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AirMaintenance UPDATE

The Magazine for Aircraft Maintenance Professionals

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Publication Mail Agreement No. 0041039024
and Return Undeliverable Canadian Addresses to
Alpha Publishing Group (2004) Inc.
Unit 100 - 6660 Graybar Rd, Richmond BC V6W 1H9
email: amumagazine@outlook.com

April - May 2025
Volume 28 / Issue 6

$7.95

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Whitepaper tackles industry digitalization

Survey results can be found by going to: www.qoco.aero/trends25-survey

DURING 2024 the software firm QOCO Systems of Finland compiled a survey of the current challenges faced by airlines and MROs in regards to digitalization. During different aviation events participants were asked to fill out a form and describe the main issues they encountered in their daily work. Nearly 90 industry professionals from companies of all sizes and continents lent their insight into how they view their digitalization efforts and in what timeline they are expecting to deal with challenges.

QOCO Systems says that it's imperative to understand digital adoption across markets and future trends. Digitalization of maintenance operations includes data exchange between OEMs and airlines, tooling management, and staff utilization. With a wide range of international customers, QOCO believes it has gained deep insight to what matters for OEMs, MROs and airlines when it comes to cost efficient operations. The company also feels it is important to understand the direction of the industry, as well as which predicaments are causing the greatest stress for the companies.

Thus, QOCO's 2024 survey is an attempt to understand the major pain points of the market and where it's heading in its digitalization efforts. The survey was conducted at three different industry conferences in Europe and the US where respondents were divided by company type, with the most frequent type being airlines followed by MROs.

The results of the survey were complied in a free-to-download Whitepaper (**www.qoco.aero/trends25-survey**). ■

— John Campbell, Editor

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production manager: Chrissie Harvey
circulation: Anne Gervin
cover photo: Dreamstime.com

Published by Alpha Publishing Group (2004) Inc.

Publication Mail Agreement Number 0041039024 and Return Undeliverable Canadian Addresses to:
Alpha Publishing Group (2004) Inc.
Unit 100 - 6660 Graybar Road
Richmond BC V6W 1H9 Canada

Subscription Rates: 1 Year: $40 2 Years: $60
AirMaintenance Update is published 6X annually.

Corporate Member of:

HAC · Helicopter Association International · NBAA

Publications Mail Registration No. 0007198278 **ISSN 1703-2318**

Upcoming Events

AME Competition is set for May in Calgary

The Canadian AME Competition scheduled for May 6-7 in Calgary, Alberta, will bring together teams to compete, while also showcasing the skills and talents demonstrated in the everyday role of an Aircraft Maintenance Engineer. While this event is open to the public, it also involves daily tours of numerous high school groups from across Alberta. Students have the opportunity to try out hands-on activities and see our industry's talented AMEs first-hand.

With new challenges and excitement in both traditional methods and new technologies, the second annual event hosted by the Alberta Aviation & Aerospace Council (AAC) is promising to be bigger and better. Showcase your business by submitting a team of AMEs or apprentices and see if you have what it takes to place on the podium. With amazing prizes and lots of fun, this two-day event is guaranteed to keep everyone on their toes.

Support the AME competition through sponsorship

The AAC is looking for sponsors and supporters in numerous areas. Do you have any unserviceable part or materials that could be used to create a unique challenge? Are you willing to volunteer your time as a judge or support in the event's execution? Is your business looking to be showcased and displayed to the teams? If so, reach out today and join as a sponsor. Contact:
nicole@albertaaviationcouncil.com

The Future Of Business Aviation In Canada

The Canadian Business Aviation Association's 2025 convention will bring together attendees from diverse roles within the business aviation sector, fostering a comprehensive exchange of industry insights, trends, and innovations. It serves as a premier platform for networking, collaboration, and knowledge-sharing among key decision-makers and influencers in the business aviation community.

Mark your calendars and clear your schedules for this event, which is scheduled to take place in Richmond, BC, from June 10–12. Anticipated to be a standout event for business aviation professionals like yourself. More than 700 business aviation leaders are expected to attend, including aircraft owners, chief pilots, flight management companies,Original Equipment Manufacturers, flight operations personnel, major industry suppliers and government representatives. Attendees will contribute to a comprehensive exchange of industry insights, trends, and innovations. For more, visit: **www.cbaa-acaa.c**a ✪

COMING EVENTS

MRO Americas
April 8-10, 2025
Atlanta, Georgia
mroamericas.aviationweek.com

NBAA Maintenance Conference
April 29-May 1, 2025
Columbus, Ohio
www.nbaa.org

Alberta Aviation, Aerospace and Defence Conference
May 05-07, 2025
Calgary, Alberta
www.albertasummit.com

Canadian AME Competition
May 06-07, 2025
Calgary, Alberta
www.albertasummit.com

International Conference on Mechanical, Aeronautical and Manufacturing Engineering
May 15-16, 2025
Vancouver, British Columbia
www.waset.org

International Conference on Aerodynamics and Hydrodynamics
May 24-25, 2025
Montreal, Quebec
www.waset.org

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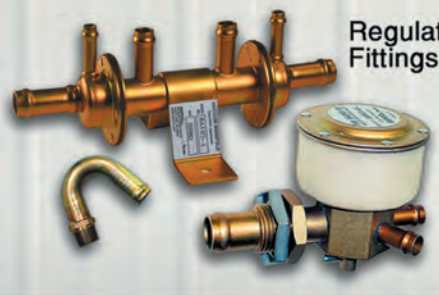

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STCs & new products

New prop pairs well with Cub

Hartzell Propeller's Kestrel is a lightweight carbon fibre constant speed prop and the first in the new Falcon composite propeller series specifically designed for aircraft powered by Rotax 916 engines. The Kestrel propeller has received ASTM approval, with FAA certification expected later this year. The Kestrel's high performance aerodynamics are tailored for the backcountry and cross-country flying capabilities of the STOL Carbon Cub UL. To design the first offering of the new Falcon series, Hartzell worked with Rotax and CubCrafters to optimize Kestrel performance, durability, and efficiency when paired with the Carbon Cub. **www.hartzellaviation.com**

Titanium legs resist fatigue

The Landing Gear Works specializes in the manufacture of titanium landing gear legs for Cessna 180 and 185 as well as tail gear springs, tailwheel assemblies and landing gear components for various Cessna aircraft. They hold STC-PMA approval for OEM replacements and titanium upgrades. Their titanium products are said to resist fatigue, retain their spring, be corrosion-resistant and provide up to 34 pounds of weight savings compared to steel on a Cessna 185. In addition to titanium options, TLGW offers heavy-duty and light-duty steel landing gear legs. **www.tlgw.aero**

PAC37 has features requested by pilots

PS Engineering has announced FAA-TSO approval for the PAC37 digital audio panel designed for legacy business jets. The PAC37 is form, fit and function backwards compatible, but also features modern day functionality requested by business pilots and operators including pilot, copilot and cabin control heads, independent volume controls for all inputs, IntelliVOX auto-squelch along with push-to-talk and hot mic intercom. Other features include illuminated selection indications for front panel user controls, independent Bluetooth in each audio panel for cellular telephone and audio streaming, additional unswitched inputs with volume adjustments. **www.aircraftaudio.com**

Headsets block out airport noise

Ramp communications at busy airports can be difficult, with the engine noise from all types of service vehicles and the roar of jet engines making it tough for ground crews to communicate. **David Clark Headset Communication** systems enhance communications and provide hearing protection from ambient noise for ground personnel, resulting in more efficient ramp operations that contribute to faster turnaround times at the gate and promote the safety of ground crews and passengers. The company offers both wired and wireless communication systems for a variety of ramp and maintenance operations including pushback and de-icing. **www.davidclarkcompany.com**

BioPro foam targets body types

Muirhead has unveiled BioPRO foam which the company says is the world's first naturally fire-resistant, protein-based aviation biofoam. Made with hydrolyzed collagen—it is a by-product of Muirhead's leather manufacturing process. With 20 percent bio-content, the product eliminates concerning substances such as melamine and PFAS ('forever chemicals') found in traditional seat foams, resulting in enhanced fire safety, durability, passenger comfort, and clear environmental benefits. The product is designed to adapt, providing support for different body types. While traditional foams are cut from large blocks, BioPRO is moulded to the customer's specifications. **www.muirhead.co.uk**

Prop stands are easily switched out

Propeller maintenance stands from **Wilcox GSE** are available in a variety of models, including single or dual propeller mount, with or without stairs and working platforms. Propeller stands are functional with a variety of propellers depending upon the length of the blade. Quickly and easily switch out the machined hub mounts allowing one stand to be utilized for a variety of aircraft propeller maintenance. The steel tubular structure with reinforced gripstrut stairs and platforms floors maintain the highest level of user safety. Under each stair and platforms are one-inch reinforcement tubes. **www.wilcoxgse.com**

To announce your STC or new product, email a JPG photo and a product description to John at: amu.editor@gmail.com

AIAC ISSUES STATEMENT ON TARIFFS

The Aerospace Industries Association of Canada issued a statement in March saying that a stable economic environment is essential for the global aerospace industry to thrive, and that the US administration's decision to impose tariffs on Canada and Mexico directly threatens that stability. "Our industry supports hundreds of thousands of highly skilled Canadian workers and contributes billions to the economy," said Mike Mueller, President and CEO of AIAC. "Given the highly integrated nature of the global aerospace industry, we must work collaboratively to protect jobs, strengthen supply chains, and maintain our competitiveness here at home and globally." AIAC believes the decision by the US government will disrupt jobs.

PROTOTYPE WING COMPLETES STRESS TEST

Embraer says it has successfully completed the initial structural fatigue tests of the wing that will be used in its New Technologies Demonstration Platform. The first phase of this project involves the development of "unprecedented" processes and methods to support analysis in ground test benches. The composite wing's reference model structure utilizes new production techniques and was subjected to progressive loads that exceeded more than 200 percent of the expected limit. The static loading test was conducted at ACS Aviation, the demonstrator platform supplier and Embraer partner in São José dos Campos, Brazil.

NEW MULTI-MISSION HELICOPTER FROM AIRBUS

Airbus Helicopters has introduced its H140, a multi-mission helicopter that complements Airbus's current light twin offering for the emergency medical services, passenger transport, and private and business aviation markets. The entry into service of the helicopter is planned in 2028 for the emergency medical services segment. The H140 features a wide range of innovations, including a new T-shaped tail boom with an optimized Fenestron that reduces sound levels, a five-blade bearingless main rotor, and new powerful engines. The helicopter also features a larger cabin space, large windows and cabin layout that can accommodate up to six passengers.

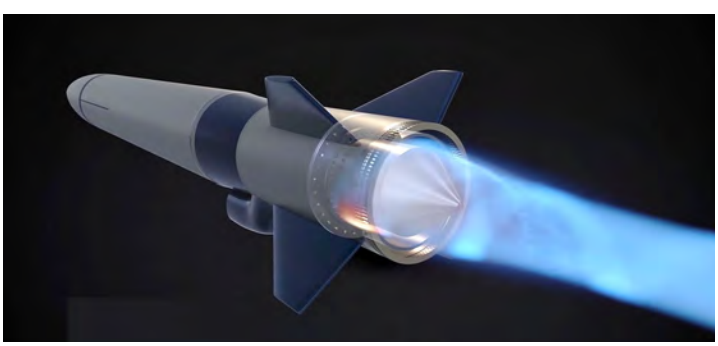
ROBINSON TEST DRIVES ELECTRIC ENGINES

Washington state-based electric aviation firm magniX has launched its new HeliStorm range of lightweight, high-speed electric engines. The first engine in the range provides factory-spec peak power of 330kW at a weight of just 75 kilograms. Its key features include an operating speed of 6,000-7,000 rpm. Thus far flight test programs have included two separate integrations with Robinson R44 helicopters. The first electric Robinson R44 helicopter powered by a magniX motor flew on June 4, 2022 at the Los Alamitos army airfield in California. Subsequent tests went on to deliver the world's first point-to-point flight of an electric helicopter.

SKYTRANS MAKES PLANS FOR PASSENGER BUMP

Australian passenger airline Skytrans recently received an Air Operator Certificate to commence operations with narrow-body aircraft in the region. It marks a key milestone in the airline's operational capabilities and strategic expansion as it recently welcomed its first Airbus A319 to its fleet. Forecasts predict that total domestic air passenger travel in Australia

will grow by approximately 2.6 percent per year, expecting to surpass 237 million passengers by 2050. The introduction of the Airbus A319 is specifically aimed at increasing passenger capacity during peak travel seasons in Australia, offering regional carriers the ability to open or test new routes and operate more flights.



ROTATING DETONATION ENGINE TESTS ON TARGET

Pratt & Whitney has completed a series of tests on its rotating detonation engine and positive test results are spurring additional internal investment. "Our testing simulated aggressive assumptions for how and where the rotating detonation engine needs to perform," said Chris Hugill, senior director of GATORWORKS at Pratt & Whitney. "This testing validated key elements of Pratt & Whitney's design approach and provides substantiation to continue RTX vehicle and propulsion integration to accelerate future capabilities for our customers." Rotating detonation engines differ from traditional turbojet or turbofan engines in that they utilize a different thermodynamic cycle and require no moving parts.

