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Bell Textron props-up AME tech school

CHRISTMAS came early for one western Canadian college when Bell Textron Canada announced in late October that it has made a donation of 1,800 aircraft components valued at \$ 6.2 million CAD. The stash includes machined parts, sheet metal, acrylic plastics, electrical and mechanical parts, and hardware to the Saskatchewan Indian Institute of Technologies.

The donation is targeted at propping-up SIIT's Aircraft Maintenance Engineering program, providing students with access to a diverse range of aircraft components for hands-on training and practical experience. The donated parts are comprised of surplus inventory from Bell which is obsolete with no potential rework or spares use on Bell's end. So, rather than the parts landing in the recycling bin, they get a second shot at life in an educational setting.

Taking a bow on behalf of his company Bell Textron Canada general manager Michael Nault said, "We are proud to support the Saskatchewan Indian Institute of Technologies and contribute to the development of the next generation of aviation professionals. This donation reflects our commitment to advancing education and skills within the aerospace industry and supporting Indigenous youth and communities in their pursuit of careers in aviation."

The donated parts were delivered to SIIT in two shipments in October to ensure that SIIT has timely access to the components as the college kicked off its fall training programs.

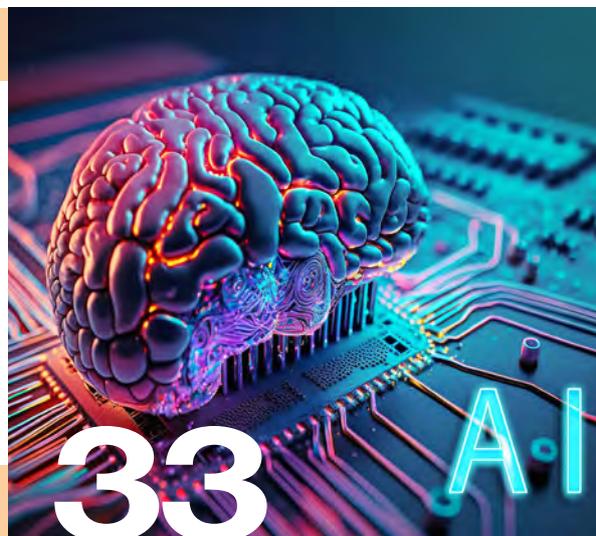
Mark Pollard, dean of Trades & Industrial at SIIT expressed the institute's gratitude. "Bell Textron Canada's donation directly supports SIIT's AME program, giving Indigenous students practical experience with real aircraft components," he said. "This donation strengthens our efforts to equip students with the skills they need to succeed in the aerospace industry and build rewarding careers." ■

— John Campbell, Editor

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Upcoming Events

Now open: Concorde virtual IA renewal series

REGISTRATION IS OPEN for Concorde's Virtual IA renewal series. Now in its fifth year, the Virtual IA Renewal Series features maintenance training seminars focused on three disciplines: Piston Engine Starting, Turbine Engine Starting and Rotorcraft. These courses are geared to engage and educate attendees worldwide.

The FAA approved sessions accommodate an international audience by broadcasting over two time slots. Each session runs four hours over two days for a total of eight hours of training. Attendees can earn up to eight hours of Inspection Authorization refresher training and Aviation Maintenance Technician credit.

Experts from respected associations, agencies and companies will present including DynaVibe, Leonardo, Collins Aerospace Goodrich De-Icer, Professional

Aviation Maintenance Association, Dassault Falcon Jet, Textron Aviation, Hartzell Aerospace Welding & Hartzell Engine Tech, Airbus Helicopters, Sikorsky, Federal Aviation Administration, and others.

Concorde Battery Corporation, with the support of Aircraft Owners and Pilots Association (Piston), National Business Aviation Association (Turbine) and Vertical Aviation International (Rotorcraft), brings you these events free of charge but you must pre-register. Registration is now open at www.concordebattery.com/training/ia-renewal-2025.html.

Concorde prioritizes safety in aviation and the importance of training. Anyone working in an aviation related field, beginning their aviation careers, or with an interest in aviation can benefit from the information presented – IA Status is not required. 🚀

S-92 SERVICE INTERVALS EXTENDED

Sikorsky announced it is increasing the scheduled inspection intervals for S-92 helicopters from 375 flight hours to 500 hours, and from 750 flight hours to 1,000 hours. By increasing these intervals, average S-92 operators will be able to safely keep aircraft in service longer between inspections, and eliminate more than a full year of downtime caused by inspections, as S-92 operators will now be relieved of the requirement to conduct up to 30 inspections over the course of the aircraft's 30,000 flight hour lifespan.

Sikorsky's decision to increase S-92

inspection intervals comes on the heels of an announcement in September that it received Federal Aviation Administration certification to offer a one-time life extension for specific main gear box housings on its S-92 helicopters. By more accurately determining the life-limit for parts, average S-92 offshore oil operators are able to keep gear boxes in service for an additional 12-18 months, and other operators for more than an additional 24 months. 🚀

COMING EVENTS

Wings Over Rockport

December 7-8, 2024
Rockport, Texas
www.wingsoverrockport.com

Ocean Reef Air Show

December 7-8, 2024
Key Largo, Florida
www.airshowcenter.com

2025 Buckeye Air Fare

February 14-16, 2025
Buckeye, Arizona
www.buckeyeaz.gov

Verticon

March 11-13, 2025
Dallas, Texas
www.verticon.org

Yuma Air Show

March 15, 2025
Yuma, Arizona
www.yumaairshow.com

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Workstation handles many welding duties

Amada Weld Tech has introduced its new WL-300A precision laser welding workstations configured for continuous wave or quasi-continuous wave fibre lasers. Typical applications include welding of metals, and select plastics, particularly for aerospace applications. The WL-300A incorporates a laser, motion, cameras, a process monitor, and other accessories. The system is a CDRH Class 1 workstation designed for low to medium-volume production with an operator load/unload of the parts. The WL-300A can handle a wide variety of welding types including spot welding, spiral welding, wobble welding and seam welding. www.amadaweldtech.com



New brackets replace metal materials

Greene Tweed is now offering high-performance thermoplastic composite aerospace brackets, which can endure the substantial demands of aerospace environments while providing significant weight savings over metallic parts. Greene Tweed aerospace production components are 35 to 60 percent lighter than competitive metallic components; the brackets are an excellent replacement for metal materials. The aerospace brackets, which are used to join structural elements together, provide support, and hold essential components firmly in place, can now be produced in complex-contour shapes for near-net, intricate geometry with molded-in features such as bushings or attachment points. www.gtweed.com



Aluminum jacks lift big loads

Tangye Jacks' new lightweight and portable jacks include a 40-tonne model together with a 100-tonne jack for handling larger aircraft. The Tangye range of aluminium jacks are used to support aircraft axles during wheel inspection and changes. The hand portable jacks are designed to lift and manoeuvre heavy loads with minimum effort and maximum safety. Tangye Hydramite jacks have capacities up to 15 tonne and Tangye Hydralite jacks with capacities up to 100 tonne are part of the axle jack and flyaway axle jack kits typically used by approved aircraft maintenance companies. www.tangyejacks.com



Ducting designed for rigorous use

Welded Layflat PCA ducting is designed for the demanding positive pressure applications of the airline industry. The fabric's unique construction provides flexibility and high resistance to external abrasion. The spiral construction features heavy-duty, military specification wearstrip that provides protection for the entire duct. As a result, the ducting experiences reduced fatigue and a longer service life. An extended inner liner and elastic seals at connection points minimize air loss. The ducting has excellent UV stabilization for rigorous outdoor use, mold and mildew inhibitors. www.hallindustries.com



Safety shower drenches in emergency

Armed with 300-series stainless steel construction, Bradley's new enclosed safety shower provides innovative drenching technology, including its Safety Shower as well as Halo Eye/Face wash for a full body washdown. Perfect for applications that demand the hygienic, non-corrosive properties of stainless steel, this new model delivers swift and exceptional washdown capability in emergency situations. In addition to the freestanding stainless steel enclosed safety space for added privacy, its stainless steel roof and walls protect the enclosure from degradation due to prolonged exposure to harsh chemicals. www.bradleycorp.com



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TRANSPORT CANADA CONTINUES DRONE TRIALS

Drones are actively transforming how we deliver life-saving medical supplies, inspect critical infrastructure, and manage the air traffic for unmanned aircraft systems. With the goal of laying the foundation for the safe and scalable use of drones in Canada's airspace, Transport Canada and NAV CANADA have selected Toronto-based Variable Pitch Inc. to participate in Phase 2 of the Remotely Piloted Aircraft Systems Traffic Management trials. "As advancements in drone technology continue to redefine aviation, air traffic management must also evolve for the safe and successful integration of RPAS into Canadian airspace," said Ryan Coates, Executive Director of the RPAS Task Force at Transport Canada.



ABLE AEROSPACE EARNS FAA ACCEPTANCE

Arizona-based Able Aerospace Services has received Federal Aviation Administration acceptance of the company's new Safety Management System (SMS) implementation plan to support aircraft maintenance and aircraft component maintenance. The new SMS program includes a voluntary reporting tool that allows employees to anonymously report aircraft and aircraft part quality risks or hazards directly to the company's SMS Committee. This committee evaluates the risk based on the information provided, investigates the cause

and plans a response. Based on the findings and solutions, processes and tools are updated, ensuring continuous improvement in safety and quality standards.



CELEBRATION MARKS FIRST AIRLINE FLIGHT OVER POLAR REGIONS

The month of November ushered in the 70th anniversary of a game-changing flight that made aviation history. On November 15, 1954, SAS became the world's first airline to operate a commercial flight over the North Pole. The pioneering flight from Copenhagen to Los Angeles not only significantly reduced flying time and lowered fuel consumption, but also established the most efficient link between Europe and the USA. Given the harsh Arctic climate there was a heightened sense of caution and preparedness as passengers were provided with snowsuits, and also onboard was a manual on how to survive in the Arctic.



AIRBUS CELEBRATES 40 YEARS IN CANADA

This year marks 40 years of Airbus' presence in Canada, which began with the establishment of the Airbus Helicopters Canada facility in Fort Erie, Ontario, in 1984. Recently, Airbus Helicopters in Canada realized another major achievement with the announcement of a contract to provide the Royal Canadian Air Force with 19 Airbus H135 helicopters to train the next generation of RCAF Pilots. The contract is part of Canada's Future Aircrew Training (FAcT) Program and marks the first time that Airbus helicopters will fly as part of the Canadian military.

Through FAcT, Airbus hopes to advance the country's aerospace capabilities.



