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AirMaintenance UPDATE

The Magazine for Aircraft Maintenance Professionals

COVID-19
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Bucking Bars:
Working to reduce HAVS

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Funding still available for hiring students

The Canadian Council for Aviation and Aerospace recently announced that funding is still available for Canadian aviation and aerospace companies to hire co-op students and interns through the CCAA's Student Work Placement Program (SWWP). Companies could receive up to $5,000 per placement of full-time or part-time students enrolled in any college or university program and $7,000 per placement of: first-year students, Women in STEM, Indigenous people and persons with disabilities.

SWPP, formerly known as the Student Work-Integrated Learning Program, supports partnerships between employers and post-secondary education institutions, creating more work-integrated learning placements for students enrolled in post-secondary studies across Canada. This program is funded by the Federal Government (Employment and Social Development Canada, ESDC) and delivered by the Canadian Council for Aviation & Aerospace, one of nine delivery partner organizations. The program started in June 2017 and runs till 2021. The CCAA's original plan was to fund 1,000 student placements over the four years.

Work-Integrated Learning refers to a continuum of learning opportunities ranging from structured work experience to instances where the employer engages directly with the post-secondary education institution to address a particular challenge. It can include co-op placement, internships, field placements, or applied projects to solve particular problems for employers.

Among the criteria, eligible students must:

- Be registered as a full-time or part-time student in a post-secondary education institution.
- Be a Canadian citizen or a permanent resident.
- Be legally entitled to work in Canada.

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Features

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Upcoming Events

National Apprenticeship conference to be rescheduled

The Canadian Apprenticeship Forum (CAF-FCA) announced in mid-March that after carefully assessing the associated risks of the COVID-19 outbreak and recommendations by Canada Public Health, it had decided to postpone the 2020 National Apprenticeship Conference scheduled to take place May 24-26 in Calgary.

"We would like to thank the more than 300 delegates who registered to date as well as our conference partners, exhibitors, speakers and vendors for their understanding and patience during these uncertain times," the CAF-FCA said in a press release. "We ask that you bear with us over the coming weeks as we navigate the administration of the decision. Please ensure that you cancel any hotel and travel arrangements related to the conference.

The CAF-FCA is currently exploring a future date for the event and will post updates through both direct and other CAF-FCA communication channels. "We look forward to bringing the Canadian apprenticeship community together at a future date when the health and safety of our partners, colleagues and staff can be assured," the CAF-FCA said.

HAC Spring Reception cancelled

In a bulletin sent during mid-March, the Helicopter Association of Canada announced the cancellation of its Spring Reception. "At HAC, we are first-and-foremost concerned about the safety of our Members," the bulletin said. "And recent events as they relate to the state of Coronavirus spread have caused us to revisit our plans for the April 2, 2020 HAC Spring Reception scheduled to take place in downtown Toronto. While the course of the COVID-19 issue is still unclear, we wanted to provide Members with some notice and around our plans, so we have elected to cancel the event in Toronto."

NBAA cancels scheduled events

The National Business Aviation Association (NBAA) announced it is canceling all of its scheduled events and meetings through July 1, as the COVID-19 outbreak continues its global spread. The decision, taken in consultation with U.S. and global public health and aviation safety experts, places the highest priority on the health, safety and security of NBAA event partners, participants and attendees. Specifically, the Centers for Disease Control and Prevention provided guidance that event organizers should postpone their plans.

NBAA President and CEO Ed Bolen said: "As with all NBAA events, we view the health, safety and security of our partners, members and participants as our foremost concern, and it will remain our guiding principle. We are working to explore opportunities to provide a virtual platform, and we will provide details as soon as they are available. NBAA will continue to closely monitor the situation as it unfolds, and will rely on guidance from several authorities, including the World Health Organization, the CDC and other public health experts." Continually updated information on COVID-19, including the status of future NBAA events, is available at nbaa.org/coronavirus.

AEA cancels convention

The Aircraft Electronics Association announced its decision to cancel the 63rd annual AEA International Convention & Trade Show that was scheduled for March 24-27 in Nashville, Tennessee. The event will not be rescheduled.