DEHAVILLAND TO SUPPORT RCAF PROGRAM

In May 2024, the Canadian Government announced that SkyAlyne, a joint venture between CAE and KF Aerospace, was the successful bidder to deliver the Future Aircrew Training (FAcT) program for the Royal Canadian Air Force. Recently, Calgary-based De Havilland Aircraft of Canada confirmed it will support this program with the delivery of three Dash 8-400 aircraft to SkyAlyne over the coming years. DHC will also support FAcT by providing airworthiness engineering and in-service engineering support once the aircraft are inducted into the program. Today, the RCAF continues to fly DHC-6 Twin Otters.

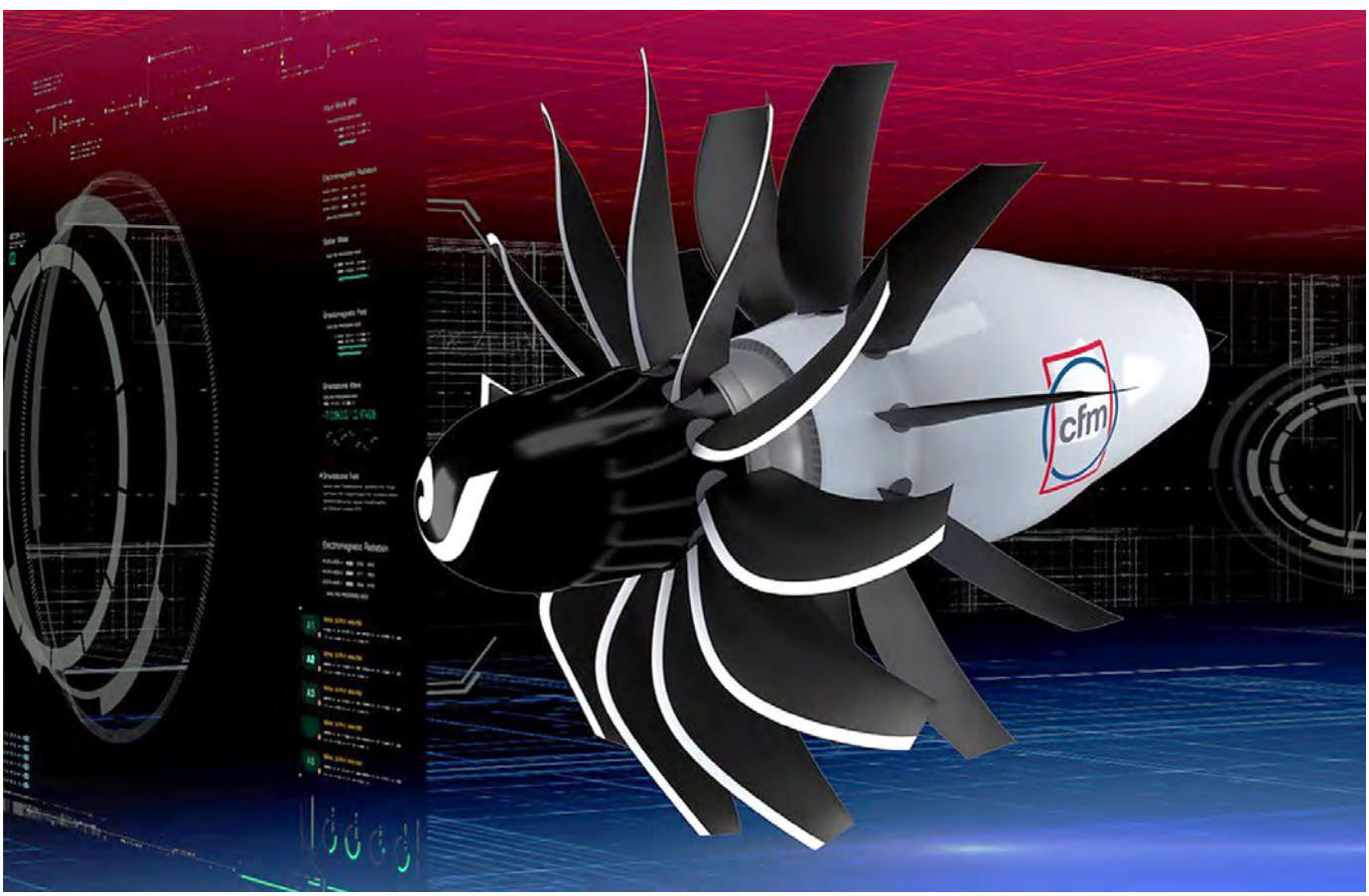
BOEING TO CONTINUE MOVING PARTS FOR BELL

Boeing and Bell Textron have signed a contract extension reaffirming Boeing as an authorized and endorsed supplier of used serviceable material for Bell 212 and 412 helicopters. This extension enhances parts inventory and distribution efficiency for commercial helicopter operators. Boeing will continue to provide USM parts for purchase and exchange. All repaired or overhauled parts are FAA approved and processed through Bell's Authorized Customer Service Facilities and Bell Authorized Maintenance centres. Boeing manages the recertification of USM parts and recycles high-value components. With over 15 million parts in its portfolio, Boeing says it continues to reduce costs and complexities for global customers. ■

Innovations Beyond the Horizon

The latest generation of commercial aviation engines have come far in terms of efficiency, but challenges remain say these industry watchers.

BY RYAN BURDON AND TOMMIE SHOREY



The RISE program accelerates the development of new propulsion technologies.

AS HAS ALWAYS BEEN THE CASE, technology continues to evolve, and two advancements are poised to revolutionize the aviation industry: One is the CFM RISE, a joint venture between GE Aerospace and Safran, the other is the UltraFan from Rolls-Royce. Both platforms represent phenomenal tech progressions in their own unique way but there are common denominators in the challenges that lie ahead. We'll explain.

The RISE program accelerates the development of new

Left: The UltraFan will have the largest bypass ratio of any engine used today on commercial jet aircraft.
Above: The quest for greater propulsive efficiency has fuelled the growth of engine fan diameters in commercial jet engines.

propulsion technologies and builds upon tests carried out by GE in the late 1980s that proved the efficiency of open-rotor engines. To maximize fuel efficiency in propulsion, the physics of propulsive efficiency dictates that an engine should propel the largest possible volume of air at the lowest possible exhaust velocity. The quest for greater propulsive efficiency has fuelled the growth of engine fan diameters in commercial jet engines. CFM believe that this evolution is ultimately leading to open fan architectures.

Unlike modern turbofan engines, whose engine components are enclosed in engine casings, RISE's innovative design has an open fan architecture. The engine features a single rotating fan, with variable-pitch carbon fibre blades, behind which sits a row of static guide vanes.

The goal is for RISE to be 20 percent more fuel efficient with 20 percent less carbon emissions compared with CFM's current Leap engine, which itself delivered a 15 percent improvement in fuel burn over the preceding CFM56.

As well as being significantly more fuel efficient using standard jet fuel, the CFM RISE technology is being developed to be fuel-source agnostic, meaning it will be compatible with alternative energy sources such as sustainable aviation fuel (SAF) and hydrogen. The engine uses advanced materials and manufacturing processes. 3D weaved carbon fibre composite blades enable larger fan diameters and propulsive efficiency, and advanced metal alloys and ceramics improve thermal efficiency.

You may think this design is similar to that of turboprop aircraft engines. However, the open fan architecture of RISE will be able to fly at the same speed as current single-aisle aircraft powered by current turbofan technology. What effect does this have on safety? Engine blades spin incredibly quickly, and engine casings are designed to contain these blades should they fail. Could this new design be prioritizing efficiency over safety? Thankfully, incidents such as this are extremely rare, even on traditional turboprop aircraft, and advancements in material technology mitigate these risks. Flight demonstrations are slated to begin in the next couple of years.

If the RISE is one of two revolutionary tech developments, the UltraFan is the other. This cutting-edge turbofan engine under development by Rolls-Royce, promises a 10 percent efficiency improvement over its predecessor, the Trent XWB. While building upon existing technology, the UltraFan incorporates several key innovations. Notably, it utilizes the geared architecture developed by Pratt & Whitney. In this design, the fan and the core operate independently, unlike conventional turbofan designs with synchronized rotation on a single shaft.

This decoupling allows for a larger and more efficient fan, spinning at a slower rate. Compared to conventional turbofans, the larger fan diameter propels a far greater volume of air at a much lower exhaust velocity. This translates to improved thrust, reduced fuel consumption and lower noise levels. Furthermore, the slower fan speed enables the use of lighter-weight materials due to reduced stress on the components. The UltraFan will have the largest bypass ratio of any engine used today on commercial jet aircraft.

These two new engine designs face some considerable challenges, including:

Complexity: Developing and producing these engines presents significant challenges due to their intricate designs. The carbon/titanium composite fan blade on the UltraFan is the largest ever produced for civil aerospace and exemplifies this complexity. Manufacturing such a massive and intricate component on a large scale while adhering to stringent regulations and industry standards demands unprecedented engineering and manufacturing expertise.

Integration: Seamlessly integrating these engines into the existing global aircraft fleet requires close collaboration between the engine and aircraft manufacturers. The constantly evolving landscape of aircraft design necessitates continuous adaptation and innovation in powertrain technology.

Competition: Maintaining a competitive edge in the aerospace market is crucial for the OEM's success. Each is consistently striving for advancements in engine efficiency and cost-effectiveness to outpace rivals and remain a leader in the industry. These challenges highlight the significant engineering feats required to successfully develop and introduce this innovative engine to the market.

In Conclusion

Continued innovation in engine technology is critical to meeting commercial aviation's long-term climate goal of net zero emissions by 2050. The good news is that there are positive results from programs already underway. These innovative designs will shape and inspire the next generation of engine technology, paving the way for a green aviation future. ■

(Ryan Burdon and Tommie Shorey are underwriters for the insurance firm Global Aerospace.)

BOEING WILL MEET delivery demand for its commercial aircraft by 2030, predicts Gediminas Ziemelis, the chairman and founder of the world's largest ACMI and wet-lease provider, Avia Solutions Group. Ziemelis made the comments after visiting Boeing's facilities in Seattle for a ceremonial signing with Boeing Commercial Airplane's CEO, Stephanie Pope, for Dublin-based Avia Solution Group's order

For various reasons Boeing has left recent orders unfilled but this major buyer believes the aircraft manufacturer will soon turn its fortunes around.

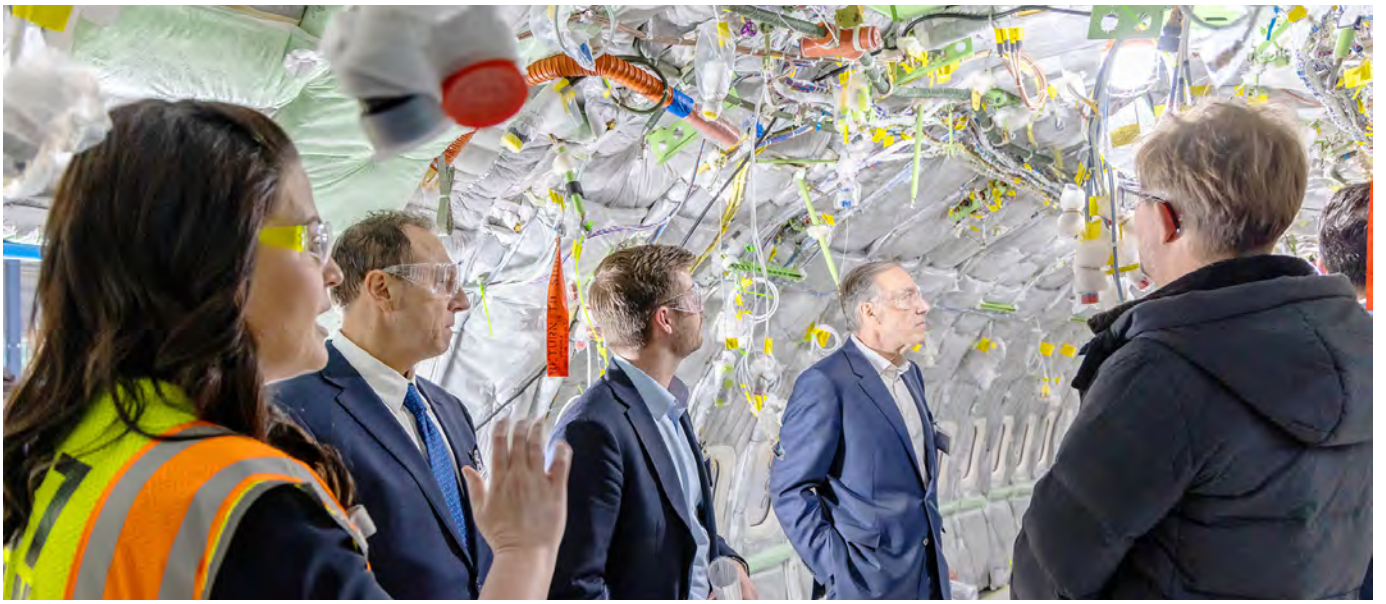
Right: Boeing will meet delivery demand for its commercial aircraft by 2030, predicts Gediminas Ziemelis.