BELL EXPANDS PREDICTIVE HUMS COLLABORATION

Bell Textron has entered into an expanded collaboration and distribution agreement with GPMS International for Foresight MX, a predictive Health and Usage Monitoring System (HUMS), for the Bell 407, 429, 212, and 412 series aircraft. Foresight MX is hardware + software service delivering all-in-one flight data monitoring, rotor track and balance, engine performance monitoring, and component health monitoring. The system moves data automatically post-flight and allows operators to view the health of their fleet from anywhere in the world with any browser-enabled device. With this agreement, customers can also share data with Bell to improve remote support and gain maintenance guidance.



SOUTHEAST AEROSPACE TO DEVELOP GALILEO STC

Southeast Aerospace announced the development of a new STC for the installation of the Gogo Galileo HDX system on the Hawker aircraft platform. Powered by Gogo Business Aviation, the HDX system will provide global, high-speed inflight internet for business aircraft of all sizes. It leverages Eutelsat OneWeb's Low-Earth-Orbit satellite network, designed for mobility and consistent performance on all global routes. This connectivity solution will give Hawker operators high-speed inflight internet. The STC will cover multiple

Hawker models, including Hawker 750, 800A, 800XP, and 900XP, addressing the growing demand for enhanced inflight connectivity and bringing unparalleled speeds to the platform.



BOEING SAYS AIR CARGO TRAFFIC WILL DOUBLE

With a strong air cargo market exceeding pre-pandemic levels, Boeing forecasts continued long-term growth, saying air cargo traffic will increase by an average of four percent per year through 2043. These projections appear in Boeing's 2024 World Air Cargo Forecast, the biennial overview and long-term outlook for the air cargo industry. "As the quickest and most reliable way to move goods, air cargo's sustained growth has returned the industry to its long-term trend," said Darren Hulst, Boeing Vice President of Commercial Marketing. "There will be many drivers for continued freighter demand over the next 20 years ..."



P&WC HAS HYDROGEN-FUELED TURBOPROP TO SHOW

Pratt & Whitney Canada will demonstrate their hydrogen combustion technology on a PW127XT regional turboprop engine as part of a project supported by Canada's Initiative for Sustainable Aviation Technology. The project named Hydrogen Advanced Design Engine Study will be in collaboration with Next Hydrogen Solutions, which will develop high-efficiency, low-cost electrolyzers needed for establishing hydrogen production infrastructure. The PW127XT engine is part of the PW100 engine series but is said to offer better fuel efficiency, improved time on wing, and reduced maintenance costs. ■

The Consequence of Decisions

Hydrogen aviation has to be done properly or not at all, says one researcher. By James Jeffs

Introducing Airbus ZEROe

Configuration	Passengers	Range	Engines	Hydrogen System
Turboprop	<100	1,000+nm	Hydrogen Hybrid Turboprop Engines (x.2)	Liquid Hydrogen Storage & Distribution System
Blended-Wing Body	<200	2,000+nm	Hydrogen Hybrid Turbofan Engines (x.2)	Liquid Hydrogen Storage & Distribution System
Turbofan	<200	2,000+nm	Hydrogen Hybrid Turbofan Engines (x.2)	Liquid Hydrogen Storage & Distribution System

Hydrogen internal combustion or H2ICE will likely be very appealing to existing engine suppliers.

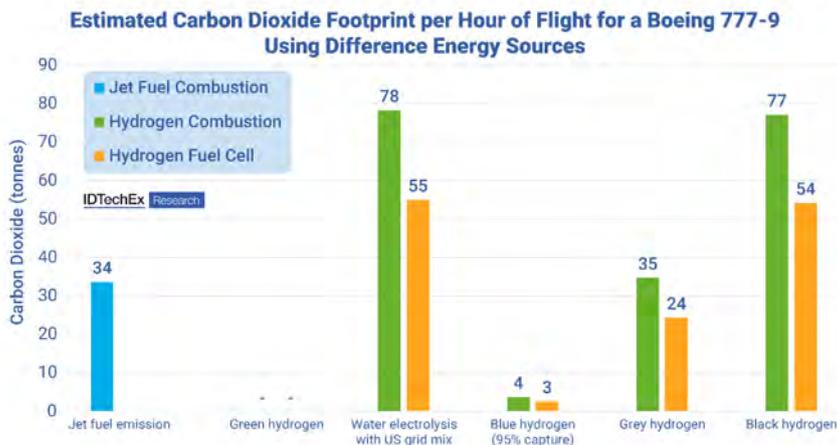
AIRBUS

IDTECHEX'S REPORT, "Sustainable Future Aviation 2025-2045: Trends, Technologies, Forecasts," finds that hydrogen is likely to be a main contender for decarbonizing the aviation industry. The report finds that the hydrogen commercial airliner market will exceed US\$20 billion in 2045. However, the technology used on the planes and the source of the hydrogen needs to be considered carefully before the industry can celebrate significant carbon reductions. If done incorrectly, hydrogen planes could be worse for the environment than existing jet fuel-powered planes.

There are three key issues and choices that aerospace companies will be considering when it comes to the development and operation of hydrogen-powered commercial airliners:

1. Whether to use traditional jet engines adapted to run on hydrogen or a fuel-cell electric powertrain
2. Whether to use cryogenically cooled liquid hydrogen or pressurized hydrogen gas
3. What the source of the hydrogen should be, also referred to as its colour.

The consequence of these decisions will impact the carbon footprint of operating a hydrogen airliner, the potential range of the airliner and therefore its ability to replace jet fuel-powered routes. Making the wrong decisions at each stage could be the difference between a genuine impact on reducing GHG emissions from the aviation industry and hydrogen planes becoming a green-washing exercise.



Hypothetical example of carbon footprint of different hydrogen sources compared to jet fuel for one hour of flight in a H2ICE and a hydrogen fuel cell powered Boeing 777-9.

excited about its gravimetric density since it weighs around three times less than jet fuel for the same energy content. The downside is that at room temperature and pressure, it takes up around 3,000 times the same space as jet fuel for the same energy. Therefore, it must be pressurized or liquified to get to a usable volumetric energy density.

At 700bar, hydrogen has around 1/6th the volumetric energy density of jet fuel, meaning if the same tank space is available, it will only have around 1/6th the range, maybe slightly more using a fuel cell. The best option for volumetric energy density is liquification. As a liquid, hydrogen occupies around four times the volume for the same energy. Combined with a fuel cell, this gives the best case for range, achieving around 37 percent of the range of a normal jet plane. However, hydrogen needs to be kept at -250C (-420F), which will add complications to storage at the airport and the addition of cryogenic cooling systems on the plane. Not to mention, any system on the plane would likely need duplicating for redundancy.

Hydrogen internal combustion vs hydrogen fuel cell

Hydrogen internal combustion or H2ICE will likely be very appealing to existing engine suppliers like Pratt & Whitney, General Electric, and Rolls-Royce. It uses largely the same design and componentry as existing jet-turbine engines with relatively minor changes to the fuel system and injectors to make them suitable for hydrogen. It would also be appealing for Boeing and Airbus, as operation and maintenance will look very similar to the existing model.

The drawback is that jet engines won't be as efficient as a fuel cell electric powertrain. In fact, the fuel cell plane will get approximately 50 percent more range for the same amount of hydrogen. Another way of looking at it is that the H2ICE plane will generate 33 percent more carbon for the same journey length as the fuel-cell electric plane, assuming both are using a non-carbon-neutral hydrogen source. In fact, the efficiency difference is so great that a fuel-cell-powered plane would get about 50 percent more range than a H2ICE plane for the same amount of hydrogen. Another way of looking at it is that the fuel-cell plane will have a 33 percent lower carbon footprint if both are fuelled with a non-carbon-neutral hydrogen source.

Fuel-cell electric planes will also have their challenges, and if left unsolved, could make them unviable in the first place. One of the key challenges is the longevity of the fuel cell. IDTechEx's report finds that Proton Exchange Membrane Fuel Cells (PEMFCs) are the most likely flavour of fuel cell to be used in hydrogen planes. Its main advantage is its power density over other fuel cell types. However, it also has a very short life expectancy compared to other technologies and compared to jet turbine engines. It is likely that the fuel cell could require replacing as often as every 18 months, increasing downtime and maintenance costs for the airlines. IDTechEx's full report goes into further detail on the balance and compromises between H2ICE and fuel-cell electric options, including total cost of ownership, potential ranges achievable, and carbon footprint differences.

Liquid hydrogen versus pressurized hydrogen

The biggest fundamental issue with hydrogen as a fuel is its volumetric energy density. Some people will get very

The colour of hydrogen

Another common talking point around hydrogen and its potential use as a fuel is that it is the most abundant element in the universe. While this is true, it has a frustrating habit of becoming trapped in other compounds or simply escaping as a gas. Since this is the case, producing hydrogen can be quite difficult.

The majority of hydrogen today comes from grey and black sources. In grey, hydrogen is stripped from natural gas, leaving the remaining carbon to combine with oxygen and releasing CO2 into the atmosphere. In black, the hydrogen is stripped from coal, also leading to CO2 release into the atmosphere. Both of these are terrible solutions when it comes to reducing overall CO2 footprint. IDTechEx's report finds that grey hydrogen in a fuel cell results in a 27 percent carbon saving compared to jet fuel; all other combinations of grey,

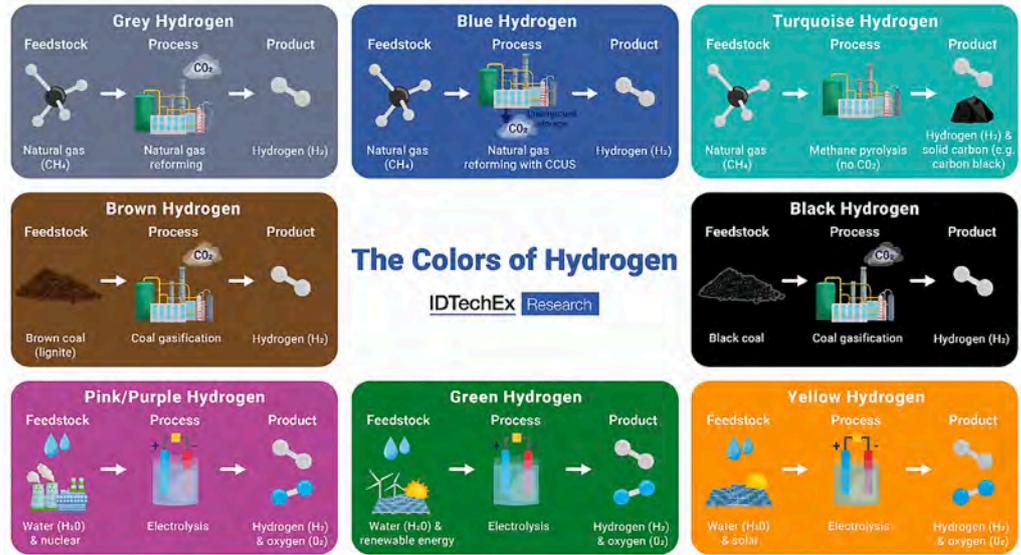


* OPINIONS continued ...

black, fuel cell, and H2ICE are worse. Black hydrogen used in H2ICE has twice the carbon footprint of jet fuel!