After announcing the show's postponement, efforts were made to reschedule the event later this year. However, with the escalating health crisis due to the COVID-19 outbreak, the decision was made to cancel. Planning for next year's AEA Convention in Dallas, Texas, March 15-18, 2021, will begin soon.

European Business Aviation Convention & Exhibition cancelled.

The European Business Aviation Association (EBAA) and NBAA announced the decision to cancel the 2020 European Business Aviation Convention & Exhibition due to the COVID-19 outbreak. The event was scheduled to take place in Geneva from May 26-28, 2020.

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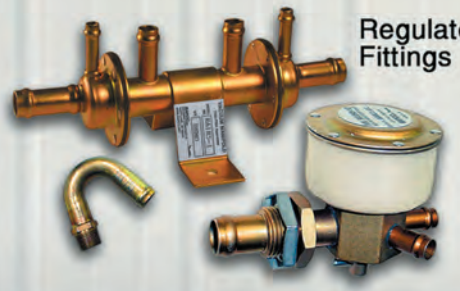

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External load window improves safety

MRO specialist, AeroBrigham has introduced external load window technology developed for the AStar single engine turbine. Utilizing a single piece bubble door, the lift window improves the field of view forward, aft, and directly underneath by a factor of ten compared to current solutions. Pilot headroom when wearing a helmet also translates to improved safety and reduced pilot workload in and around the aircraft for all demanding external load operations.

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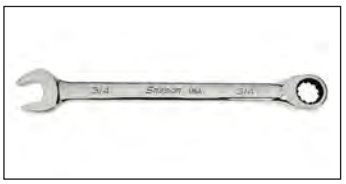
Wrenching system delivers more power



Spline zero-degree offset combination wrenches from Snap-on Industrial feature a uni-directional, zero-degree offset gear design to deliver more power in less lateral space, helping to access and remove the most stubborn fasteners in tight spaces. The ratcheting gears have up to 60 teeth, and work with an eight-tooth pawl, which together minimizes swing arc needed to remove fasteners in restricted spaces. The flank drive wrenching system on box-end generates up to 15-20 percent more turning power than conventional wrenches.

For information visit www.snapon.com

Transport Canada approves Max-Viz STC

Astronics Corporation announced Transport Canada has approved an amended Supplemental Type Certificate for its Max-Viz 1400 and 1200 Enhanced Vision Systems on Bell 407 helicopters. Astronics expects FAA validation will follow within six months. Astronics obtained the approval for its MaxViz 1400 and 1200 EVS in cooperation with AVIO dg in Calgary. The first installation of the certified Max-Viz 1400 equipment is on a Bell 407GXI. Astronics' Max-Viz 1200 and 1400 systems are lightweight, solid-state, low power, and feature an uncooled thermal camera.

For information visit www.Astronics.com

Falcon sockets feature double-sided design

Alberth Aviation's line of Falcon spanner sockets is constructed of stainless steel. Their unique double-sided design allows the Aircraft Maintenance Engineer to use one tool for both the main and the nose wheels. These spanner sockets are available for the Falcon 50, 900, 2000 and 7X. Additional Falcon tooling is also available.

For information visit www.AlberthAviation.com

Laser workstation accommodates larger parts

Amada Miyachi's laser workstation WL-300A is designed to accommodate larger parts and is available in bench top or floor standing options. Standard options include an XY table, rotary stage, cover gas module, fume extraction, bar code reader, and camera systems to tailor the machines to the specific process. The WL-300A offers a large viewing window for visual observation. An optional compact motorized rotary axis makes marking and welding cylindrical parts easy and fast. A fume extraction port is included to extract harmful fumes.