Left: Avia placed an order for up to 80 737 MAX 8s.

for up to 80 737 MAX 8, placed in November last year. The order is split between 40 firm aircraft and 40 options.

Both Airbus and Boeing have encountered significant supply chain disruptions since the pandemic, hindering their ability to build on their 2018 delivery records. Boeing delivered 348 jets in 2024, leaving it with a total backlog of over 5,500 unfilled orders. Airbus managed to deliver 776 aircraft in 2024, four below its official target. However, Ziemelis reckons Boeing will have successfully overcome its production issues within the next five years.

"I've seen first-hand as a customer that Boeing is turning the corner on its production issues," said Ziemelis. "I anticipate a gradual return to 2018 production levels from both Airbus and Boeing as we progress through the rest of the decade. This



Above: Avia and Boeing personnel during last year's ceremonial signing.

year, and perhaps 2026, will be the last years when the industry will experience any real impact from missed deliveries. By 2030, I expect both manufacturers, to have resumed normal operations. The more vocal critics of Airbus and Boeing are likely being opportunistic, seeking to leverage current challenges for better deals. When we placed our inaugural direct order with Boeing last year, we did so based on our confidence in the aircraft and the company. This conviction remains unwavering." ■

The Many Near-Misses

"Highly disturbing and unacceptable" is how this legal authority describes air traffic control conditions over the Potomac River where 67 people died in January.

ROBERT CLIFFORD of Clifford Law Offices who represents several victims of the January 29 crash of an Army helicopter and American Airlines regional jet near Reagan National Airport (DCA), echoed National Transportation Safety Board (NTSB) Chair Jennifer Homendy's sentiments and said, "It should not take a tragedy that led to the loss of 67 lives to correct the safety issues that had been going on for years around Reagan National Airport."

Homendy held a press conference March 11, releasing the NTSB's current fact-finding results in a preliminary report along with urgent safety recommendations to the Federal Aviation Administration (FAA) regarding the midair collision January 29 over the Potomac River. Clifford said he found it highly disturbing and unacceptable that Homendy reported at least one extremely close call resulting in Traffic Collision and Avoidance System (TCAS) Resolution Alerts between helicopters and commercial aircraft at DCA every month from 2011 through 2024 (13 continuous years), reports of which were available to the FAA and the many commercial aircraft operators that operate at DCA the entire time, yet nothing was done by the FAA to correct the situation(s) causing these near-misses.

Homendy also pointed out that the FAA's ASAP voluntary reporting system contained 15,214 reported close proximity events (less than one nautical mile horizontal separation and less than 400 feet vertical separation) between commercial airplanes and military helicopters at DCA from October 2021 through December 2024. As a result of that data and this accident, she said the NTSB has now issued urgent safety recommendations to the FAA asking that they prohibit helicopter operations on Route 4 when Runway 15/33 is in use at DCA. Clifford agrees with this safety recommendation and notes it is consistent with his position since this accident happened.

Top image: Safety issues have been going on for years around Reagan National Airport.

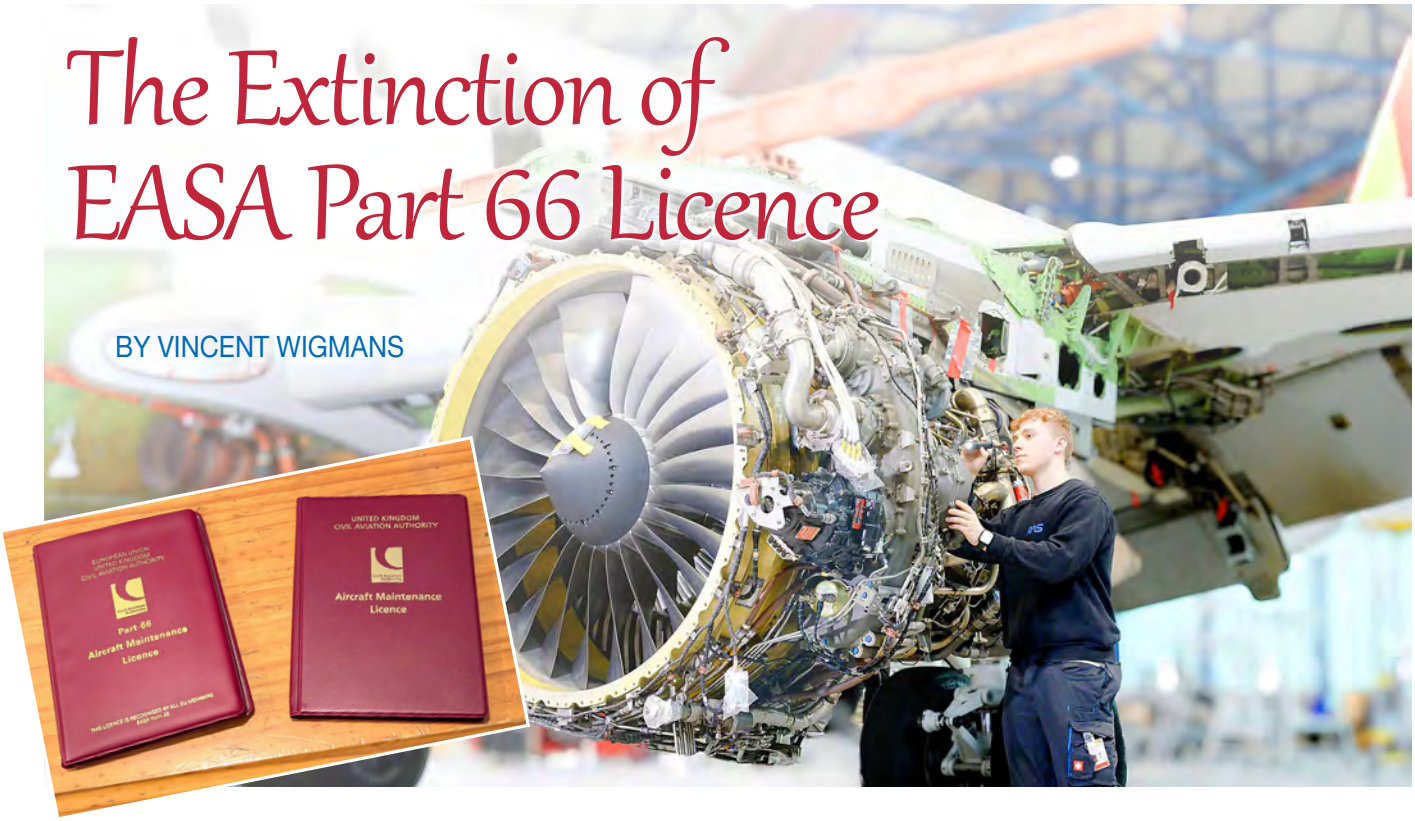
Above: Robert Clifford says Airlines and the FAA have the highest duty of care to the flying public.

"Airlines and the FAA have the highest duty of care to the flying public," Clifford said. "That level of safety clearly wasn't provided to the passengers of AA/PSA Flight 5342 here. With thousands of close calls around Reagan National Airport that have been documented over the years, it is sheer recklessness and a lack of conscience to ignore these statistics for at least 13 years. Our hearts go out to all of the families who lost loved ones in a crash that clearly was preventable and could have been avoided."

Clifford Law Offices filed for property damage, personal injury or wrongful death allegedly caused by a federal employee's negligence or wrongful act occurring within the scope of the employee's federal employment. The $250 million claims are directed against multiple governmental agencies that may be responsible. The NTSB has reported that staffing in the tower of air traffic controllers (ATC) was "not normal" at the time of the nighttime collision and that there were communication lapses between the ATC and the aircraft. ■

The Extinction of EASA Part 66 Licence

BY VINCENT WIGMANS



Europe's aviation industry is facing a safety crisis, says this aircraft sales executive.

HAVING WORKED for years in an EASA Part 145 maintenance environment as a postholder, I've witnessed firsthand the challenges and transitions within the industry. With many seasoned mechanics heading into retirement in the coming years, the private aviation sector risks a critical shortage of certified personnel capable of maintaining its diverse fleet of aircraft.

When EASA licensing regulations were implemented in 2003 (above 5,700 kg) and 2006 (below 5,700 kg), mechanics with national Aircraft Maintenance Licences (AML) had the opportunity to transition to an EASA Part 66 licence under a grandfather clause. This process allowed experienced professionals to transfer their qualifications, provided they could demonstrate work experience on a range of aircraft types. This transition created a pool of highly skilled and versatile mechanics, many of whom could work across various aircraft models.

However, these mechanics are nearing the end of their careers, and the pipeline of new certified personnel has not kept pace. This is particularly problematic for private aviation, which requires a broader scope of expertise due to the sheer variety of aircraft types in operation.

Challenges in the Private Aviation Sector

While airlines typically operate a uniform fleet, simplifying certification and training requirements, the private aviation sector presents unique hurdles. These challenges have made it increasingly difficult to cultivate a new generation of mechanics with the broad qualifications needed to support private aircraft.

1. Complexity and costs of EASA Part 147 Training Requirements

For some aircraft types, EASA Part 147 training courses mandate combining B1 (mechanical) and B2 (avionics) training. This creates a significant barrier for specialists. For example, a B2 mechanic focused solely on avionics may find it impossible to expand their qualifications to include certain aircraft types without completing the B1 course as well—a course irrelevant to their expertise. This "one-size-fits-all" approach fails to account for the specialized roles prevalent in private aviation.

Also, the costs to expand your EASA Part 66 licence with an additional private jet type are nothing short of enormous. It's not uncommon to see training prices starting at €25,000 for a single type training, and that's just the beginning. This figure doesn't include the additional expenses and not the additional expenses associated with completing the mandatory On-the-Job Training (OJT), which often also involves travel, accommodations, and coordination with certified organizations. For private aviation companies dealing with rare or specialized aircraft types, these costs can quickly become a prohibitive burden, complicating efforts to maintain a qualified workforce.

Vincent Wigmans has worked for years in an EASA Part 145 maintenance environment.

2. On-the-Job Training Limitations

OJT is another obstacle. In airline environments, OJT is rather straightforward, as fleets are standardized. In private aviation, however, mechanics often encounter rare or unique aircraft types. Securing OJT opportunities on these models can be so challenging that companies must sometimes request assistance from competitors. This reliance on external parties complicates the certification process and delays the readiness of mechanics.

3. Limited Availability of Type Training Courses

EASA Part 147 training courses are not universally available, especially for older or less common aircraft types frequently encountered in private aviation. This lack of access to necessary training further hampers the ability to maintain a diverse fleet and keep up with industry demands.

The need for a more practical approach

EASA has largely tailored its regulations and training requirements to meet the needs of airlines, which benefit from standardized fleets and economies of scale. However, this focus neglects the realities of private aviation. In 10 to 20 years, when mechanics with grandfathered licences retire, the private aviation sector will face an even greater shortage of qualified personnel.

To address this impending crisis, EASA must adopt a more practical and flexible approach. As the private aviation sector plays a vital role in Europe's aviation ecosystem, and its unique needs must not be overshadowed by the priorities of the airline industry. EASA has an opportunity to rethink its regulatory framework to ensure the continued availability of skilled mechanics. Without proactive measures, the extinction of EASA Part 66 certified mechanics in private aviation is inevitable—a prospect that threatens the safety, efficiency, and growth of the industry. It's time for practical solutions to secure the future of private aviation. ■

(Vincent Wigmans is the founder of FA Aircraft Sales)

In Praise of Robo-Cleaner

Here's a thought. Automized exterior cleaning might actually improve fleet maintenance.

AS THE AVIATION INDUSTRY goes through digitalization processes every year, the most recent advancements are being applied to different fields of this area. Computer-based intelligence systems help to handle large measures of information and upgrade automatization, which makes workforce more effective. One way to improve fleet maintenance is automated aircraft exterior cleaning, which has many benefits.

Keeping the aircraft fuselage clean is very important, because well-maintained aircraft can help to reduce fuel consumption, operational costs, and improve sustainability practices. Automated cleaning machines are designed to work effectively, reducing the number of staff needed, the time spent on the procedure, and increasing safety. They help to eliminate long hours of manual labour-intensive washing procedures. It is especially important for ground staff working at great heights.

According to Veronika Andrianovaite, the Chief Commercial Officer of Nordic Dino Robotics, the use of modern aircraft washing robots, such as the Nordic Dino, can help to reduce aircraft exterior cleaning times by up to 80 percent. For wide-body airliners like the Airbus A330 and the Boeing 777, the time spent on exterior cleaning can be dropped from six to two hours. Evaluating the effectiveness of narrow-body jets like the Boeing 737, the required aircraft on ground (AOG) time is reduced from three to one hour.

The aviation industry is also focusing on reducing negative impact on the environment. One of the goals is to minimize water usage. Aircraft washing robots can impressively reduce the amount of water used for cleaning the outside of aircraft.