The only realistic options that ensure hydrogen is not more damaging to the environment than jet fuel are green and blue hydrogen. In green hydrogen, electrolysis of water from renewable sources is used to produce hydrogen with zero emissions (at the point of production). Blue is similar to grey, but the CO₂ is captured during the production process, leading to a ~95 percent reduction in GHG impact compared to grey. The downside of blue and green hydrogen is that they are significantly more expensive than grey and black. If this does not improve, then airlines will be looking at a difficult choice between retaining similar levels of overall GHG emissions, absorbing the high price of green and blue hydrogen, or having to put ticket prices up.

While hydrogen offers a realistic path to the decarbonization of air travel, offering a significant range improvement over



The Colors of Hydrogen
IDTechEx Research

Different colours of hydrogen and their production processes.

battery electric options, the journey is going to be challenging. Aerospace companies, engine manufacturers, and airlines will need to make some tough choices around the propulsion technology, storage state, and hydrogen source. ■

(Dr. James Jeffs is Principal Technology Analyst at IDTechEx, which provides independent research on emerging technologies and their markets.)

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Spotlight on Standards

There are key considerations to bear in mind during the manufacture of aircraft lighting.

By John Fogel

Ensuring each batch of lamps performs consistently is vital.

THE QUALITY of aircraft lighting cannot be overstated. Durable lamps that make the aircraft more visible to other aircraft, improve pilot visibility and provide illumination for specific purposes are critical for the safe and efficient operation of an aircraft. There are four key factors involved in the production of high-quality aircraft lamps that ensure reliability and safety.

The design process

The FAA sets specific requirements for aircraft lighting for operational safety. All aircraft must have approved anti-collision lights and a position lighting system for nighttime operations. The position of lights consists of Aviation Red on the left side, Aviation Green on the right and an Aviation White taillight. Additionally, there are different requirements for different aircraft.

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Materials used to manufacture the best-quality lamps include those that are more resistant to wear.

It is important for a manufacturer to keep detailed documentation throughout the design process to guarantee compliance. Keeping accurate records not only provides transparency, but it also makes it possible to identify any potential issues early in the production process.

Materials matter

High-quality materials can dramatically extend the life of a product and play an essential role in the performance and lifespan of aircraft lighting. Materials used to manufacture the best-quality lamps include those that are more resistant to wear, corrosion and breakage, all of which reduce the need for frequent replacements, a key factor in maintaining operational efficiency and cost savings. For example, using high-grade glass and durable metal alloys can increase a lamp's resistance to environmental stressors, while specialized coatings can improve heat dissipation and protect against chemical exposure.

Batch-to-batch quality

Batch-to-batch quality in lamp manufacturing is crucial for several reasons. Ensuring each batch of lamps performs consistently is vital as variations can lead to differences in brightness, colour, temperature and lifespan. Manufacturers must make certain each batch of lamps meets quality standards and maintains the expected reliability.

Test for safety and durability

Safety is non-negotiable in the manufacturing of aircraft lighting. Each product must undergo rigorous testing to withstand the stresses and hazards of continuous operation in various environmental conditions. Assessments include electrical safety tests, thermal performance evaluations, structural integrity checks, and durability testing—which involves simulating long-term use to assess how the lamp holds up over time, including factors like flicker and lumen depreciation (the gradual dimming of light over time).

These tests reveal potential risks such as electrical shorts, overheating or material weaknesses. Also of concern are environmental conditions such as extreme heat, cold, moisture and UV exposure which can degrade materials over time, making it important to simulate these conditions during development to ensure lamps will function reliably in any weather.

Set standards for today and tomorrow

The goal in manufacturing aircraft lighting is never just about meeting today's needs. It is also about anticipating the challenges and opportunities for improvement going forward. As advancements in technology continue to evolve, so must manufacturing processes to always provide the current best results in efficiency, durability and safety on aircraft worldwide. ■

(John Fogel is Product Manager at Amglo and has worked with the company for more than 15 years in product development.)

Declaring Hardware Independence



Intepro Systems testing software.

*Electronic devices need regular testing.
That can get complicated. There are solutions.*

ADVANCED AUTOMATED Test Equipment software platforms are used to accommodate hardware changes with minimal reprogramming. These ATE and Automated Test Systems (ATS) serve the critical purpose of ensuring that electronic devices operate according to specifications in the field, thereby averting the introduction of flawed products to the market.

For this reason, the aerospace and defence sectors make substantial investments in ATE due to the criticality of lifesaving electronics used in military equipment such as aircraft, naval vessels, and ground vehicles, as well as in various systems like weapons, radar, and wireless communication.

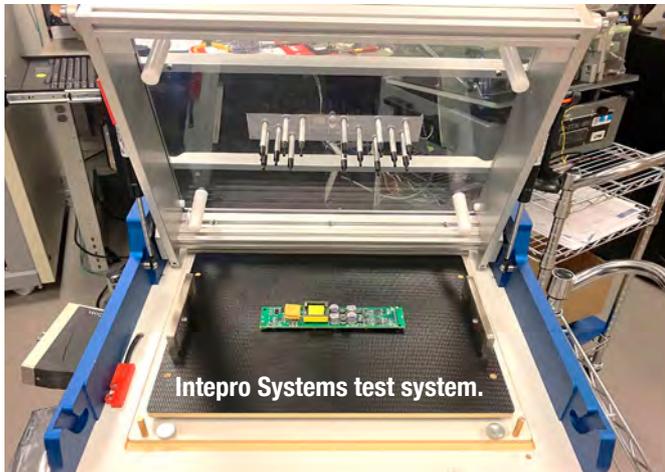
ATS is also widely utilized for testing automotive electronics, batteries, and electronic drive systems in the EV market. ATEs are also used to optimize the performance of telecom infrastructure, analyze and improve the efficiency of renewable energy systems, and validate consumer electronics.

Unfortunately, the one constant in Automated Test

Equipment is change. Over time, the system's hardware components deteriorate or become outdated. Alterations in test project and change of scope parameters ensue. Test specifications undergo modifications, sometimes necessitating a complete reconfiguration of the test.

To implement such changes in most systems, extensive reprogramming of the test software is required, often at a substantial cost. Frequently, test engineers, who are in growing demand, must handle the implementation of the programming code.

To address this issue, many engineers are advocating for "hardware independence," which, in a nutshell, involves the adoption of flexible test program software that streamlines and adapts to inevitable changes without extensive new programming. These hardware-independent solutions simplify the programming of complex test procedures by using fill-in-the-blank test routines to slash development time dramatically.



This strategy frees engineers from the constraints of a single equipment brand, granting them the flexibility to select cost-effective or specialized equipment. ATE stations can be modified or even repurposed, leading to significant reductions in equipment maintenance costs over time.

“Hardware independence is important for several reasons. Although the test equipment hardware requires a significant investment of hundreds of thousands or millions of dollars, the writing of test programs costs multitudes more,” says Andrew Engler of Intepro Systems. Founded in 1981, Intepro has supplied Automated Test Equipment systems that test power electronics used in various applications.

“With more flexible software, ATE stations can essentially be ‘future-proofed’ to ensure that as hardware requirements change and evolve, the test programs can adapt accordingly to ensure long-term usability,” adds Engler.

Although ATE systems can be used for different types of tests, Engler says Intepro specializes in power electronic testing, which includes testing power converters, inverters, chargers, batteries, adapters, and other power components.

For this type of testing, ATE stations are specifically engineered to produce and disperse substantial energy to validate the functionality of the units being tested.

“A typical automated test solution consists of hardware, software, test instruments, signal sources, and test harnesses, probes or handlers,” explains Engler. “However, not all automated test solutions use the same components. The configurations vary widely depending on the device being tested by the customer and the parameters requiring measurement.”

The hardware components are typically consolidated into all-in-one test stations, which vary in size and portability from compact test stations on wheels to large stationary test towers. Each system also includes test program software, which plays a critical role in test development and the management of data collection, storage, reporting, and analysis.

Engler describes the software as the “heart” of the ATE station. However, when the test parameters change, or hardware must be replaced, the software must be reprogrammed.

“Many of our customers are project-based,” explains Engler. “So, if they are involved in aerospace testing and they have a multi-year project that gets reassigned, now the test station they have has to change. They can either throw it all away or they can refurbish it and adapt it to the requirements of a new program,” says Engler, adding that if the test requirements change dramatically, entire stations can end up as “500-pound paperweights collecting dust in a test lab.”

Engler says this contradicts the core objective of ATE, which is to automate and streamline repetitive testing to save time, reduce errors, and provide a repeatable process.

“Even if you are an expert C+ or Python programmer, it is going to take you a lot of time to get through lines and lines of code. We simplify that process and cut the development time in half, or more,” adds Engler.

That is why companies like Intepro have developed hardware-independent test software with simplified drag-and-drop test routines designed to dramatically reduce development of test programs.

Intepro’s offering, called PowerStar, provides hundreds of fill-in-the-blank test routines that provide a range of control, from single instrument functional control to full test procedures with easy-to-use parameter entries. Engineers can customize their programs, without having to write code or assemble graphical components.

The ability to interchange hardware without significant software reprogramming offers substantial advantages to sectors bound by stringent regulations and federally



mandated approvals, including aerospace, defence, and medical equipment manufacturing. Once test programs and procedures are established and approved, obtaining a re-approval after programming changes can be expensive. Tools such as PowerStar enable engineers to document their progress, thereby decreasing the time factors required to certify test programs.

Even in the absence of explicit regulations, any company manufacturing products for critical applications may be legally liable if the product malfunctions. This underscores the hidden costs associated with inadequate testing. ■

The Modular Solution

A new joint venture aims at producing Bombardier techs

CAE's 2023 Aviation Talent Forecast predicts a need for 402,000 new maintenance technicians industry-wide by 2032.

THE global aviation training firm CAE and Bombardier are now collaborating on the development of a modular maintenance training program which aims to optimize the time required to train Bombardier Service Centre maintenance technicians. The testing phase of this new training program will take place at Bombardier's service centres in Wichita, Kansas; Tucson, Arizona; and Opa Locka, Florida. CAE's 2023 Aviation Talent Forecast predicts a need for 402,000 new maintenance technicians industry-wide by 2032, more specifically 74,000 in business aviation.

