systems U.S.

TUESDAY, July 25 – 4:00 p.m. – 5:00 p.m. (Reception Following)

Osh for a Cause

Benefit for EAA's Young Eagles Program

Meet Celebrity Pilots, Connect with Your Favorite Aviator and Purchase Raffle Tickets for Great Prizes While Supporting Youth in Aviation. Brought to You by GlobalParts.aero and Precise Flight

WEDNESDAY, July 26 – 2:00 p.m. and 4:00 p.m.

Gill Batteries Overview

Training and Information Sessions Provided by Teledyne

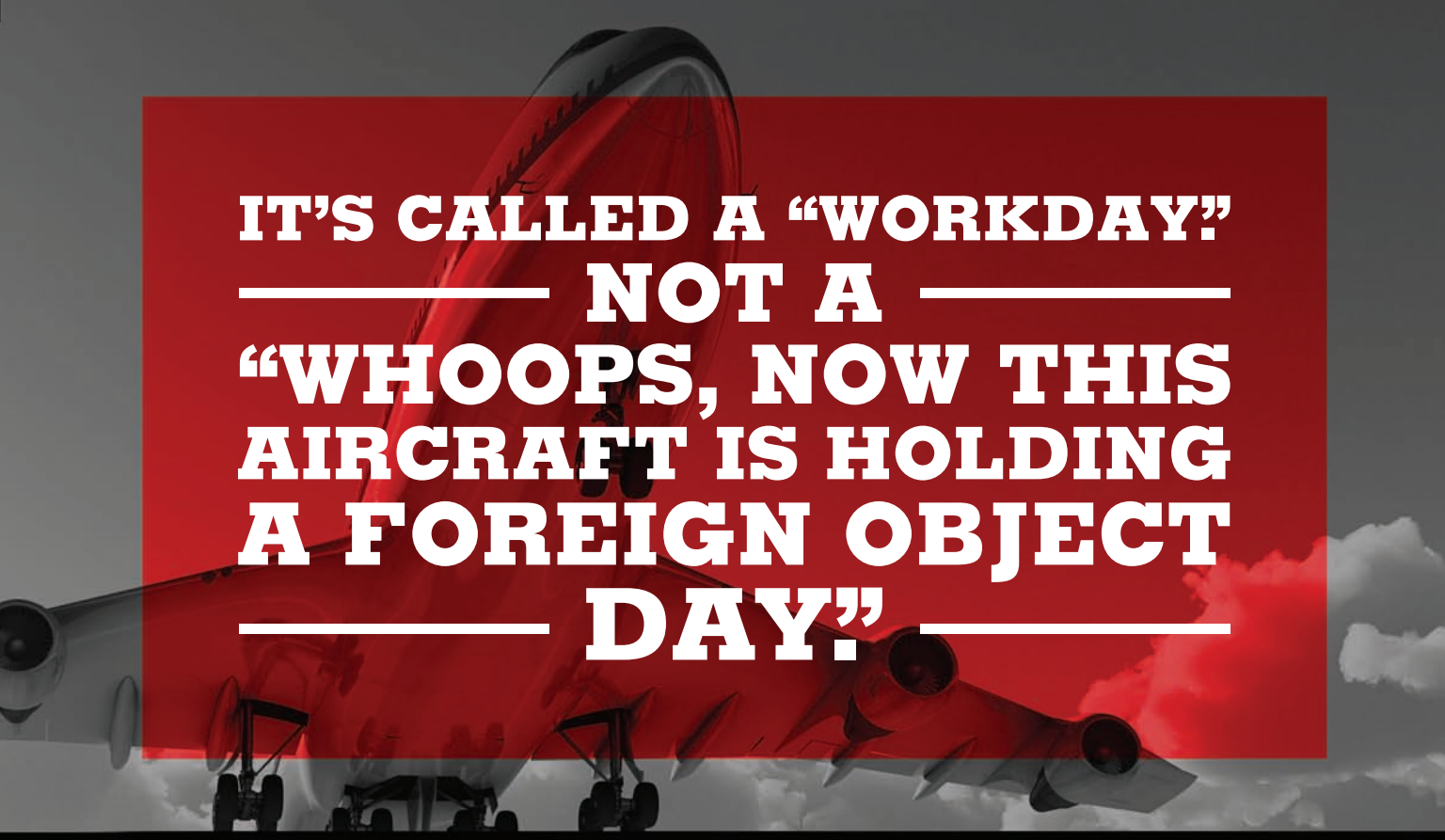
WEDNESDAY, July 26 – 5:00 p.m. – 8:00 p.m.

Corporate Reception

Refreshments will be Served. Precise Flight products, Gill Batteries, Evo Fire Containment Kits and Avox Zodiac O2 Masks will be Featured During the Event.

GLOBALPARTS.aero

WWW.GLOBALPARTS.AERO 1.316.733.9240 INFO@GLOBALPARTS.AERO



IT'S CALLED A "WORKDAY." NOT A "WHOOPS, NOW THIS AIRCRAFT IS HOLDING A FOREIGN OBJECT DAY."

BOOST PRODUCTIVITY AND INCREASE OUTPUT WITH THE LEVEL 5 TOOL CONTROL SYSTEM.

When you get a handle on tool control, you get a handle on FOD. And Snap-on's Level 5 Automated Tool Control (ATC) provides you with the advanced digital imaging technology and proprietary software that lets you know where every tool is at all times—and, in real time. And if knowledge is power, Level 5 ATC is a powerful way to eliminate FOD. Find out how to minimize downtime, maximize productivity and improve every aspect of tool management at **SnaponLevel5.com, or call 877-740-1900 to speak with a Snap-on representative.**

ORGANIZATION | VISIBILITY | ACCESS CONTROL | ASSET MANAGEMENT | AUTOMATION

LEVEL 5 Tool Control System™

Snap-on®