"More than 30 percent of water is saved when compared to the traditional methods," says Andrianovaite. "A single cleaning session could consume up to 11,300 litres of water. But the automated washing systems are designed to reduce water consumption by more than 80 per cent, with each wash using approximately 1,800 litres of water. Moreover, automated systems optimize chemical usage, which results in reducing environmental harm." ■

★ TRANSPORT CANADA ★
Reports and Comments

The following are selections of Canadian Aviation Service Difficulty Reports originally published as "Feedback" by Transport Canada.

Airbus BD500

REPORT: AIRBUS CANADA BD 500

Improperly Crimped Terminal Lugs

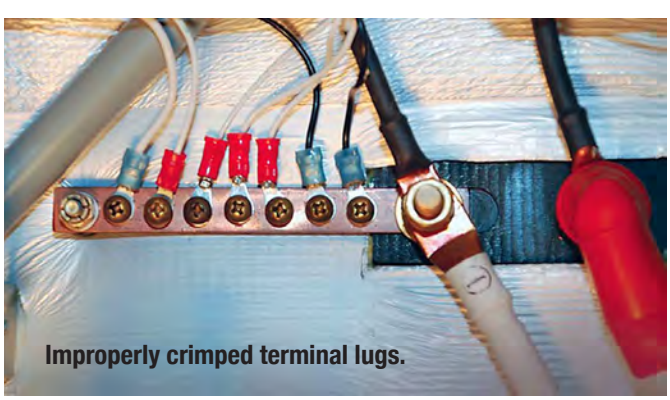
Subject:

Airbus received several reports indicating terminal lugs were not meeting crimp requirements (falling easily from wire). These reports are raised for terminals crimped on AWG-22 wire. Based on an internal investigation, we have identified that B0808005-005N terminals (Part number (P/N) 50832), crimped on AWG-22 are also considered suspect (failures found on the same supplier P/N in another program). The root cause is still under investigation.

Transport Canada Comments:

There are many systems incorporated into a fully functional aircraft; some of these systems can be observed as they function, while other systems can't be observed. Special tools and techniques are necessary to validate if these types of systems are operating within acceptable parameters. One such hidden function is electrical bonding between aircraft structures and component grounds.

Technicians should be aware that while troubleshooting electrical system anomalies on the A220 or any other aircraft platform, the integrity and electrical performance of crimped terminal lugs should not be assumed simply because the lugs are secure. If in doubt, verification of conductivity can be accomplished using a digital multimeter or an equivalent tool as specified by the manufacturer. In addition to and possibly even before the electrical verification, a tactile check to ensure mechanical retention of the wire in the terminal lug can potentially reveal a weakness in the system.


Improperly crimped terminal lugs.

A Beech 200 flying over a rural landscape.

REPORT: BEECH 200

Landing Gear Torque Tube Taper Pin – Security of Attachment

Subject:

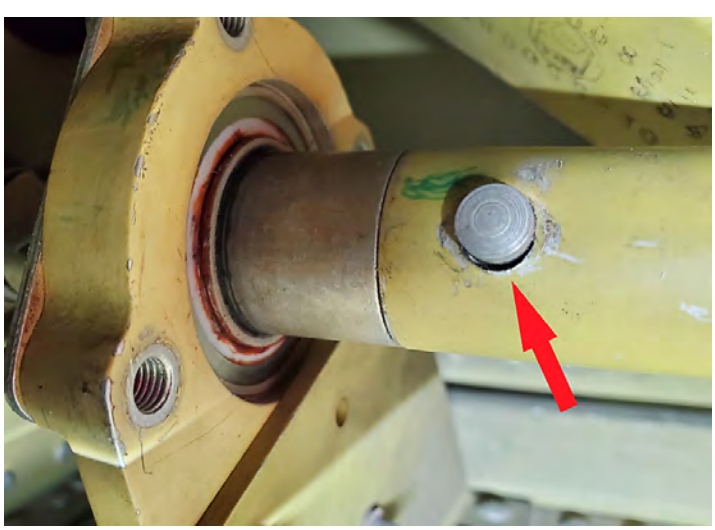
While performing the biennial airframe inspection, it was noted that the outboard taper pin hole of the middle right-hand main landing gear torque shaft was elongated and cracked. The torque tube damage appears to be caused by repeated torque loads. A review of the technical records indicated that this was probably an original factory installation. A complete failure of this shaft or the taper pin, part number AN386-2-8A, would have prevented the right-hand main landing gear from extending or retracting.

Transport Canada Comments:

Human error has been identified in multiple King Air gear collapse accidents where a taper pin was not installed correctly. When completing maintenance that requires removal and reinstallation of taper pins, it is extremely important that the correct torque is applied as specified by the appropriate Instructions for Continued Airworthiness (ICA) to ensure security of attachment.

It is worth noting that the absence of a taper pin in the torque tube will not allow the landing gear to be extended in an emergency. There is no system redundancy, the emergency extension system utilizes the same torque tube connection to the mechanical actuator as the electric motor during extension / retraction. Additional information on the installation of taper pins can be found in King Air Communique No. 2003-02

Below: Torque Tube Taper Pin Hole - Elongated.



Left: a Bell Textron 412EP.

Below: The fractured transmission oil fitting.

REPORT: BELL TEXTRON 412EP

Fractured Transmission Oil Fitting

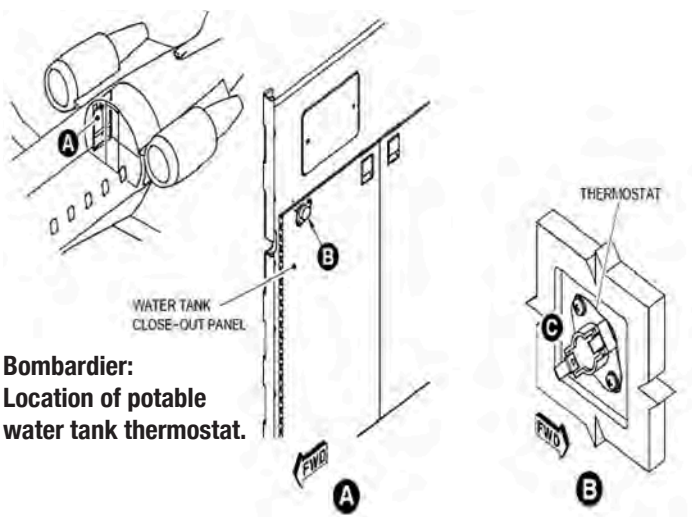
Subject:

Bell reports: "oil trend" indication followed by loss of transmission oil pressure while performing a target approach over the lake at 50 ft. The aircraft was brought back safely over an adjacent field and landed safely. Transmission oil fitting was fractured and 9 quarts of oil was lost.

Transport Canada Comments:

Bell has received reports of model 412EPX helicopters experiencing loss of main transmission oil pressure. Their investigation revealed that the loss of oil pressure was due to the fracture of some part number (P/N) elbow fittings on the main transmission ring gear case. In some instances, Bell has found that the oil tube assemblies are non-conforming.

To mitigate the risk of an elbow fitting fracture and subsequent loss of transmission oil pressure, Bell has published ASB 412-23-193 to inspect and replace certain P/N elbow fittings. The latest revision of ASB 412-23-193 also provides instructions for the correct installation of the hoses and clamps associated with the elbow fitting. TCCA would like to make the owners, operators and maintainers aware of the affected Bell 412 EP helicopters and consider accomplishing the instructions of ASB 412-23-193.



Bombardier: Location of potable water tank thermostat.

REPORT: BOMBARDIER CL-600-2B16 (604) - CL605

Potable water tank electric terminals missing insulating silicone

Subject:

While performing a 6-month inspection on a Challenger 605 (CL605) and working on the potable water tank, with electrical power applied to the aircraft, my colleague was electrocuted and had to go to the hospital. This happened because there is an installation work step missing to apply sealant on the electrical connections. This step was found missing from the Supplemental Maintenance Manual (SMM) work step within SMM task 21-41-57-400-801 for the CL605 aircraft.

When you compare the Challenger 650 (CL650) SMM with CL605 SMM, they are not the same. In the CL650 SMM task 21-41-07-400-801, you must apply silicone on the electrical connections and in the CL605 SMM task 21-41-57-400-801 this work step is missing. This leaves 115 volts on the un-protected electrical connections and you can easily touch them while servicing the potable water tank on the CL605.

Silicone protected terminals.

Unprotected terminals.

The technician working on the aircraft touched the electrical connection on the baggage compartment heater thermostat with his forearm. As soon as he touched the potable water tank with his hand, he was electrocuted.

The Bombardier description reads, "…the terminals of the thermostat are located on the water tank forward access door, which is only opened by maintenance personnel during maintenance activities…" As per the engineering approved under the completion Supplemental Type Certificate (STC) SA06-90 on the CL605, there is no silicone installed on the terminals of the thermostat. Therefore, there were no errors in the SMM task 21-41-57-400-801 as it reflects the engineering approved on the aircraft. On the CL650, there is engineering coverage to install silicone on the terminals which is a safer installation.

Transport Canada Comments:

This issue was brought to Bombardier's attention and CASA 2024-12 was published on November 21, 2024, by Transport Canada as an advisory and awareness measure. This article is to provide additional awareness to maintenance personnel who perform maintenance on the affected aircraft. The investigation into the issue noted the following:

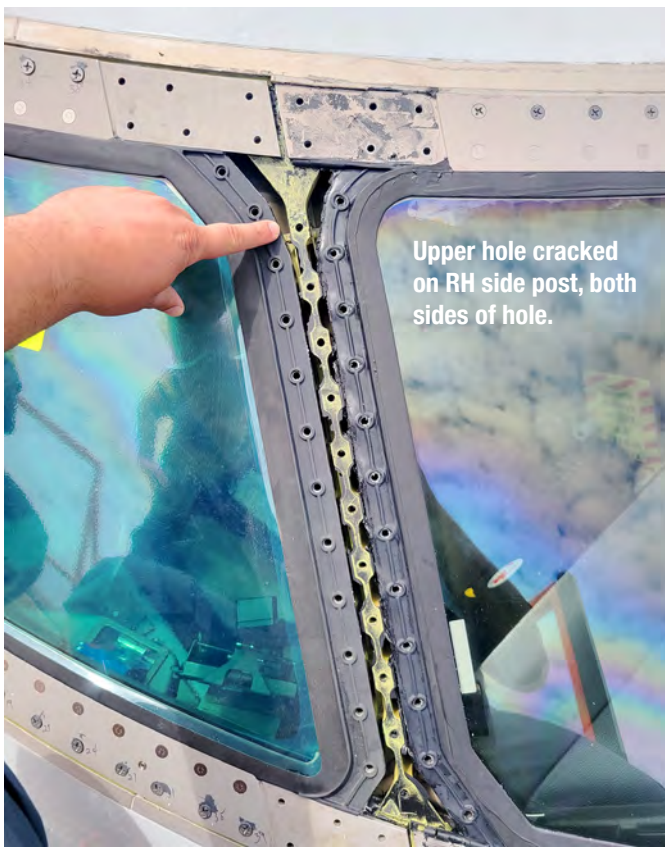
The terminals of the Baggage Compartment Heater thermostat (part number 2511L1941658) are located on the water tank FWD access door, which should be only accessed by maintenance personnel during maintenance activities.

On the CL605, as per the engineering approved under the completion STC SA06-90, there is no silicone installed on the terminals of the thermostat. Therefore, the Supplemental Maintenance Manual (SMM) task 21-41-57-400-801 is aligned with the approved engineering. However, it has been identified that the thermal sensor in the FWD baggage area access door can result in maintenance personnel contact with 115-volt electrical power while servicing the potable water tank. On the CL650, there is engineering coverage to install silicone on the terminals as per SMM task 21-41-07-400-801.

As a result of the investigation, Bombardier issued a recommended Service Bulletin (SB) 605-21-006, to address the issue and install sealant on the exposed terminals and correct STC SA06-90, FAA STC ST0235NY and EASA STC 10016019. The SB was issued to all affected aircraft serial numbers to correct the original installation per the affected STCs.

It is strongly recommended that operators of all affected aircraft carry out the instructions of Bombardier recommended SB605-21-006 to prevent inadvertent injury to personnel.


MHI RJ Aviation CL600


Upper hole cracked on RH side post, both sides of hole.

REPORT: MHI RJ AVIATION CL600 2C10 (RJ700) - RJ700/900/1000

Cockpit window posts cracking

Subject:

A crack was discovered in the right-side window post hole when window was removed for replacement.

Transport Canada Comments:

There have been 29 reported events since January 2017 of left and right window posts cracking and 36 reported events since January 2013. The increased number of events over the last 7 years may be due to the fleet aging.

The manufacturer has assessed these cracking events and because the side posts are a fail-safe design have found that there is no immediate safety issue. Non-destructive inspection (NDI) of the posts is included in the manufacture's maintenance program with the initial inspection interval being 32 000 flight cycles (FC) with a repeat interval of 3200 FC.

Left: Close up of upper hole crack which goes down through post. Right: Side view showing the crack going all the way to the nut.