"While there is a need to better promote the career path of an aircraft technician to students around the globe, a big part of the challenge is that it currently takes too long to train new technicians and even longer to train them across several aircraft platforms," explained CAE Business Aviation Division President Alexandre Prévost. "CAE's new modular solution developed for Bombardier will reduce training time by consolidating courses for an entire aircraft family since they share many components and features."

"We are very excited about this potential new program," added Mike Menard, Senior Director Bombardier Aircraft Services Americas. "Given the need for qualified technicians in the marketplace, it is imperative that we maximize their time working on aircraft and optimize the value of their time away for training. The goal of this new modular system is to allow us to better tailor our training to the needs of our technicians, our organization and ultimately our customers. Expertly trained technicians are core to Bombardier's continued success." ■



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★ TRANSPORT CANADA ★ Reports and Comments

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



Above: an Airbus A319-114.
Above, right: Main landing gear axle.

Left: Main landing gear upon arrival.
Right: Close-up of main landing gear axle with axle nut removed.



REPORT: AIRBUS A319 114

Missing Wheel Assembly After Departure

Subject:

After departure, it was observed that one of the wheel assemblies had potentially departed the right main landing gear (MLG). The aircraft did a fly-by of the tower and the tower confirmed that the number four (#4) wheel assembly was indeed missing. The flight continued to its destination airport. The crew declared an Emergency and the aircraft landed uneventfully with Airport Fire Rescue standing by. The aircraft stopped on the runway and the damage was assessed before the aircraft moved to the operator's maintenance facility. All passengers were deplaned on the runway and transported by bus to the terminal. Maintenance was on site after landing to inspect the landing gear. Upon visual inspection, wheel #4 was missing and the inner hub was

found fractured in two (2) locations. The right-hand MLG assembly was replaced along with a new wheel assembly. The state authority reported that the wheel assembly had been found and retrieved fully inflated.

Transport Canada Comments:

The event detailed above is quite interesting. The investigation to determine the cause of the wheel assembly departure is ongoing. Preliminary inspection, performed by the wheel assembly manufacturer, points to a sudden lock-up of the wheel's outboard bearing. The pictures above show a crack radiating through one of the axle nut retention bolt holes. This crack could have been caused by the lock-up torque radiating from the bearing or the cause of the bearing being loose and failing.



REPORT: BOMBARDIER CRJ100/200

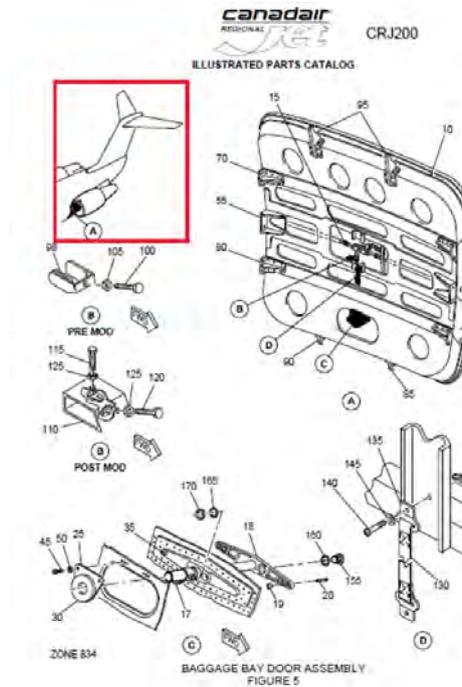
Aft Cargo Door Fitting Cracked

Subject:

During a scheduled inspection, a crack was observed on the aft cargo compartment door forward upper door fitting. Fitting to be replaced with a serviceable part.

Transport Canada Comments:

The defect was found during a scheduled inspection and there doesn't appear to be movement or smoking, the inspector who found it was doing a thorough inspection. As aircraft age, more wear and fatigue defects can occur. The cargo doors are opened and closed many more times than there are cycles on the aircraft, as such, this area is one which can be susceptible to damage.



Above, left: Bombardier CRJ100/200.
 Above, right: Illustrated parts catalog showing door fitting.
 Left: Door fitting crack location.
 Below: Close-up of the cracked area.



REPORT: CESSNA 208B *(See photos, next page)*

Main Wheel Thru-Bolt Failure

Subject:

During a walk-around inspection of the aircraft (C208B), it was noticed that there were two out of nine nuts missing from the right-hand (R/H) main wheel tie bolts. Both tie



bolts were found to be sheared in the threaded area, and the nuts would have departed. One of the broken bolts remained in its installed place, while the other one backed out until it contacted the torque plate assembly and the bolt was bent. One of the nuts that had departed was located on the airport ramp area where the aircraft had been operating. Upon disassembly, the torque plate was found to be badly scored from the contacting bolt. The bolts are being sent for material analysis.

Transport Canada Comments:

Failure of main wheel tie bolts, otherwise known as thru-bolts by the type certificate holder, often result in a damaged brake caliper torque plate. It may also damage a brake lining or allow the wheel assembly halves to separate with subsequent tire deflation.

Indication of failure during landing in similar occurrences has been described by the pilot as a loud noise such as



clicking or grinding. In many cases on record, the failure was discovered during preflight inspection. A missing thru-bolt nut from the outer wheel half is easily identifiable.

The exact cause of failure is not entirely evident, although improper installation torque may be a contributing factor. The following caution is contained in Section 32-40-00 of the maintenance manual regarding main wheel assembly:

CAUTION: Uneven or improper torque of thru-bolt nuts can cause bolt failure with resultant wheel failure.

Transport Canada Civil Aviation (TCCA) would like to raise awareness of this failure mode as data suggests that the incidence rate has increased. Please continue to be vigilant during a preflight inspection and report any defects by submitting a Service Difficulty Report (SDR).



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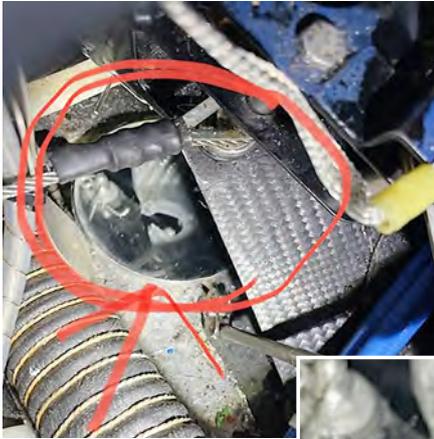


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**Above: Failed Rudder Steering Bracket.
Right: Edge Distance and Elongated Hole Evident.**



Diamond DA42.

REPORT: DIAMOND AS, DA 42

Jammed Rudder due to failed Rudder Steering Bracket

Subject:

Pilots reported a clicking sound when doing pre-flight inspection. The aircraft was snagged and while maintenance was trying to determine the source of the clicking sound, a pop was heard, and the rudder became fully jammed. The rudder steering bracket had failed, and the rudder steering bell crank detached from the bracket causing it to jam. This is an ongoing issue with the DA 42 resulting in several Airworthiness Directives (AD) and Mandatory Service Bulletins (MSB). The most recent European Union Aviation Safety Agency (EASA) AD 2023-0013 had been carried out including the modification MSB for the improved rudder T-Yoke bolt. The aircraft is 51.8 hours from the required repetitive inspection. The previous inspection and measurement showed to be within limits as per MSB.

Transport Canada Comments:

During investigation of this occurrence, distance D as defined in MSB 42-143 had not been recorded. The current amount of wear would suggest the T-Yoke bolt may have been loose at the last inspection, though not identified for unknown reasons. Since this Service Difficulty Report (SDR) was reported, EASA re-issued AD 2023-0013 at revision 1, clarifying several items. Marking the T-Yoke bolt and self-locking nut with torque seal is not a terminating action but must be followed up on a reoccurring basis with particular attention to identify a loose T-Yoke bolt prior to failure.

Transport Canada suggests any future findings of a loose or failed T-Yoke bolt be reported as an SDR so it can be investigated appropriately.



Piper PA44.

REPORT: PIPER PA44 180

Emergency Exit Departs on Take-off

Subject:

The emergency exit departed the aircraft on take-off. The aircraft was just in for maintenance. The emergency exit was inspected, re-installed and confirmed it was in place with its locking mechanism. The small diameter rod that is used to push the latch into its locking slot in the emergency exit door frame did not hold or it worked its way out during flight due to flexing of the rod. In our opinion, the rod is too weak and causes it to flex instead of push linear, so engagement is not 100%. If the rod has been previously flexed it could have memory of a bowed position, causing it to work out of its locking slot which can cause the emergency exit to depart.



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Transport Canada Comments:

Loss of the emergency exit during flight can contact flight control surfaces, possibly causing damage. There have been multiple reports of Piper PA44-180 emergency exits separating from the aircraft during flight. Of these, many describe poor latching, in particular the forward latch not engaging as intended, leaving only the aft latch to secure the exit. Root cause of loss of engagement was not conclusive in this occurrence, though a bowed rod could not be ruled out as a contributing factor.

Owners, operators, and maintainers should pay extra attention to the verification note highlighted within the installation steps recommended by the manufacturer in chapter 52-20-00 of the maintenance manual.

Since the event, the operator has instituted numerous mitigation actions. These actions include:

A flight crew alert message advising crew to be mindful of HOT BRAKES Electronic Centralized Aircraft Monitor (ECAM) message triggered during taxi-out; and

A fleet campaign to inspect and replace all MLG wheel bearings.

As stated above, the investigation to determine the cause of this failure is ongoing. Transport Canada recommends that operators of all types of aircraft be mindful of wheel bearing conditions upon wheel assembly installation. Always follow the manufacturer's recommendations when greasing bearings and installing wheel assemblies.





P&W PT6A.
Left: Damaged seal.

REPORT: PRATT & WHITNEY PT6A-67F

Leaking Fuel Pump Drive Seal

Subject:

The engine driven high pressure fuel pump drive seal was leaking oil excessively. The seal was found to be damaged. No lost time.

Transport Canada Comments:

Damaged O-rings and seals are a common root cause for many leaks in oil, fuel and hydraulic systems on aircraft. Many factors, such as limited access and lack of proper tooling, contribute to the possibility of damaging seals on installation. However, in this case, the fuel pump drive gear shaft appears to have been scored, reducing the effectiveness of the oil seal. In cases like this, simply replacing the seal is unlikely to be effective and the shaft would normally require repair or replacement to correct the oil leak. ■

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Pacific AME Association



In Memory of Michael Joseph Gore

We are deeply saddened to announce the passing of Michael Joseph Gore, on September 21, 2024. Michael was a cherished member of the Pacific Aircraft Maintenance Engineers Association and served as President for three years.

From a young age, From a young age, Michael was immersed in the world of aviation, thanks to his father, Gilbert Rawson Gore, who served as secretary to Grant McConachie. At the age of 18, Michael responded to an ad in the Richmond News for a mechanics helper at West Coast Air, quickly rising to the role of General Manager by the age of 20 at the invitation of Gordy Peters, the Chief Aircraft Engineer at the time.

After West Coast Air sold its charter fleet to Air BC, Michael partnered with Gordon Lindemere and Larry Davis to purchase its Parts and Services Department, thereby establishing Lindair Services Ltd., where he remained as General Manager until his retirement and the sale of the company between 2008 to 2012.

Michael's gentle nature and easygoing demeanor made him a beloved figure to all who met him. He had a heart of gold and was

always ready to lend a helping hand, embodying compassion in everything he did. Michael leaves behind a remarkable legacy of passion and dedication in the aviation industry, particularly at YVR. He was often called upon by Vancouver International Airport and various aircraft operators to advise pilots on troubleshooting landing issues and to assist in retrieving damaged float planes from the Fraser River.

Michael will be deeply missed, but his spirit and the lives he touched will forever remain in our hearts.

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 AME Association

www.wamea.com



temporarily email = md@werkasset.com

Shock Absorber Best Practices

(The following article is from Airbus, which provides a description of best practices that maintenance crews can apply when performing the landing gear servicing tasks, especially fluid and gas.)

Shock absorber servicing ensures that the shock absorber has the correct gas pressure and quantity of hydraulic fluid. Incorrect servicing of the shock absorber can have the following consequences:

1. If the shock absorber is too stiff, (overserviced fluid or gas) the vibrations and landing forces will excessively propagate to the aircraft structure combined with poor shock absorbing performance on landing (excessive bounce).
2. If the shock absorber is too soft, the shocks can bottom causing damage to parts of the landing gear and the airframe structure.
3. Use the shock absorber temperature, (never use the ambient air temperature) to determine the correct gas pressure. Using the wrong temperature value if different, will negatively affect the oleo servicing.
4. Do not service a landing gear for at least two hours after the last flight to reduce fluid/gas emulsion and permit more even landing gear temperature.

5. Due to "stiction," it is recommended to perform the oleo servicing task with aircraft on jacks. This will ensure accurate and efficient servicing of the shock absorber fluid level and nitrogen pressure.

6. After refilling the shock absorber with fluid, the nitrogen needs to be extracted from the mix of new hydraulic fluid with older fluid, which contains dissolved nitrogen molecules due to the gas dissolution effect (foaming).

7. After refilling the shock absorber with hydraulic fluid, it is compressed to check the quantity. Initially, the fluid is likely emulsified meaning "foamy" hydraulic fluid which must be purged so the fluid contained in the oleo is completely clear, just as it comes out of the can.

8. Hydraulic fluid needs to be added and the shock absorber compressed again, repeating these steps until there is no more foam released (clear hyd fluid). It is harder to remove emulsified hydraulic fluid from the shock absorber with the aircraft weight on wheels, and more likely to produce foam in the fluid, making the procedure more difficult to perform. Not recommended.



Central AME Association



About CAMEA

The Central Aircraft Maintenance Engineer Association is an organization dedicated to maintaining and enhancing the standards, rights and privileges of all AME members in the central region of

Canada. Our chapter is one of six similar associations across Canada who collectively support the national body AMEC-TEAC (Aircraft Maintenance Engineers of Canada).

Our organization works with Transport Canada in the formula-

tion of new rules and regulations and provides a collective viewpoint for all AME's.

CAMEA is a not-for-profit organization run by a volunteer group of AME's. We elect members of our organization to be part of our Board of Directors. Members of CAMEA are comprised of AME's, AME apprentices, students, non-licensed persons working in the industry and corporate members.

Manitoba's Annual Aviation Symposium

Exciting news! The 2025 CAMEA Annual Aviation Symposium is back and is scheduled to take place February 20-21, 2025 at the Canada Inns Destination Centre in Winnipeg. Stay tuned for updates on registration—it will be available soon.

www.camea.ca



AME Association of Ontario

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Our Outreach Program Continues

Unfortunately, we have not been able to obtain government or industry financing for the continuance of our Skills Development Program. Last year with funds from Labour Canada administered by the Ministry of Labour, Immigration, Training, and Skills Development of Ontario, our Skills Development Program benefited 75 people. Participants received courses ranging from online courses in Workplace Mental Health and a certified Soft Skills Program to a 10-day hands-on Composite Materials Inspection and Repair course. We also offered a custom Industry Readiness Refresher Program.

Even without the government financial assistance, we have been able to continue our Outreach Program. This program was developed to visit schools, aviation events and career day fairs to promote aircraft maintenance trades and the Aircraft Maintenance Engineer profession. We continue to attend events with our booth equipped with an aircraft engine and propeller display, a hands-on lock wire demonstration panel, touch-screen aircraft component displays, and a jet engine demo. Youth and their parents can ask our experienced personnel what working on

small and large aircraft is like. Lists of approved colleges and course prerequisites are provided to those interested in aircraft maintenance. Our core of dedicated volunteers is added by numerous local area individuals.

Hopefully we will be able to obtain some financial help from the industry to continue the outreach program. We have the basic equipment, but there are numerous expenses outside of our association's budget. Meal and accommodation expenses for our volunteers, fuel for our vehicle, and our biggest expense – insurance for our truck - are limiting our program.

We need to reach out with information to interested young people who are looking for a challenging and successful career as an Aircraft Maintenance Engineer.

Submitted by Stephen Farnworth

For the Board of Directors

www.ame-ont.com



Quebec AME Association

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

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L'AMEC-TEAC

L'Association des TEA du Québec a eu un emploi du temps occupé ces derniers mois. Nous avons participé à différents événements mettant en avant les carrières en aérospatiales durant lesquels nous avons eu

l'opportunité d'expliquer les rôles et responsabilités des Techniciens/Techniciennes d'entretien d'aéronefs tout en captant l'attention de la prochaine génération de TEA!

Nous avons été présents à l'assemblée annuelle de l'AMEC-TEAC, qui regroupait les représentants des 6 Associations régionales de TEA du Canada. Cette réunion à Ottawa a permis des échanges constructifs et permettra aux Associations de TEA du Canada de faire des projets intéressants pour leurs membres, de même que de se rapprocher du grand public pour que tous saisissent l'importance des TEA dans le secteur aérien! Nous avons aussi passé une journée avec les représentants de la navigabilité opérationnelle du siège social d'Ottawa de Transports Canada. Ils ont pu répondre aux différentes questions envoyées par les membres des Associations régionales de TEA au Canada tout en présentant une mise à jour réglementaire.

Nous serons présents aux côtés de l'AMEC-TEAC lors du Salon des carrières d'expériences en aérospatiale d'Ottawa le 11 et 12 décembre prochains. Aussi, nous en profitons pour rappeler à nos membres la prochaine assemblée annuelle de l'Association des TEA du Québec qui aura lieu à Montréal le jeudi 16 janvier prochain, les membres recevront tous les détails par courriel prochainement.

The Quebec AME Association has had a busy schedule in recent months. We have participated in various events highlighting careers in aerospace, during which we had the opportunity to explain the roles and responsibilities of Aircraft Maintenance Engineers while capturing the attention of the next generation of AMEs!

We attended the AMEC-TEAC annual meeting, which brought together representatives from the 6 regional AME associations in Canada. This meeting in Ottawa allowed for constructive discussions

and will allow the Canadian AME associations to carry out interesting projects for their members, as well as to reach out to the public so that everyone understands the importance of AMEs in the aviation sector!

We also spent a day with the operational airworthiness representatives from Transport Canada's Ottawa headquarters. They were able to answer the various questions sent by members of the regional AME associations in Canada while presenting a regulatory update.

We will be present alongside AMEC-TEAC at the Ottawa Aerospace Experiences Career Pathways Fair on December 11 and 12. We would also like to take this opportunity to remind our members of the upcoming annual meeting of the Quebec AME Association, which will be held in Montreal on Thursday, January 16. Members will receive all the details by email shortly.

www.ame-tea.com email: info@ame-tea.com

Atlantic AME Association



Of the three forms of transportation, air travel is one of the most delicate as it involves a lot of risks. Some of these risks are due to elements we cannot control while others are due to negligence. In this case, the latter refers to proper maintenance of the medium of transportation, the airplane.

Indeed, airplanes need regular maintenance and it is the duty of Aircraft Maintenance Engineers to keep it in airworthy conditions. Like other professions, they need an association to regulate and protect them. The Atlantic Aircraft Maintenance Engineers Association is the organization tasked with the duty of regulating and protecting

professional aircraft maintenance engineers.

A separate committee under the auspices of the association runs an annual Conference. This workshop is a two-day event that features speakers on a variety of related topics, as well as, an industry trade show with over thirty-five booths from various companies, suppliers, manufacturers and other organizations. Attendance at the various sessions held during the conference may be counted toward the recurrent training requirements required by Transport Canada, provided that your employer has this conference listed in their approved manual.

www.atlanticame.com

SoCal PAMA Chapter



Flight Safety Detectives Episode 247: First HondaJet Fatality

The first fatal HondaJet accident just occurred. Greg Feith and John Goglia go over the known facts of the air crash in Mesa, Arizona on November 5th.

The jet ran off the runway and struck a car on a nearby road, killing the driver and four of the five people on board the jet. The Flight Safety Detectives draw similarities with a 2014 takeoff accident involving a Gulfstream jet near Boston.

Poor preflight preparation may be the biggest contributor to this deadly event. Greg and John share the simple tests and steps that can be the difference between a successful and a fatal flight.

The detectives also discuss Greg's recent recognition from the National Aeronautic Association. Greg was named a 2023

Distinguished Statesmen of Aviation.

They finish the episode with a discussion of the show's newest advertiser, Piston Power, and how their various options for managing routine and non-routine repairs may benefit an aircraft owner.

They also welcome a new sponsor – PistonPower. The company offers general aviation's first and only Unscheduled and Power-by-the-Hour programs for piston aircraft. Designed by aviation pros who've designed and built similar programs for turbine engines, PistonPower brings stability to your maintenance budget and peace of mind to your business and personal flying.

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Doctoral student 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

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UNDER PRESSURE: TOO HIGH IN THE SKY?



There are more questions than answers in the crash of this Cherokee.

ON ²⁴ **NOVEMBER 2023**, the privately registered Piper PA-28-180 Cherokee aircraft (registration C-GGOR, serial number 28-1392) was conducting a recreational flight under visual flight rules from the Vanderhoof Aerodrome (CAU4), British Columbia, to the Invermere Aerodrome (CAA8), BC, with only the pilot on board.

Shortly after departing CAU4, the aircraft appeared on radar at 12431 climbing through 3000 feet above sea level (ASL). At 1255, the aircraft levelled off at 9500 feet ASL. It flew east and was no longer visible on radar at 1331, near the north end of the Columbia Valley, BC. At 1421, the pilot communicated with a family member via text message that he was passing the village of Valemount, BC, and at 1508, that he was flying at an altitude of 11 500 feet ASL. The occurrence flight was conducted above 10 000 feet ASL for an unknown duration.