Defect history shows the CRJ700/900/1000 window average change interval to be around 23 000 flight hours so there is often an opportunity for a visual inspection prior to the 32 000 FC NDI threshold. Window post cracks are detectable with a detailed visual inspection when the window has been removed. Maintenance personnel should be aware of the potential for post cracking and are advised to perform a detailed visual inspection of the window posts each time a window is removed for replacement.

REPORT: PIPER PA31 350

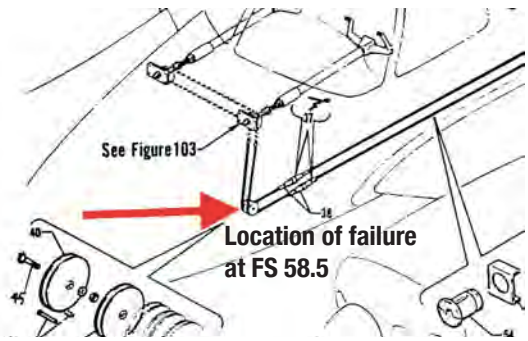
Aileron Control Cable Failure

Subject:

Crew experienced a loss of aileron control on approach. The aircraft landed safely with the use of rudder and differential engine power. The company's maintenance department completed inspection and found that the right-hand aileron control cable had completely failed at fuselage station (FS) 58.5 where the cable is redirected 90 degrees by a pulley from the vertically positioned aileron interconnect chain to horizontally through the fuselage in the cabin. The pulley and guide pins were found to be in serviceable condition.

It was discovered that a portion of the cable is hidden by the pulley bracket and floor structure which could prevent a thorough inspection of the cable in that section during inspections. Even with full deflection of the cable in both directions, it does not extend the cable beyond the aircraft structure sufficiently to complete a thorough visual inspection. It is recommended to use a borescope and/or removal of the pulley to inspect the cables in that area.

Piper PA31 350 in flight.



Failed Aileron control cable.

Transport Canada Comments:

This occurrence highlights the importance of complete control cable inspection. Piper Aircraft published a Service Letter Maintenance Alert (SL) 1135 in 2010 titled Control Cable / Pulley Inspections which is applicable to ALL Piper Aircraft models. It is encouraged that all maintenance personnel become familiar with the contents of this publication. ■

PACIFIC

Pacific AME Association

PAMA: a volunteer-run organization

The Pacific AME Association is a non-profit organization, run by a volunteer group of AMEs and non-AMEs. Directors are elected by member AMEs to the Board for a two-year term. The purpose of the association is to maintain and enhance the standards of professionalism of the AME and the aircraft maintenance industry as a whole, and to promote the rights and privileges of the AME.

The association works with and is consulted by Transport Canada in the formulation of new rules and regulations to promote the viewpoint of the AME. We are represented on various committees and working groups involved with aircraft maintenance and licensing. We support the community college aircraft maintenance programs throughout BC through annual monetary awards and bursaries.

Pre-Covid, two workshops were conducted annually. Usually one in the Lower mainland and one elsewhere based on demand and corporate requests. These workshops are run by volunteers and are single day events and feature speakers and interactive presentations on a variety of topics. Attendance at these can be counted towards the recurrent training requirements by Transport Canada. We publish periodic newsletters which contains items of current interest to our members as well as commentaries and articles on maintenance procedures.

Reminder

This is a reminder that PAMEA has decided to formally transfer Membership Administration to AMEC/TEAC which is currently handled by the Ontario Association. What this means for the Membership is that our web site page will send you to the Ontario Association Membership pages for you to sign up if you are a new member or to complete your renewal as a PAMEA Member. Visit: **www.amec-teac.ca/pacific**

WESTERN

Western AME Association

www.wamea.com

temporarily email = md@werkasset.com

Various items found on our LinkedIn page

A functioning active CO detector capable of alerting pilots via aural or visual warnings are required to be present when carrying passengers. It seems a bit odd that pilots can fly without a monitor present when no passengers are being carried. The logic is that pilots are supposed to be aware of CO poisoning symptoms where passengers are not.

CO (carbon monoxide) poisoning has been cited as a factor in multiple general aviation (GA) accidents globally. In the UK, since 2000 there have been three accidents, two of which were fatal, where CO poisoning was identified as the likely cause. Another 15 events were reported where CO was suspected as a factor.

The dangers of carbon monoxide exposure have been highlighted by the UK Air Accidents Investigation Branch (AAIB) in several accident reports, most notably following the 2019 fatal accident involving N264DB.

Hartzell Propeller President JJ Frigge explained the first of its new Falcon series propeller line is the "Kestrel" which was designed for the Rotax 916 engine, was specifically tailored to enhance the backcountry and cross-country flying capabilities of the STOL Carbon Cub UL.

CubCrafters' president and CEO Pat Horgan said of the propeller delivers superior handling, improved takeoff and climb performance, and a 3-4 knot increase in cruise speed compared to other propellers—all while maintaining a lightweight design. Plus, it looks fantastic on the aircraft. The "Kestrel" weighs 19.6 pounds, approximately 10 pounds less than any other option for the airplane.

WAMEA has an agreement with the AME Association of Ontario that they will recognize new members joining AMEAO as WAMEA by their Alberta and NWT postal codes. Current AMEC/TEAC members will receive an email with log in information/links. If you do not receive an email from AMEC/TEAC, or have just joined the association as a member, please email 3739casorso@gmail.com for the log in instructions.

Website still down

Due to our website crash, please temporarily email WAMEA at md@werkasset.com. The Western Aircraft Maintenance Engineers Association (WAMEA) is an organization equipping its members with the knowledge and professionalism which distinguishes the occupation of Aircraft Maintenance Engineers (AMEs) in the aviation industry (AME-M1 and/or M2 ,AME-E and AME-S and AME-Baloon).
www.wamea.com

CENTRAL

Central AME Association

CAME's Award Winners

Outstanding AME: Caroline Sicat

Caroline began her aviation journey as an adult student in Winnipeg at Tec Voc High School's AMMOP program in 2000. She later earned her Aircraft Maintenance Engineer (AME) "M" License Diploma at Red River Community College, launching a remarkable career in aircraft maintenance and training.

She started as a Non-Destructive Test Inspector at StandardAero, specializing in T56 engine inspections, before joining Air Canada's Heavy Maintenance Base in Winnipeg. There, she worked on Airbus and Embraer aircraft, eventually becoming the first female Lead Licensed Aircraft Technician at the YWG Heavy Maintenance Base when Air Canada transitioned to Aveos.

After Aveos closed, Caroline shifted to aviation training, returning to StandardAero as a Senior Technical Trainer and Learning & Development Specialist. Since 2012, she has mentored hundreds of employees through the Gas Turbine Repair & Overhaul (GTRO) Program. She also developed the RR300 Field Level Maintenance Training Course, approved by Rolls-Royce.

A passionate advocate for youth in aviation, she volunteers for Girls in Aviation Day, AAIM Day, and student work placements. She serves as Secretary-Treasurer for Skills Canada Manitoba and played a key role in the Women in Aerospace Program, which earned an All Star Award in 2024.

Women AME in Training Winner: Iryna Bilchuk

The CAMEA – Ninety-Nines Scholarship Award for Women AME in Training is a significant initiative aimed at promoting and supporting women pursuing careers in Aircraft Maintenance Engineering. This newly established scholarship serves as a catalyst for change, inspiring more women to enter the field by providing them with the resources and encouragement needed to achieve their professional goals. Congratulations to this year's Women AME in Training Award recipient, Iryna Bilchuk!

Rookie of the Year Award: Justine Boo

The AME Rookie of the Year Award recognizes the next rising star in the eld of Aircraft Maintenance Engineering who has demonstrated exceptional dedication to mastering their craft. This award celebrates individuals who exhibit strong technical skills, a commitment to continuous learning, and a passion for excellence in the industry. Congratulations to this year's Rookie of the Year recipient, Justine Boo!

Sheet Metal Award: Ashton North

New recognition honouring AMEs who demonstrate exceptional skill, precision, and craftsmanship in sheet metal work. This award highlights the importance of structural expertise in aviation maintenance, recognizing individuals who excel in metal fabrication, repairs, and medication—critical skills in ensuring aircraft integrity and safety. Congratulations to this year's Sheet Metal Award recipient, Ashton North! Visit: **www.camea.ca**

AME Association of Ontario

#613 - 7360 Bramalea Road, Mississauga, Ontario L5S 1W9
tel: 1-905-673-5681 email: association@ame-ont.com website: www.ame-ont.com

52nd Annual Conference & Eighth Annual Skills Challenge (November 13-14, 2025)

For over 50 years, the Ontario Aircraft Maintenance Conference has been a cornerstone of the aviation industry, bringing together professionals, exhibitors, and teams from across the country. As the event has grown, we have welcomed participants from every corner of Canada, and it has become clear that the name should reflect our national reach. With the largest attendance, the highest quality and variety of training sessions, and the original skills challenge, we are proud to announce a new name that better represents the scope of the conference:

National Aircraft Maintenance Conference and Skills Challenge

This event is for everyone involved in aircraft maintenance—Aircraft Maintenance Engineers, PRMs, QA professionals, buyers, stores personnel, technicians, and more. This change recognizes the incredible contributions of sponsors, exhibitors, attendees, and teams from across Canada while celebrating everything that makes this event unique.

While the name evolves, we remain deeply committed to honouring our roots with the Aircraft Maintenance Engineers Association of Ontario, while continuing to represent the entire Canadian aviation maintenance community. Thank you for your continued support. We look forward to welcoming you to the National Aircraft Maintenance Conference and Skills Challenge!

Website Updates

Our board determined that the previous platform hosted by SilkStart was not meeting the needs of the association. A committee was formed to review our existing website and identify what was good, bad, or missing. The committee put together a request for proposal (RPF) outlining the details of what we needed to move forward. This was distributed to companies, and the committee reviewed all bids, eventually electing to award the contract to Computer Elite.

The timeline was quite tight to try to get the new site up and running, and Computer Elite delivered. We are still working through a few kinks in the system, as happens with any newly implemented process and platform. We appreciate notification of any issues that members may run into so that we can improve the process or solve them accordingly. There are a few features we are still ironing out, and we thank you for your patience in this rollout. The website address remains the same: ame-ont.com

Who We Are

The Aircraft Maintenance Engineers Association of Ontario is a non-profit organization, run by a volunteer group of AMEs and non-AMEs. The purpose of the association is to maintain and enhance the standards of professionalism of the AME and the aircraft maintenance industry as a whole, and to promote the rights and privileges of the AME.

Submitted by Stephen Farnworth
For the Board of Directors
www.ame-ont.com

QUÉBEC

Quebec AME Association

Association des Techniciens/Techniciennes d'Entretien d'Aéronefs du Québec

C.P. 34510, 3131 Côte-Vertu; CSP Place Vertu, Saint-Laurent, Qc, H4R 2P4
email: info@ame-tea.com website: www.ame-tea.com

Mission Statement

The association's mission is to represent all AMEs in Quebec regardless of the company or the contracts on which they work. Regardless of the type of aircraft on which the AME works, he/she will be welcome. We will simply recognize ourselves as a holder of an AME Transport Canada M1/2, E or S license with an attachment in Quebec.

The Association will ultimately become the AME's voice to Transport Canada's ears and will work with existing AME associations from coast to coast to make our profession stronger and more cohesive. One of the great goals of our association is to elevate ourselves to the status of a professional and to be recognized as such by the various federal government bodies. The other major mission of our association will be to make our profession better known to the public and to get involved with young people so that they know what AME's work is and consider it as a career choice.

In addition, our association will offer many benefits to its members such as group discounts from various vendors, free magazine subscriptions, and discounts for insurance companies offering products designed for AMEs.

Cette association se donne pour mission de représenter tous les TEA au Québec quelle que soit la compagnie ou les contrats sur lesquels ils travaillent. Quel que soit le type d'aéronefs sur lequel le TEA travail, il/elle sera bienvenu. Nous nous reconnaîtrons simplement en tant que titulaire d'une licence de TEA de Transport Canada M1/M2, E ou S et ayant un attachement au Québec.

L'Association deviendra à terme la voix des TEA aux oreilles de Transport Canada et travaillera de concert avec les association de TEA existantes d'un océan à l'autre afin de rendre notre profession plus forte et en y insufflant une plus grande cohésion. L'un des grand objectifs de notre association est de nous élever au rang de professionnel et d'être reconnu comme tel par les différentes instances gouvernementales fédérales.

L'autre grande mission de notre association sera de mieux faire connaître notre profession au public et de nous impliquer auprès des jeunes pour que ceux-ci sachent en quoi consiste le métier de TEA et qu'ils le considèrent en tant que choix de carrière.

www.ame-tea.com

ATLANTIC

Atlantic AME Association

President's Message — By Bob Pardy

The AME Association (Atlantic) is an organization formed by people who work, or have worked, in the various maintenance disciplines in the aviation community, in the Atlantic Region. This Association is overseen by a group of volunteers who have been elected by the membership to promote and advance the aircraft maintenance profession for its members. They dedicate their time bringing you, the members, programs that will benefit you as an AME, such as Human Factors training, the annual conference, where you gather some of the latest technology in aircraft maintenance and technical presentations from industry suppliers and promoters. Also give you the opportunity at various events to network with fellow AME's, the regulators and other aviation personnel.