At approximately 1554, the aircraft was observed in a vertical dive, approaching the ground at high speed approximately 2 nautical miles west of the community of Brisco, BC. The aircraft was reported to have executed an abrupt pull-up from the dive to a level attitude at an altitude of approximately 300 to 500 feet above ground level. The aircraft then reportedly had a wing and nose drop before impacting the ground in an inverted attitude (Figure 1).

A ground and air search was initiated after the crash was reported to emergency services through a call to 911. The Canadian Mission Control Centre did not receive an

An airworthiness directive exists for the Piper PA-28-180, requiring inspection of the exhaust-type cabin heater to reduce the risk of carbon monoxide poisoning of aircraft occupants.

emergency locator transmitter (ELT) signal from the aircraft. Multiple search and rescue (SAR) helicopter sorties were flown in an attempt to locate the crash site, which was found more than 17 hours after the occurrence.

The pilot was fatally injured. The aircraft was destroyed. There was no post-impact fire.

Pilot information

The pilot held a private pilot licence – aeroplane, issued in July 2022, and a valid Category 1 medical certificate. The pilot held the appropriate licence for the flight in accordance with existing regulations. At the time of the occurrence, the pilot had accumulated approximately 243 hours total flight time, of which approximately 170 hours were completed in the occurrence aircraft.

Aircraft information

The occurrence Piper PA-28-180 aircraft (Figure 2) was manufactured by the Piper Aircraft Corporation in 1963. It was equipped with a 180 hp Lycoming Engines O-360-A3A engine and a fixed-pitch propeller. It was not equipped with a flight data recorder or a cockpit voice recorder, nor was it required to be by regulation.

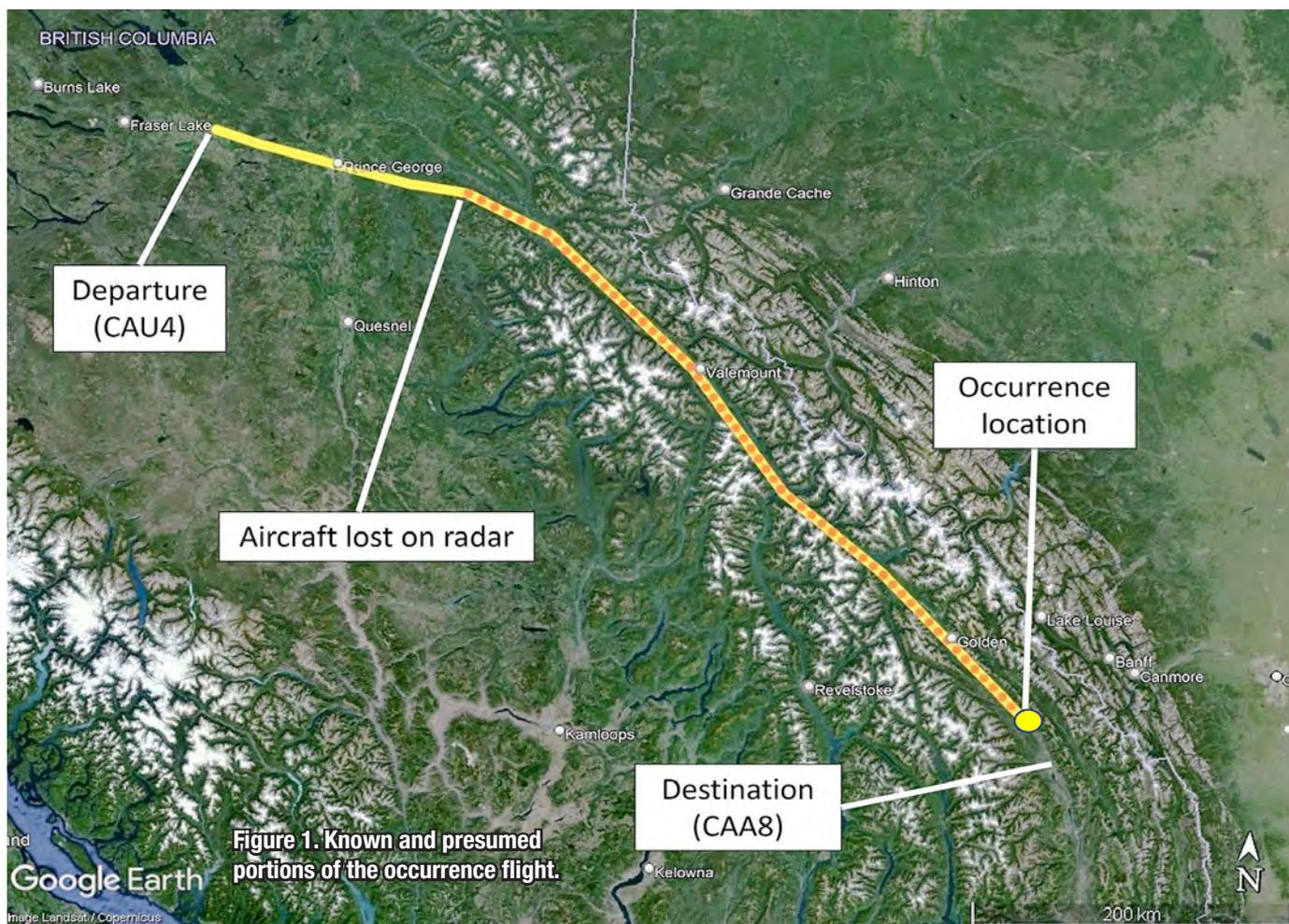


Figure 1. Known and presumed portions of the occurrence flight.



Figure 2. Occurrence aircraft.

Fuel

The pilot had a history of fuelling the aircraft with 91-octane gasoline (both boat and automotive), often known as MOGAS. The aircraft owner’s handbook requires that the aircraft be fuelled with aviation-grade fuel. In order to operate the aircraft with other than aviation-grade fuel, such as MOGAS, a supplemental type certificate (STC) is required. An STC for using automotive gasoline with the

occurrence aircraft’s airframe and engine is available but requires mechanical modification to the original aircraft’s fuel system. The occurrence aircraft’s technical records available to investigators did not indicate that this STC had been completed.

The records maintained by the STC provider did not show that the STC had been performed on the occurrence aircraft. Additionally, a physical examination of the aircraft wreckage determined that the modifications required by the STC had not been completed. The aircraft was being operated using MOGAS during the occurrence flight; however, it could not be determined if this was a contributing factor to the outcome.

Maintenance

The aircraft’s last annual inspection had been completed on 28 March 2023. An airworthiness directive exists for the Piper PA-28-180, requiring inspection of the exhaust-type cabin heater to reduce the risk of carbon monoxide poisoning of aircraft occupants. The occurrence aircraft’s technical records indicate this airworthiness directive was not completed and was overdue by more than 8 months; however, carbon monoxide poisoning was determined not to be a factor in the occurrence.



Figure 3. Illuminated stall warning light in an aircraft similar to the occurrence aircraft type.

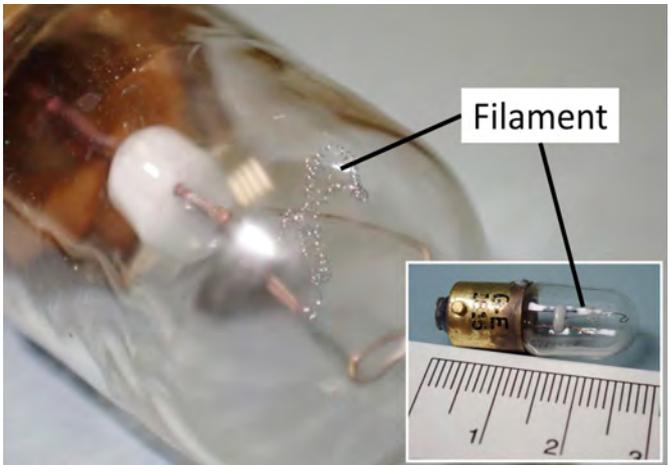


Figure 4. Enlarged view of the filament from the lightbulb removed from the occurrence aircraft's stall warning system, with full view of the lightbulb in inset.



Figure 5. Occurrence aircraft wreckage.

Engine examination

The occurrence aircraft's engine was sent to the TSB's facility in Richmond, BC, for examination. The engine magnetos were removed and produced a spark at the terminal leads when tested. One of the 8 engine spark plugs did not fire when tested; however, it appeared to have sustained significant damage as a result of the accident. Push rods and valves were found connected.

The engine cylinders and pistons were examined using a lit borescope, and no anomalies were found other than some surface corrosion that is believed to have occurred post-occurrence. Continuity was established between the powertrain and the rear accessory gear case, but the crankshaft could not be fully rotated because of engine damage sustained during the accident. The aircraft's vacuum pump was found to be internally destroyed; however, this damage is attributed to impact forces. Other components of the aircraft engine could not be assessed on account of damage sustained during the accident. The investigation found no indication that a component or system malfunction played a role in this occurrence.

Stall warning system

The aircraft was equipped with a stall warning system, which consisted of a red-filtered, incandescent lightbulb that illuminated when the system detected the aircraft was at, or near, a stalled condition (Figure 3).

A lightbulb filament analysis showed that the typically tightly wound coils of the filament were severely stretched (Figure 4). This occurs when an illuminated light filament becomes more ductile as a result of the high temperature from its illumination and is then exposed to sufficient shock; like that of an aircraft impacting terrain. This filament stretching indicates the stall warning light was illuminated at the time the aircraft struck the ground.

Supplementary oxygen

Flying unpressurized aircraft at altitudes above 10,000 feet ASL without the use of supplemental oxygen can lead to hypoxia (confusion, difficulty breathing, rapid heart rate).



Figure 6. Occurrence aircraft's emergency locator transmitter as found by search and rescue personnel, with dotted line showing the switch aligned with the antenna attachment and reset button, and with detail of the transmitter switch in inset.