The Association acts as a liaison between you and Transport Canada Civil Aviation, both regionally and nationally, on matters pertaining to your AME licence and any matters you would like the Association to present on your behalf.

Canada, under the leadership of the national association (AMEC/TEAC), celebrates "AME Day." This special day takes place on April 20th and is observed by Canadian AMEs from coast to coast to coast, as our day to show our work and our importance in the safety of the Canadian Aviation community, and to celebrate our work in the various geographical areas of the country.

As I have asked previously, and I am continuing to ask, please submit photos of AME's at work in the Atlantic Region. These photos should cover all aspects of our work, heavy maintenance, field recovery, bush operations, component overhauls, inspections, component replacement, etc. You can submit your photos to; bob.pardy@atlanticame.com.

As you page through our website, I ask you to take a few minutes to review the Awards page of this website and consider nominating a person or company, who you feel is deserving of one of the AME Association (Atlantic) awards, in recognition of their work and dedication to our industry. The nominee does not have to be a member of the association, only a person who is working in the Atlantic region, or has worked in the region prior to their retirement.

The AME Association (Atlantic), in partnership with AMEC/TEAC aims to be your voice and support to our Industry.

www.atlanticame.com

SoCal PAMA Chapter

Flight Safety Detectives Episode 260: Is it Safe to Fly?

A look at several recent high-profile aviation accidents. Although flying is much less risky than decades ago, crashes change the public's opinion about aviation safety. It now feels less safe to fly. The February 17 crash in Toronto of an Endeavor Airlines CRJ-900 operating as a Delta Air Lines regional flight gets particular emphasis. Flight Safety Detectives Todd Curtis, Greg Feith and John Goglia compare the Toronto crash to three other crashes where the wings broke off, the aircraft ended up inverted, and there was a post-crash fire. The 1997 crash of a FedEx MD11 at Newark Airport is one similar event. John was the NTSB board member leading the on-site investigation.

The detectives discuss the known evidence and what is expected to be uncovered during the investigation. The crash is being investigated in Canada, so the release of public information is expected to be somewhat limited.

Witnesses both inside and outside the accident aircraft published videos shortly after the accident. These make it possible to estimate the aircraft's speed before landing and average descent rate as well as see the initial breakup of the aircraft.

The videos also offer a case study of evacuation practices and issues. While the videos provide valuable insights for investigators, the passengers who took videos during the evacuation jeopardized safety.

Hear why the evacuation slides did not deploy. The detectives share the smart decisions made by the flight crew to avoid issues that happened in the Miracle on the Hudson event. The detectives separate fact from fiction in the media commentary about the Toronto accident. Some experts are just plain wrong.

www.socalpama.org

SOCAL

Central Ohio PAMA

COPAMA to cease operations in 2025

After much deliberation, the COPAMA Board came to a unanimous vote concerning the continuation of COPAMA as a Non-Profit organization. Since we have ongoing commitments to a few student awardees till next June 30th, the Board will meet again at that time to finalize the close of operations. The 2 members, Lowell Dowler and Gene Sprang, who were not seeking reelction, will remain on the board through closing.

Our thanks go out to Alex Teffenhardt, Robert Everett, Todd Worthington and Tyler Worthington who were in attendance to contribute to the discussion. The minutes of the meeting will be published once approved by the board.

Our final event will be the 2025 Ohio Aviation Maintenace Symposium. It will be held Monday March 24th at the Eastland Career Center off Hamilton Road near Groveport, Ohio in Southeastern Franklin County.

Doctoral student still needs your input on aviation safety

Whitney Lee, a doctoral candidate in the Graduate Studies in Education department at Southern Nazarene University, is seeking your participation in her study regarding how leadership styles in the aviation industry potentially impact safety.

The purpose of her study is to explore perceptions of aviation safety leaders regarding their supervisors' leadership styles contributing to the organization's safety culture. She is seeking individuals who are aviation safety leaders currently working in aviation with five or more years of industry experience. If you are willing to participate, you will be asked to share your insights in this area.

If you are willing to participate, Whitney would like to send you four questionnaires to fill out. The data collected from the questionnaires will be carefully and respectfully guarded. If you decide to participate in this study, your identity and responses will not be revealed. She will use pseudonyms to protect your identity.

If you would like to participate or have any questions regarding the project, please contact her for further discussion at 405-567-5974 or wlee950@mail.snu.edu.

www.copama.org

CENTRAL OHIO

Transportation Safety Board of Canada | Bureau de la sécurité des transports du Canada

Tangled Up in Trees

A defect in a braze bond leads to fatal consequences for pilot and machine.

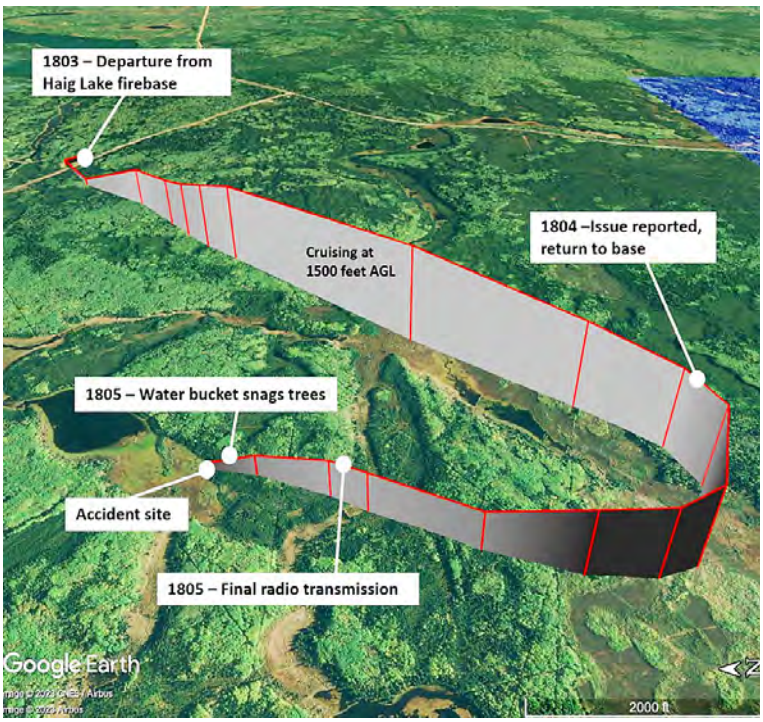
ON **19 JULY 2023,** the Valhalla Helicopters Inc. Bell Textron Inc. 205A-1 helicopter (C-GRUV) was conducting operations in support of firefighting efforts in north-central Alberta. At 1803 Mountain Daylight Time, the helicopter departed Haig Lake firebase, Alberta, on a visual flight rules flight to a forest fire located approximately 15 nautical miles northeast of Peace River Aerodrome (CYPE), Alberta, with one pilot onboard and an empty bucket suspended below the helicopter on a 150-foot longline. Shortly after departure, the helicopter experienced an engine failure. During the subsequent autorotation to a patch of muskeg, the water bucket became entangled in trees. At approximately 1805, the helicopter impacted the terrain in a nose-down, left-banked attitude and was substantially damaged. There was no post-impact fire. The pilot survived the initial impact and was able to egress from the helicopter but later died of his injuries.

HISTORY OF THE FLIGHT

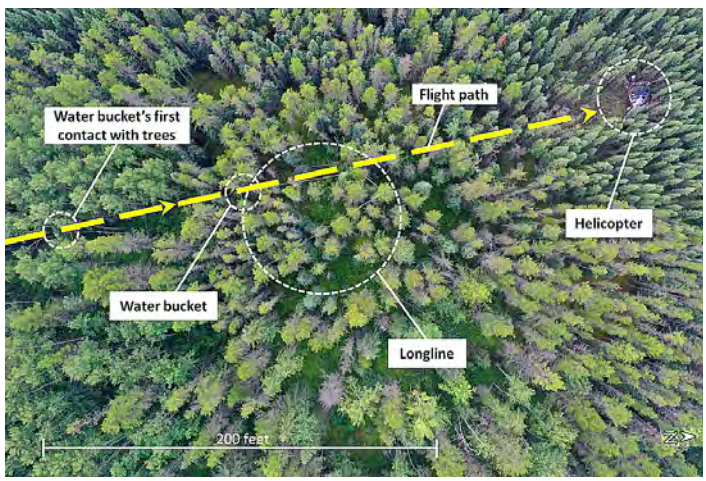
On 19 July 2023, the occurrence pilot from Valhalla Helicopters Inc. was contacted at 10201 by the dispatcher at Peace River Forestry for a 1200 departure to assist with firefighting efforts but was stood down at 1131. The pilot was subsequently dispatched at 1752 to support suppression of a fire located to the northeast of Peace River Aerodrome (CYPE), Alberta.

At 1803, the occurrence pilot departed Haig Lake firebase, Alberta, alone in a Bell Textron Inc. (Bell) 205A-1 helicopter, for a visual flight rules flight to aid in suppressing a wildfire. The helicopter had a full load of fuel in the main fuel tanks and a 150-foot longline with a water bucket attached to its external load hook.

The pilot informed the dispatcher that the helicopter was airborne and had turned on course to reach the fire, climbing to a height of approximately 1400 feet above ground level (AGL). Once the helicopter was in level flight, the pilot contacted the dispatcher for information about the fire. While the pilot was reading back the information to the dispatcher, the helicopter lost approximately 300 feet of altitude.



Left: Occurrence aircraft's flight path leading to the accident site.
Below: An overhead view of the wreckage trail, showing the locations of the water bucket, longline, and helicopter in relation to the flight path.



At 1804, the pilot informed the dispatcher that he was returning to the Haig Lake firebase due to an unspecified issue. This transmission was acknowledged by the dispatcher. The helicopter began a 180° turn to the right, to a heading of approximately 025° magnetic, during which it continued to lose altitude. The helicopter then experienced a complete loss of engine power and the pilot began to autorotate into a section of muskeg to the west of his current location.

At 1805, when the helicopter was at a height of approximately 500 feet AGL, the pilot made one final transmission to the dispatcher of which only the helicopter's call sign was heard.

Shortly thereafter, the water bucket contacted trees and then became entangled in a tree. The pilot released the longline using the manual release (also known as the mechanical release) and, shortly thereafter, the helicopter impacted the ground in a nose-down, left-banked attitude.

DAMAGE TO AIRCRAFT

The aircraft was substantially damaged by the significant impact forces when it collided with the terrain in a nose-down, left-banked attitude. The tail boom was hit by the main rotor blade. The condition of the main rotor blade is consistent with low rotor rpm at the time of impact.

PERSONNEL INFORMATION

The pilot held a commercial pilot licence – helicopter, with BH04 (including the Bell 205A-1), BH12, BH06, EC30, R66, RH22, and RH44 type ratings. At the time of the occurrence, the pilot had current proficiency checks on both the Bell 205A-1 and Bell 212.

The pilot completed his last Bell 205A-1 written exam on 12 March 2023. His last pilot proficiency check for the Bell 205A-1 series helicopter was conducted on 14 March 2023. The pilot held the appropriate licence and rating for the flight in accordance with existing regulations and had a valid Category 1 medical certificate.

AIRCRAFT INFORMATION

The Bell 205A-1 is a single-engine, single-main-rotor helicopter that can carry up to 14 passengers in addition to the pilot. The helicopter is equipped with an Ozark Aeroworks, LLC (Lycoming) T5317B free-turbine engine. There were no recorded defects outstanding at the time of the occurrence. The aircraft's weight and centre of gravity were within prescribed limits. The occurrence helicopter was configured to be flown by one pilot from the left front seat. This configuration allows the pilot to look down the left side of the helicopter to monitor the external load.

ENGINE

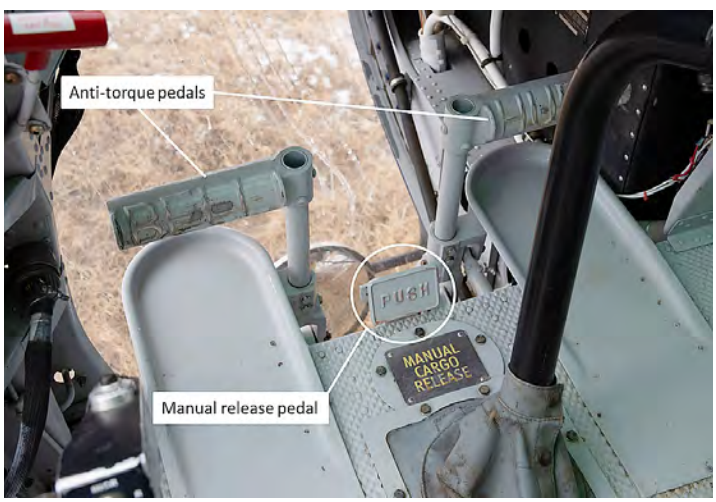
The T53 series gas turbine engine has a 2-stage free-type power turbine, an external annular atomizing type combustor, and a 2-stage gas-producer turbine that drives a combination axial centrifugal compressor. The power shaft runs from the power turbines through the compressor section to the reduction carrier assembly.