Wreckage and impact information

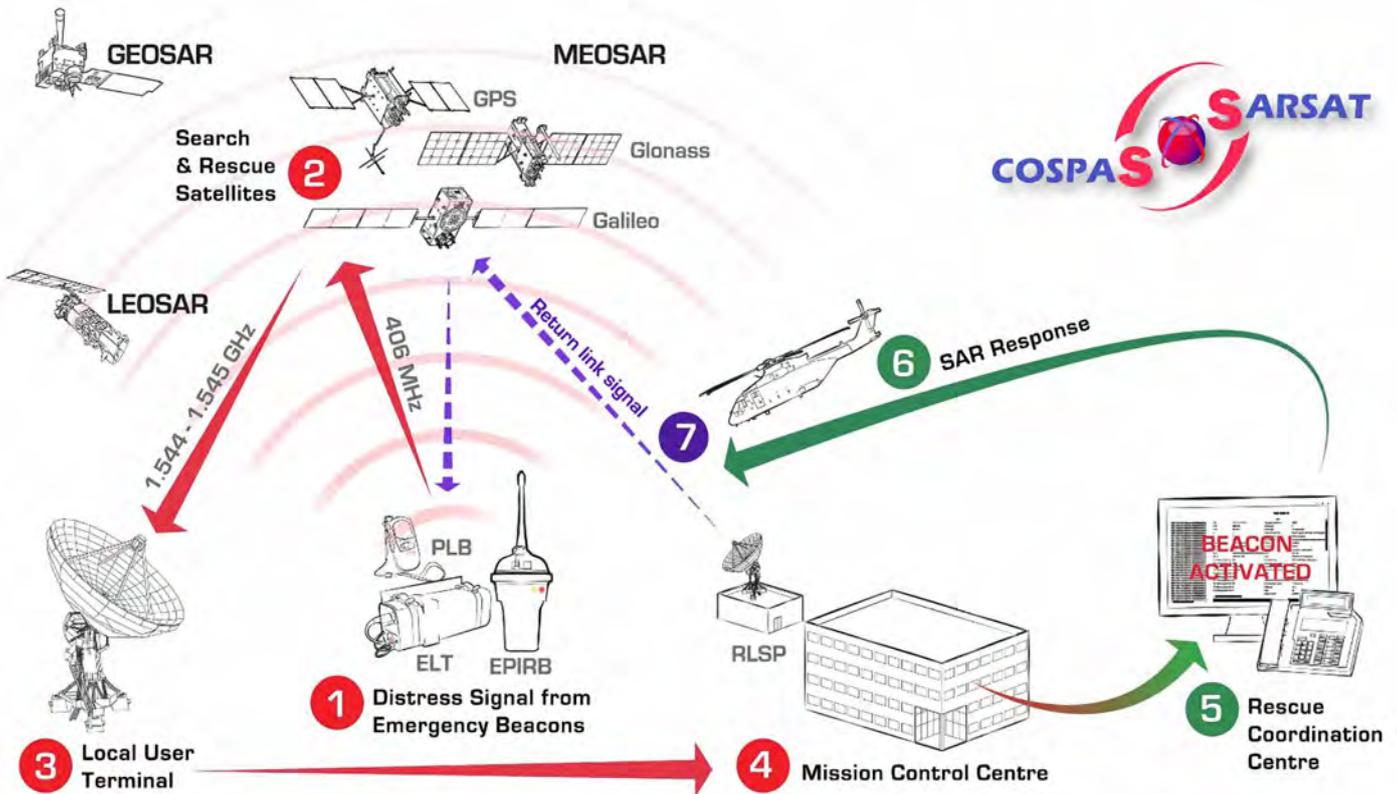
The aircraft came to rest in a wooded area in an inverted attitude. The wreckage indicated a high-angle impact with little forward velocity. One propeller blade exhibited rearward bending whereas the other blade had a slight forward bend, which is consistent with low or no propeller rpm at the time of impact. The aft section of the fuselage and tail were bent to the right, and both wings were found on the left side of the fuselage, indicating rotational forces existed when the aircraft struck the ground. The occupiable space inside the aircraft was significantly compromised (Figure 5).

Safety belt

The aircraft was equipped with a 3-point safety belt made up of a lap strap and a shoulder harness. The safety belt was found to be intact and properly used by the pilot; however, the occurrence was not survivable owing to the impact forces involved.



The operator of the incident aircraft had a history of fuelling the aircraft with 91-octane gasoline.



The Cospas-Sarsat satellite system only detects ELT signals transmitted on 406 MHz.

Emergency locator transmitter

The occurrence aircraft was equipped with an automatic fixed ELT capable of transmitting on 121.5 MHz and 243 MHz. The ELT did not activate. The ELT switch was in the OFF position when the aircraft was found by SAR personnel (Figure 6). The investigation was unable to confirm what position the switch was in before the occurrence.

Laboratory analysis of the power supply to the ELT indicated that no significant draw on the battery had occurred. SAR logs indicate no signal was received from the ELT on the frequencies over which it was capable of transmitting. As of 01 February 2009, only 406 MHz ELT signals are monitored by the Cospas-Sarsat satellite system.

In 2020, Transport Canada amended the CARs to require that aircraft be equipped with ELTs capable of transmitting simultaneously on 121.5 and 406 MHz; however, compliance for recreationally operated aircraft is not required until 25 November 2025.

The ELT did not assist the Joint Rescue Coordination Centre in directing SAR personnel to the aircraft wreckage, which was located via ground search more than 17 hours after the occurrence. However, the time required to locate the aircraft did not influence the survivability of the occurrence.

Safety messages

While the investigation could not determine the specific cause of the occurrence, it found some maintenance required for the safe operation of the aircraft had not been performed. Owners and operators of aircraft are reminded that compliance with legally required aircraft maintenance activities, including airworthiness directives and supplementary type certificate requirements, is essential for the safe operation of all aircraft.

In addition, pilots are reminded of the CARs supplementary oxygen requirements applicable when operating at cabin-pressure-altitudes above 10 000 feet ASL.

The Cospas-Sarsat satellite system only detects ELT signals transmitted on 406 MHz. As a result, occupants in aircraft equipped with ELTs not transmitting on that frequency may be exposed to life-threatening delays in SAR service following an occurrence. Pilots should make sure that automatic fixed ELTs are properly installed, serviced, and armed in order for them to perform their intended function. ■

(This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 24 July 2024. It was officially released on 13 August 2024.)



The aviation business is currently in growth mode but it's a complex industry with many global factors affecting outcomes. In a recent report, Allianz Insurance examined the situation as it stood in 2024.

THE VOLUME OF global air passengers was expected to hit an all-time high in 2024 with Asia-Pacific and North America in the lead. But growth does not come without challenges. Allianz Insurance recently published a report entitled “Aviation Risk, Claims and Insurance Outlook” in which its aviation team highlights some of today’s most important trends and challenges impacting the industry. Following are excerpts from that report.

TRENDS

Collision crash incidents account for over half the value of all aviation insurance claims (63%) by value and one-third (33%) by number, according to analysis of more than 30,000 industry claims with a value of €14bn (US\$15.1bn) over the past five years. Such incidents do not just include major crashes. They also incorporate events like hard landings, bird strikes and runway incidents.

Faulty workmanship/defective product is the second top cause of claims by value and by frequency while natural ca-

tastrophes (including turbulence) rank third by value of claims. Travel issues (including property damage, personal injury, baggage claims, lost/stolen goods etc.) rank third by number. Other top causes of claims include fire and slip and fall incidents.

There has been a significant increase in aircraft repair costs in recent years, driven by higher labor rates and the cost of aircraft parts, among other factors, such as inflation. The shift to next generation aircraft continues to impact claims, especially when it comes to engine disassembly and repair costs. Claims costs related to certain aircraft spare parts have increased by 10% to 15% over the last few years, which has resulted in a greater number of aircraft being deemed Constructive Total Losses (CTLs) than in the past.

Supply chain challenges continue. Delivery times for mechanical and avionic components are challenging and unpredictable for all involved: insured clients, maintenance, repair and overhaul operations, and insurers, driving up the cost of claims. Maintenance and repair capacity resources are dwindling across the UK, Europe, and the US.



Faulty workmanship and defective product is the second top cause of claims.

There has also been a noticeable rise in ground handling claims at large airports worldwide, including towing, fueling, catering and wheelchair services related to commercial aircraft operations, as well as vehicle collisions on the tarmac. Pandemic-related layoffs have resulted in new hires and less experienced employees in some cases, contributing to these claims.

Over the past year or so Allianz Commercial has also witnessed a shift in certain types of ‘everyday’ claims being lodged by commercial airline passengers. For example, claims that were once prevalent and in the news, such as ‘air rage’ claims after the pandemic, and claims involving animals on board aircraft, have now dwindled.

A growing demand for helicopter sightseeing trips and getaways, including ‘heli-skiing,’ ‘heli-fishing,’ or ‘heli-hiking’ trips, is also impacting claims activity, primarily in North America but there have also been cases in Europe and Asia. Examples includes crashes, hull damage and injury.

RUNWAY INCURSIONS ON THE RISE

Runway incursion incidents, such as taking off or landing without clearance, are among the most persistent threats to aviation safety, given the consequences of a collision. In the US, over the last decade the rate per one million takeoffs and landings rose from 25 to over 30. With airports becoming even busier – global air passenger volume is expected to hit an all-time high in 2024 (+10.4% year-on-year) – there is increasing scrutiny on what is being done to manage the risks.

Contributing factors include weather-related factors such as low visibility; airport-related factors such as congestion; Air Traffic Control (ATC)-related factors such as incorrect or inadequate clearance; or crew-related factors such as improper knowledge of signals and signs. Ensuring good communication between crew and ATC during taxi is crucial to reduce the chances of an incident occurring. Crews also need to ensure they have a proper knowledge of airport surface markings, lights, and signs. Technology also has an important role to play in supporting crews and ATC.

GPS JAMMING AND SPOOFING INCIDENTS

Aviation has suffered a significant increase in Global Positioning System (GPS) spoofing and jamming incidents as geopolitical tensions have heightened around the world, with the average number of events 40% higher than in Q1, 2023. GPS spoofing, also known as simulation, refers to the practice of manipulating or tricking a GPS receiver by broadcasting false signals.

Essentially, it misleads the GPS receiver into believing it is located somewhere it is not, resulting in the device providing inaccurate location data. Compared to jamming, spoofing represents a much more sophisticated attack which actively exploits weaknesses in the aircraft’s navigation system, according to Bernhard Koessler, Global Airlines Underwriting Practice Leader, Allianz Commercial.

To date, most reported spoofing attacks have come from Eastern Europe and the Middle East as well as the Black Sea region. Incidents have escalated since the onset of Russia’s in-

Below: Runway incursion incidents, such as taking off or landing without clearance, are among the most persistent threats to aviation safety.





Aviation has suffered a significant increase in Global Positioning System spoofing and jamming incidents as geopolitical tensions have heightened around the world.

vasion of Ukraine. However, operators should be cognizant of the potential for spoofing anywhere.

Examples of incidents have included false GPS signals which have tricked aircrafts' flight management systems into indicating that the aircraft is many nautical miles off-track. The potential consequences in the event of a serious prolonged incident are obvious.

“Aviation has suffered a significant increase in GPS spoofing and jamming incidents as geopolitical tensions have heightened around the world,” says Bernhard Koessler. “While there is no simple way or a ‘silver bullet’ to prevent this trend continuing, particularly when it comes to GPS spoofing, there are a number of things that companies are doing or can do to raise awareness of these situations and potentially mitigate the impact of them.”

EVTOLS TAKE FLIGHT

The aviation sector is excited about the prospect of exponential growth for Advanced Air Mobility (AAM) and electric vertical takeoff and landing (eVTOL) aircraft in future, which offer the potential to revolutionize aviation, fostering sustainability, efficiency, and enhancing passenger experiences.

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For now, the expectation is that eVTOL operational risks will remain the same as currently seen in general aviation operations.



ways, and performing a variety of tasks including passenger and cargo transportation, medical evacuation, firefighting, and offshore operations. Revenues are projected to surge from US\$1bn in 2030 to US\$90bn by 2050.

Insurance is already being provided to eVTOL manufacturers for test flights. As with every development of new technology, there will always exist uncertainty, however. For now, the expectation is that operational risks will remain the same as currently seen in general aviation operations, such as loss of power, mid-air collisions, or foreign object damage. However due to the sensitive nature of aircraft movements in dense urban areas and its implication for liability claims, underwriters will deeply scrutinize the safety management systems of operators to ensure that full regulatory compliance is achieved.

ARTIFICIAL INTELLIGENCE TAKES OFF

As with every facet of life, the aviation sector is primed for a significant transformation with the integration of Artificial Intelligence (AI). It has already been using AI for many years, and the current speed of development means it is revolutionizing the industry in many ways, from enhancing flight safety and improving maintenance procedures to personalizing the passenger experience and optimizing route management.

AI algorithms can analyze data from flight recorders and sensors along with historic data to predict potential system failures before they occur, allowing for preventative maintenance and reducing the risk of accidents. AI-driven simulations and predictive analytics can be used for training pilots,

Above: AI algorithms can analyze data from flight recorders and sensors along with historic data to predict potential system failures before they occur.

Pictured here: Cabin air claims and lawsuits are primarily filed by pilots and flight attendants.



providing them with realistic scenarios and helping them make better decisions in critical situations.

AI can even improve security at airports via biometric identification and evaluation. However, with benefits comes risk and there are challenges to consider, such as ensuring data privacy and maintaining rigorous safety standards as AI systems become more autonomous. The focus on data security also sits alongside the greater focus on cyber threats, which rank as the second top risk for the aviation industry in the Allianz Risk Barometer 2024.

‘CABIN AIR QUALITY’ CLAIMS

Aircraft ‘cabin air quality’ claims, which had pre-pandemic beginnings, persist and, hence, is an area Allianz Commercial continues to watch, according to Cristina Schoen. These claims allege that due to an onboard event and/or defect with the aircraft, bleed air has caused the cabin air to become contaminated, ‘toxic,’ or otherwise unhealthy to inhale. Such claims and suits are primarily filed by pilots and flight attendants against aircraft manufacturers, rather than by airline passengers.



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The rapidly growing shortage of aircraft mechanics has now supplanted the pilot shortage in terms of concerns.

As Stephan Fisher, Senior Manager, Aviation Claims, Allianz Commercial, says: “In our experience, it’s relatively rare to see a cabin air claim filed by a passenger against an airline. Moreover, any such US-based claim filed by a crew member against an airline, which is the crew member’s employer, would likely be barred by workers’ compensation laws.”

Kevin Murphy, Director, Products and Major Case Unit, Allianz Commercial, agrees: “The majority of cabin air suits we see are filed by the same one or two firms against the major aircraft manufacturers on both sides of the Atlantic. In fact, it seems these firms have created a cottage industry in the space. Aviation aerospace insurers worldwide continue to keep a close eye on developments around this subject matter, as interest in it by the plaintiffs’ bar has not seemed to wane.”

Despite such interest by the plaintiffs’ bar, however, and as Guillaume Cadillat, Claims Practice Leader Aviation, Mediterranean Region, Allianz Commercial, notes: “To date, neither international or national studies by official bodies on cabin air quality, including the most recent ones, nor any reliable scientific or medical evidence, have demonstrated any potential harm to cabin occupants. These studies do not support the allegation of toxic fumes. These claims come from one or two individuals within the crews and never the whole crew.”

SHORTAGE OF MECHANICS

Previous Allianz Commercial aviation sector reviews such as Aviation trends post Covid-19 focused on the pilot shortage that plagued the commercial airline industry, particularly during the wave of pandemic-related early retirements and reductions-in-force.

Today, the extent of the pilot shortage seems to have eased or even plateaued, observes Carmen Paul, “(In North Amer-

ica), the major airlines have now filled their ranks, many times by hiring pilots from the regional airlines. Likewise, the regional airlines have scaled back hiring, as there is no longer an immediate need for them to have pilots waiting in the wings should their crews decamp for the majors.”

The rapidly growing shortage of aircraft mechanics has now supplanted the pilot shortage in terms of concerns that are foremost in the minds of industry leaders as well as the traveling public. In 2022, industry analysts Oliver Wyman remarked, “Behind the scenes yet another labor shortage looms – not enough aircraft mechanics.”

At that time, it predicted that while there were “just enough” mechanics to handle the maintenance, repair, and overhaul workload on the North American fleet in 2022, in 2023 there would be a shortfall of roughly 12,000 to 18,000 mechanics depending on economic and fleet growth. This gap, it concluded “represents about 14% of the total mechanic workforce.” Moreover, it posited, “that imbalance between supply and demand – including licensed and unlicensed labor working on aircraft and in the backshops – will persist through the rest of the decade . . .”

By all accounts, these predictions have rung true and, in 2024, the mechanic shortage is squarely on the radar of Allianz Commercial’s claims practitioners.

“First and foremost, and from a risk management perspective, there is no escaping the fact that this shortage has resulted in less experienced mechanics being on the line,” says John Nowicki. “Of course, the obvious concern is that the mechanic shortfall ultimately leads to an aviation accident, despite the systems of checks and balances in place in the industry.”

As for claims of a more attritional nature, the mechanic shortage could result in longer claim cycle times, as it may take longer to complete repairs if vendors lack manpower, or if the new generation of mechanics is not as efficient as the previous one, with its decades of experience.

Further, claim cost could be driven up if new mechanics do not acquire or maintain the same skillsets as veteran mechanics. That is, if a mechanic does not have the ability to repair a part, the part will need to be replaced with a new one, which typically is more costly. ■

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New turbo-prop targets remote regions

Deutsche Aircraft examined the harsh realities of Canada's more northerly routes and concluded it could offer a better way of doing things.



GERMAN MANUFACTURER Deutsche Aircraft says it has a new and better way for Canadian operators to service remote regions. The Deutsche solution is its new D328eco turbo-prop aircraft, which the company promoted at the Air Transport Association of Canada conference in Vancouver, November 5-7.

The D328eco is touted as being ideally suited to serve remote regions because it can land practically anywhere. Consequently its ability to operate on grass or gravel makes it ideal for smaller airports where infrastructure can be limited. Boasting a claimed 30,000-foot service ceiling, a top speed of 324 KTS, a climb rate of 2,355 feet/minute, and the ability to handle Canada's challenging weather, it promises to be a year-round traveler.

"This plane will be a game-changer for Canadian operators," said Nils Heuer, Deutsche Aircraft's Sales Director. "Airlines looking to operate smarter, more sustainable fleets now have their solution."

With a capacity of up to 40 seats and a break-even load factor of 22 passengers, the aircraft would indeed appear to be a good fit for regional Canadian airlines with another upside being economic viability even on low-traffic routes. With lower fuel consumption, reduced emissions,

and simplified pilot training, the aircraft is said to provide significant cost savings, making it a financially viable option for airlines looking to open new regional routes and improve existing ones.

Designed with versatility in mind, operators can configure the cabin for multiple uses ranging from passenger transport, cargo, and other special missions, and it can even be used for air ambulance or firefighting, catering to the diverse needs of northern and remote communities across Canada.

Deutsche Aircraft and Pratt & Whitney Canada recently concluded a series of five emission and contrail measurement flights on a D328 UpLift research aircraft using a fully synthetic Fischer-Tropsch fuel, preparing for the use of future sustainable aviation fuels produced using Power-to-Liquid technology. This latest effort marks 40 years of collaboration between the two companies and helps pave the way to ensuring that Deutsche Aircraft's 40-seater D328eco powered by Pratt & Whitney Canada PW127XT-S engines will be ready to operate with future specifications for 100 percent SAF from the aircraft's Entry into Service.

With over a century of aviation expertise Deutsche Aircraft is a type certificate holder and service partner for existing D328 (both prop and jet) operators worldwide. ■

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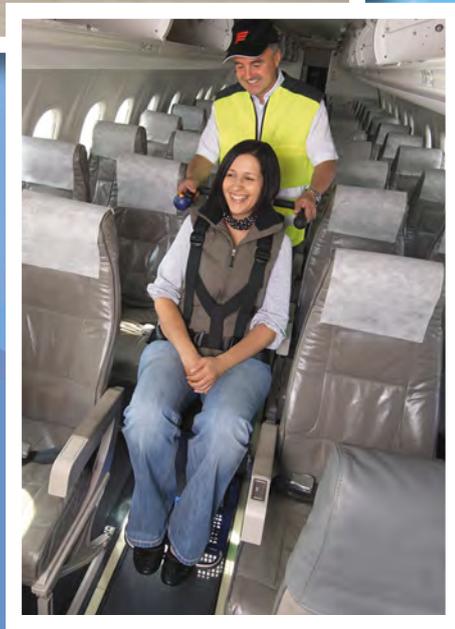
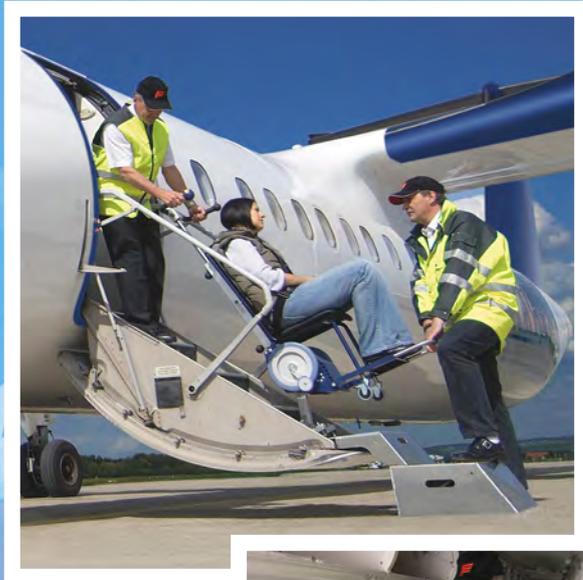
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