The forward end of the compressor section is supported by the No. 1 main ball bearing (radial and axial support). The aft end of the compressor and the 2 gas-producer turbine wheels are supported by the No. 2 main roller bearing (radial support).

Far left: CARGO REL [cargo release] switch, as found post-accident, on the overhead panel of the occurrence helicopter. DC Power and Battery switches were selected OFF, post-accident, for safety reasons.

Left: The electric cargo release push button on the cyclic from the occurrence aircraft.

Below: The manual release pedal and anti-torque pedals of a typical Bell 205A -1



The T53 series engine in the occurrence aircraft is rated at a take-off power of 1500 shaft horsepower and a maximum continuous power of 1350 shaft horsepower at sea level and in standard atmospheric conditions.

ENGINE EXAMINATION

The occurrence engine was shipped to the Ozark Aeroworks, LLC facility in Springfield, Missouri, United States, for examination. The T53 series engine was originally designed and manufactured by Lycoming in the 1950s. Ozark Aeroworks, LLC is currently the type certificate holder and original equipment manufacturer (OEM) of the engine. Ozark Aeroworks, LLC also undertakes maintenance, repair, and overhaul of the engines.

Both the Transportation Safety Board (TSB) and the National Transportation Safety Board of the United States sent investigators to oversee the engine examination at Ozark Aeroworks, LLC.

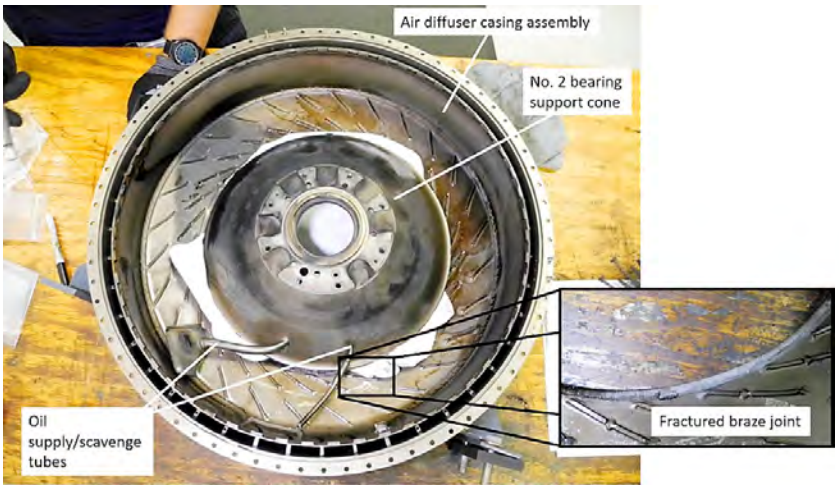
The engine was then shipped to the TSB Engineering Laboratory in Ottawa, Ontario, where some of the components from the engine assembly were subjected to a more detailed examination and further analysis.

Examination of the air diffuser's components revealed that the No. 2 bearing support cone was brazed to the air diffuser casing assembly and that the entire circumference of the braze had failed in addition to the non-structural oil pressure and scavenge tubes at their outer extremities. The 2 separated components appeared to show no marks of previous disassembly or repair, such as grinding, chiselling, or other mechanical means that would have marred the surfaces. The intermittent fillet welds appeared to be the original OEM welds, consistent with the other welds on the air diffuser casing assembly.

The brazed surfaces did not show signs of liquation, porosity, or unevenness. The brazing appeared to have complete coverage of both surfaces over most of the circumference. The separation of the braze centreline (cohesive zone) was consistent throughout the circumference on both faces with only a few small, scattered areas of apparent loss of bonding between the air diffuser casing assembly and the support cone.

One area of the bond, under the scavenge oil tube location, appeared to have a larger area of bonding loss and separated from the air diffuser casing assembly surface. This area appeared to stretch over the entire width of the bonding area and measured approximately 10mm wide.

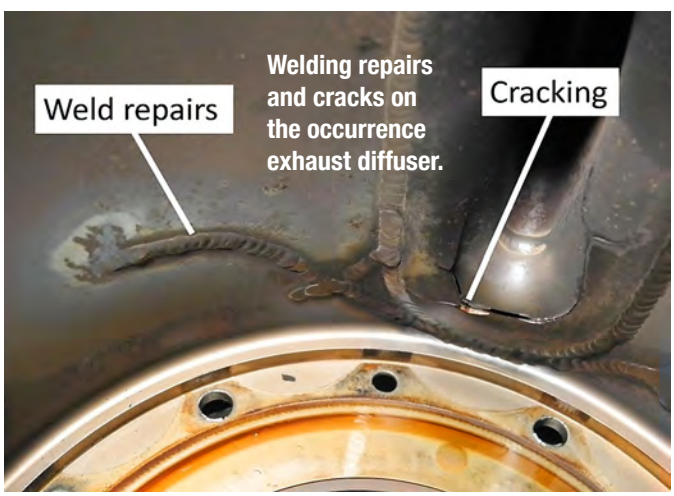
There are many reasons that a brazing weld does not perform as required. A common issue is that the brazing alloy fails to bond one or both joining surfaces. This is normally caused by surface contamination but can also be the result of ineffective fluxing action or the formation of refractory oxide.



Air diffuser assembly, showing the No. 2 bearing support cone, oil supply/scavenge tubes, with a close-up view of the fractured braze joint in inset.

Exhaust diffuser showing the bearing housing inner support struts.

Air diffuser casing assembly (left) and No. 2 bearing support cone (right) separated at the braze joint.



It is also possible for the brazing alloy to fail to smoothly flow into a joint. This is typically due to poorly fitting components, uneven heating, poor joint ventilation, overheating, or liquation (liquid/solid) separation.

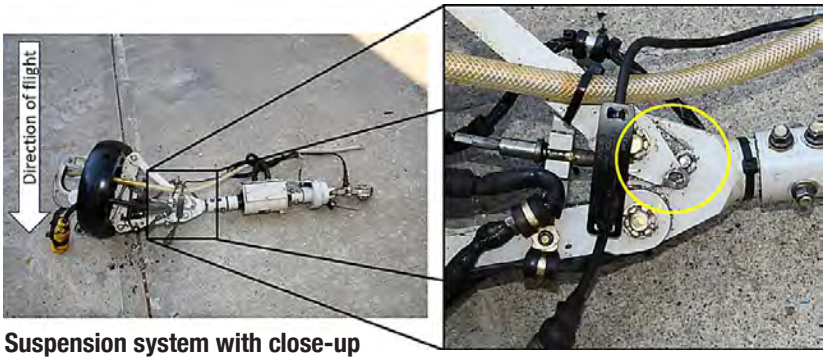
Another indicator of a poor brazing joint can be porosity in the joint (voids) due to excessive variable clearances, insufficient or uneven heating, or poor joint ventilation. Blowholes, indicated by rounded shiny interiors, are the result of hydrogen pick-up in the molten alloy or flux entrapment.

Shrinkage is another indicator of a poor joint. Shrinkage is caused by excessive local tolerance, overheating, or excessive freezing range of the brazing alloy. Finally, if the failure is at the joint surface (i.e., close to one of the parent metals), it can be caused by contamination of the parent metal, the formation of a brittle layer, or possibly interfacial corrosion (stainless steel only).

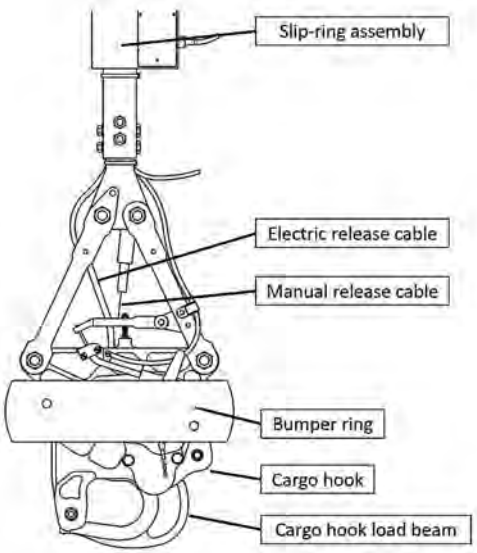
Examination of the support cone brazing did show one area where the braze failed at or near the air diffuser casing assembly surface. This indicates a possible localized contamination in this area. Since the air diffuser casing assembly material is made from stainless steel, it is also possible there was some interfacial corrosion. However, the exact cause of this failed brazing is unknown.

There are 8 fillet welds that are used to hold the cone in position on the air diffuser casing assembly before the parts are brazed together. Three of the 8 fillet welds were torn away with the base metal of the air diffuser casing assembly still attached and were in a row, located roughly opposite to the vent tube and oil scavenge tubes. The remaining 5 fillet welds were separated at the throat of the fillet weld. These separated fillet welds also had a pounded appearance.

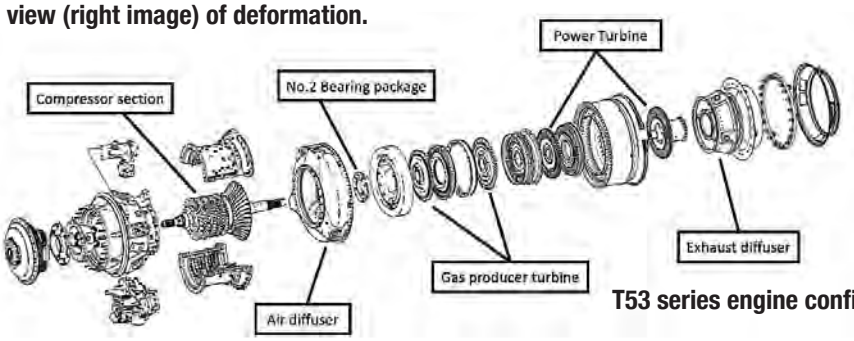
The distribution of these 8 failed fillet welds suggests that the braze weld failed first around most, or all, of the circumference of the support cone. The pounded appearance of the 5 fillet welds that each failed in the weld throat suggests that they failed before the 3 welds that were torn away, and these 5 were subsequently pounded due to repeated movement and contact between the support cone and air diffuser casing assembly. The 3 remaining fillet welds most likely failed due to overstress, after the braze and other fillet welds failed, because



Suspension system with close-up view (right image) of deformation.



Suspension system diagram.



T53 series engine configuration.

they do not exhibit the same impact (pounding) damage. Evidence of impact damage was noted at the fitment lip around the entire circumference of the air diffuser casing assembly and support cone, again suggesting repeated movement between the support cone and air diffuser casing assembly. This means that the failure of this braze was a progressive failure with repeated movement between the support cone and air diffuser casing assembly over some length of time, most likely due to a deteriorating brazing bond.

The use of brazing in this application has the advantage that the lower heat and ease of reworking makes the initial assembly easier to perform; however, the lack of metal fusion means that if the brazing filler material breaks or there is a loss of bonding, the 2 base components can, and likely will, separate, as was the case in the occurrence aircraft.

LOSS OF POWER

A teardown of the occurrence aircraft's engine was completed as part of the investigation. It was determined that the failure of the air diffuser's No. 2 bearing support cone brazing resulted in an unsupported No. 2 bearing and air diffuser casing assembly, and the compressor rotor made contact with the power shaft. In addition, the loss of support experienced by the gas producer nozzles and cylinder allowed contact with the rotating gas producer components.

The failure of the brazing was precipitated by an undetermined defect at the time of manufacture. This loss of support allowed the assembly to have a significant loss of concentricity and lateral power shaft displacement, also known as dynamic runout with corresponding high levels of vibration.

The result was a loss of clearance of many rotating parts within the engine. The damage observed in the power turbine and gas producer sections was consistent with this loss of concentricity and lateral compressor rotor displacement, and, in conjunction with the effects of mechanical damage caused by the separation of the air diffuser's bearing support cone, would have severely compromised the supply of compressed air to support combustion, which would have led to the engine failure.

WATER BUCKET CONTACT AND ENTANGLEMENT WITH TREES

During the autorotation following the engine failure, the water bucket connected to the longline contacted the trees and became entangled. The snagged water bucket resulted in forward momentum being translated to a circular acceleration vector toward the ground, increasing the helicopter's rate of descent.

To counteract this, the pilot likely pulled aft on the cyclic and increased the collective to arrest the descent. With the engine no longer producing power, these actions would have led to a decay in main rotor rpm in the final moments of flight.

The main rotor blades slowed to the point that the main rotor rpm would not have been recoverable. As the main rotor slowed, the retreating blade (left side) would have stalled, causing a roll to the left and a pitch forward in the final seconds before impact.

ELECTRIC RELEASE

The investigation learned that it is common practice within the industry for pilots, including those at Valhalla Helicopters Inc., to conduct external load operations with the CARGO REL (cargo release) switch in the OFF position. This is done to reduce the risk of an accidental release of the external load but adds complexity to the procedure when an emergency release is required.

With the CARGO REL switch in the OFF position, releas-

ing the cargo electrically with the cyclic's electric cargo release push button becomes a 2-step procedure and involves releasing momentarily one of the flight controls. This is not ideal in an emergency, particularly when the focus is on maintaining aircraft control.

Additionally, although there is an amber CARGO RELEASE ARMED annunciator illuminated on the lower right side of the forward instrument panel, a pilot may try the electric switch before recalling that the CARGO REL switch is not in the ARM position. This may result in a delay in releasing the load.

The investigation was unable to determine if the pilot in this occurrence attempted to release the water bucket using the electric cargo release push button after the engine failed.

Given that the CARGO REL switch was in the OFF position, it would have been very difficult to jettison the load using this switch in the short time between the engine failure and the impact with terrain.

To re-arm the electric release, the pilot would have had to either remove his right hand from the cyclic or his left hand from the collective and reach up above his body to the overhead panel to move the CARGO REL switch. These options would have been very difficult during the high workload and given the precision required for a successful autorotation.

FINDINGS

A defect in a braze bond in the engine's air diffuser, which occurred for an undetermined reason at the time of manufacture, created a localized stress concentration that, over time, resulted in the progressive failure of the braze bond and led to an engine failure. During the helicopter's autorotation, the water bucket became entangled in trees and led to the loss of control and collision. ■

(These were excerpts from the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 29 January 2025. It was officially released on 27 February 2025.)

Positive Partnership

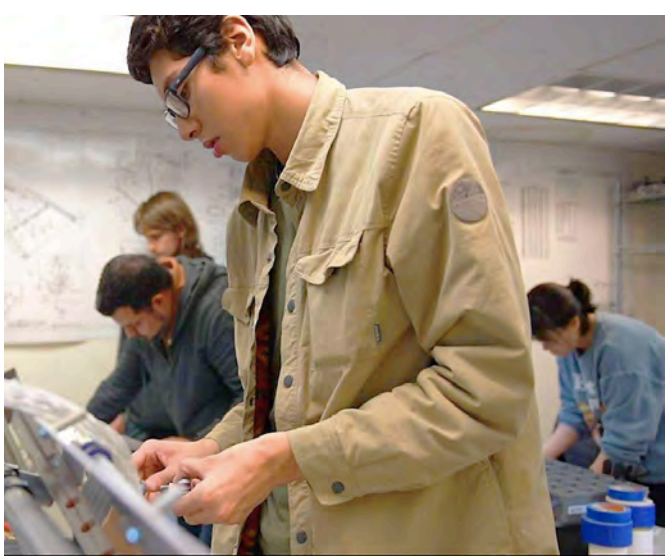
This unique industry partnership designed to enhance aerospace manufacturing training provides students access to real-world scenarios while using industry-grade equipment.

By Paul Michaels

FOR MORE THAN A DECADE, the Everett, Washington-based cabin interiors manufacturer Jamco America and the Washington Aerospace Training & Research (WATR) Center have been involved in a unique and very fruitful partnership. Over the years, Jamco has provided donations of equipment, parts, and supplies for the Center's aerospace manufacturing training programs. The donations mean that WATR Center students gain access to high-quality, aircraft grade materials so they can learn from real-world scenarios utilizing industry equipment. In return, Jamco has access to a pool of skilled employees trained in critical aerospace manufacturing skills.

WATR CENTER MEETS AEROSPACE INDUSTRY DEMANDS

The WATR Center, established as part of Edmonds College in 2010, offers five specialized aerospace manufacturing training programs. With a strong track record of success, the Center has trained nearly 5,000 students, preparing them for high-demand, living-wage careers in aerospace-focused roles – and beyond. The Center boasts a remarkable graduate placement rate; 90 percent of graduates tracked were offered industry jobs.



The 12-week hybrid program is 60 percent online, and self-paced, with the final 40 percent consisting of in-person labs at the WATR Center's state-of-the-art facilities. According to Shelia Dersham, Associate Director for the WATR Center, the lab portion of the program is intensive and immersive, allowing a maximum of 10-12 students per class. Classes

Jamco donated beam assembly drawings and samples for students to put together.

Far left: The Washington Aerospace Training & Research (WATR) Center.
Left: The WATR Center, established as part of Edmonds College in 2010, offers five specialized aerospace manufacturing training programs.
Bottom, Left: Students working on electrical harnesses at the WATR Center.

run five days a week and eight hours per day, much like a real job site. This level of training gets students up to speed on industry safety and procedures so they become productive employees faster.

Students at the WATR Center begin by completing the pre-requisite four-week online Manufacturing Core course, after which they can then enroll in the eight-week Specialty Certificate in such areas as electrical assembly mechanic, assembly mechanic, tooling mechanic, manufacturing composites, and quality assurance (QA). QA is a more advanced skill set that requires either industry experience or an earned certificate from one of the other specialties.

Allen Gipson, Jamco's Vice President of Corporate Planning, has been on the WATR Center's Advisory Board for more than ten years and provides industry guidance and support for workforce training and development initiatives. He, as well as other board members, were instrumental in the WATR Center's launch and continue to review existing curriculum to assure they meet industry needs. Jamco and the WATR Center also

Innovation Lab retrofit included fully encasing fuselage forward opening with a custom glass door and enclosure, installation of electrical and compressed air systems for pneumatic and power equipment, as well as HVAC and fire safety systems.

Donations of material enhances WATR's composite curriculum.

collaborate at the state level to secure funding for educational initiatives championed by the Aerospace Futures Alliance (AFA).

Gipson applauds the WATR Center's efforts to train the next generation of aerospace workers, who go on to work at Jamco, Boeing, or other related manufacturers. "There is a real shortage of that type of talent," says Gipson." Employees often either have to be hired off the street and trained internally, hired from somewhere like the WATR Center to come in with skills, or hired away from the competition.We really appreciate the work they do to push more assembly mechanics into the aerospace market and we usually hire a few of their graduates each year."

Gipson notes that the WATR Center's certificate program is relatively low-cost and quick, so students do not spend years in training. He also applauds the Center's high placement rate and collaboration with industry. "We have reached out to several STEM programs to attract talent into our industry. Supporting these efforts supports the entire industry and the WATR Center program is among the finest."

POSITIVE RELATIONSHIP LEADS TO PARTNERSHIP

Based on the industry focus of the program, Gipson initiated a partnership with the WATR Center a few years after its inception. Jamco then started donating materials and supplies for use by students in the aerospace manufacturing program, which continues today. The original "excess inventory donation project" was in some ways borne out of Jamco's sustainability goals and metrics, fostered in part by its Japanese roots, and fitting within its overall good citizenship goals.

Aircraft-grade wiring remnants are used to train students on soldering and working with crimps and connectors.

The partnership lets students get hands-on experience utilizing real materials they will be working with during their careers. This results in far more value than working only with what a professor or a teacher may have in the shop.

Shelia Dersham explains that the partnership is about people and relationships. "Allen has been on our board for a long

Inspecting a 767 fuselage donated by Boeing to the WATR Center.

time and what we receive from Jamco enhances our programs because these items are very expensive." She adds, "As a self-supporting program, donations reduce our costs, and receiving actual parts helps our team train students in real-world scenarios utilizing industry-grade materials. It also allows our graduates to become familiar with local aerospace suppliers so they have employment options to meet their individual needs."

To date, Jamco has donated thousands of excess items that have accumulated from prior aircraft programs, including many that would have been destined for recycling. Some items were identified by Jamco as having a potential training use, while others are items the WATR Center had difficulty sourcing, including aircraft wire and windows.

The first round of items donated included bolted upper fitting assemblies that the WATR Center accepted with the intention of using them along with the engineering drawings to have students practice quality assurance inspections.

The goal was to mimic a real workplace task, in which students are given a drawing and parts then asked to ensure they were built correctly. Instructors explain that parts are often packaged this way and ask students to determine how they might identify scratched parts and how many they would pull out to inspect. (In the real world, as many as 10 percent may be damaged and would be sent back to the vendor.)

Also included are scrap or remnant wire for use in the electrical assembly class, as well as electrical components like pins or connectors that are left over from making wire harnesses. The WATR Center found it difficult to find aircraft-grade wiring for use in training on soldering and working with crimps and connectors. Jamco now asks its wire shop to place the six-inch cut-offs into a box to save for the Center's use. WATR Center students may need only a few inches to practice with and the material would otherwise have been discarded. The wire program provides access to a full range of relatively expensive wire types because Jamco makes such a wide variety of wire harnesses.

Another donation received by the WATR Center is plastic molded vanity mirror modules that came from one of Jamco's first seat programs. Jamco had purchased plenty of extras to have on hand if needed during installation and to sell as spares. Since the seats are no longer in service, the inventory remaining will not be sold, so the WATR Center is using them in the relaunched QA training course.

One recent donation was windows that could be installed

Left: Donation of seat structures helped demonstrate to students how the seat is attached to seat tracks.

Above: Jamco business class seat partially complete.

in the tail section of a 767 fuselage donated by Boeing to the WATR Center. The "Gray Ghost," aptly renamed "Innovation Lab" was delivered in spring 2023. The final, self-funded retrofit was completed in July 2024 and included fully encasing the forward opening of the fuselage with a custom, glass door and enclosure, installation of electrical and compressed air systems for pneumatic and power equipment, as well as HVAC and fire safety systems.

The fuselage was missing windows, which was not ideal, given the WATR Center's location in the rainy Northwest. Jamco donated windows from a prior aircraft modification program that were a perfect match, so the fuselage could be sealed up, protecting it from the weather, and appearing more like an aircraft interior as the students work on it.

Most recently Jamco was clearing out some of its old seat structures that had been used for dynamic testing. They donated them to demonstrate how the seat is attached to the seat tracks. They also donated one full-height closet unit.

Newly received tray table seat assemblies, lighted mirror assemblies, and window panels will likely be integrated into special projects for the new Boeing 767 fuselage tanker lab. According to Dersham, "We are excited to assess the use of items Jamco delivered to us for a potential Aircraft Interiors Assembly program we are investigating as a sixth specialty. We would like more opportunities to do higher level and extensive training for interiors and this will be exciting to introduce to our students."

Last, but not least, Jamco has donated chemicals and compounds to the WATR Center and other training facilities that could not be used in their manufacturing program before expiration. The WATR Center believes Jamco's donations of aircraft adhesives, potting compounds, and sealants will greatly enhance their composite curriculum, including use in composite sandwiches, and edging, potting, and sealing of composite parts. This enables them to provide hands-on experience in new areas of interest.

Gipson explains that Jamco is extremely pleased to be able to donate the chemicals to an institution that can use them. He concludes, "We have gotten a lot of value from the partnership, which extends beyond the WATR Center to work to promote aerospace in the entire region."

Adds Dersham, "We are grateful to Jamco for being a true legacy partner. They continue to be very supportive of our technical job training programs because our success allows us to be a workforce pipeline for them and other industry partners. ■

Aviation Services

Aviation Services

Aviation Services

Flight into the Unknown

Global credit ratings firm Morningstar DBRS explains how Trump tariffs might create turbulence for cargo and passenger airlines.

Tariffs could directly affect air cargo volumes and cargo yields because of a supply-demand imbalance.

SIGNIFICANT UNCERTAINTY looms around the Trump administration's announced tariffs on goods imported from Canada and Mexico and the possible retaliatory measures taken by these countries. We (Morningstar DBRS) expect tariffs to affect trade volumes and freight activity in the region, which could reduce both volume growth and yields for air cargo companies. For passenger airlines, cargo usually represents a very small portion of revenues. However, there are indirect effects on airlines, such as a slowdown in air travel activity as weakness in consumer purchasing power could hit discretionary air travel, which could affect the credit profile of issuers in the airline industry, particularly if tariffs remain in effect for an extended period.

The amount of goods traded via air transport between the US and Canada, and the US and Mexico was around $56 billion in 2024. Electrical and computer-related machinery and aircraft and aircraft parts are among the top traded goods transported via air. Tariffs could directly affect these air cargo volumes and cargo yields because of a supply-demand imbalance. The credit profiles of air cargo companies with more domestic exposure are likely to be less affected than those with more exposure to international trade in the region. In addition, the credit profiles of air cargo companies that operate under Aircraft, Crew, Maintenance, and Insurance contracts are also likely to be less affected in the near term. Companies that service the air cargo sector, like freight forwarders, could also be affected by lower volumes.

For passenger airlines, tariffs could have an indirect impact depending on how long they remain in effect as (1) higher inflation and/or a slowing economy could dent consumer purchasing power and therefore affect air travel demand as consumers may reduce discretionary travel, (2) passengers may pull back from international travel as a result of trade conflicts, (3) business travel could decline because of lower trade and business activity among the three countries, and (4) the rise in costs of aircraft manufacturing could result in higher capital and operating expenditures for passenger airlines in the long term.

Depending on how long the tariffs last and the severity of their economic impact, this could have a material negative impact on airline issuers in North America. Smaller, low-cost carriers with weaker balance sheets and/or more exposure to U.S.-Canada-Mexico routes could see their credit profiles weaken more significantly than carriers with stronger balance sheets and global operations. ■

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