For information visit www.amadamiyachi.com

New seat design slides over to allow wheelchair

Molon Labe Seating has unveiled a prototype of a new airline seat that will allow passengers of restricted mobility to fly on airlines in their own wheelchairs. Their solution is based on the side-slip seat design but modified from a standard economy-class triple seat to a economy-class double seat. During normal operations it is a normal economy-class seat but when required the aisle seat slides over the window seat and locks into place. Sliding the aisle seat over the window seat offers a 36-inch wide space to secure the wheelchair in place. **For information visit** www.airlineseats

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FLYING COLOURS OPENS BIG NEW PAINT HANGAR

In late-March, MRO operator Flying Colours opened its largest and most advanced paint preparation and application facility at its Peterborough, Ontario headquarters. The new purpose-built, facility gives Flying Colours the capacity to paint any size business aircraft as well as narrow body executive airliners. The first paint job is already in process on a Bombardier Global aircraft. The inauguration of the paint facility represents the start of operations in Flying Colours' new $25 million hangar, with a planned 100,000-square-foot extension of its headquarters this spring.

CENTRE RENAMED TO HONOUR GLOBAL SUPPORT

Following a decade of close collaboration in support of aerospace education, skills training and research and development, Centennial College in Ontario announced in January it is renaming its Centre for Aerospace and Aviation at Downsview Park to Bombardier Centre for Aerospace and Aviation and is receiving a Bombardier Global 7500 flight test vehicle for training purposes. Centennial students will receive hands-on experience working on the prototype. The aircraft will have a permanent spot outside Centennial's new hangar at its Downsview Park facility, which opened in January 2019. Global 7500 aircraft are assembled at Bombardier's facility in Toronto.

JAPAN'S FIRST COMMERCIAL JET TAKES FLIGHT

Mitsubishi Aircraft completed the mid-March maiden flight of Flight Test Vehicle 10 (FTV10), the first Mitsubishi SpaceJet M90. FTV10 took off at 14:53 (JST) from the Prefectural Nagoya Airport and conducted basic aircraft performance tests in normal operating conditions over the Pacific Ocean.

After approximately two hours of flight, the aircraft returned to Nagoya at 16:40 (JST). With the completion of FTV10's first flight, Mitsubishi is prepared to enter the final phase of certification flight testing for the SpaceJet M90, the first commercial jet manufactured in Japan.

ELECTRIC AND INTERNAL COMBUSTION COMBINED

France's VoltAero marked a milestone in developing its all-new family of Cassio e-aircraft with the initiation of flight-testing using Safran Electrical & Power's smart electric motors. This testing is a major step toward validating the electric and hybrid-electric powertrains for Cassio aircraft. The current flight evaluations utilize VoltAero's Cassio 1 testbed aircraft, with the two ENGINeUS 45 electric motors installed in forward-facing positions on the wings. In its full-up nine-seat version, the Cassio aircraft will use electric motors along with VoltAero's proprietary aft-facing hybrid power module, which brings together an internal combustion engine and three electric motors.

PACIFIC PROPELLER ADDS TO MRO CAPABILITY

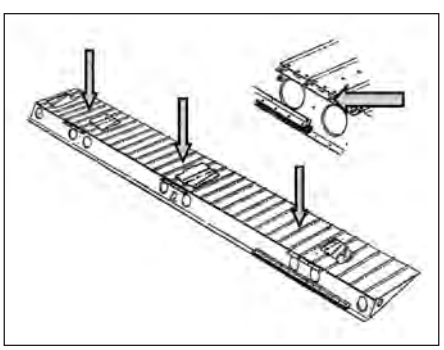
With nearly six decades of experience working with the Lockheed C-130 Hercules airframe, Pacific Propeller International is expanding its capabilities to include repair and overhaul services to the Hercules braking system from its 64,000 square foot facility in Washington State. This MRO expansion simplifies the need to source multiple vendors for operators in need of brake repair and overhaul, the company said in an early March news release. PPI states that its experience and renowned technical knowledge of the C-130 airframe offers immediate confidence and trust.

NEXT-GEN COMPOSITE BLADES RECEIVE FAA APPROVAL

Portland, Oregon-based Erickson Incorporated announced FAA approval of its next-generation composite main rotor blades. Erickson began the process of designing the new blades in 2008. To maintain close control of blade manufacture,

Erickson built a composite manufacturing facility in 2015. After thousands of hours of design, testing, and analysis, the new composite main rotor blades for the S-64E have an initial life that will increase as fatigue testing continues, says Erickson. Certification for the CH-54A is expected to follow quickly in the coming weeks, and certification for the S-64F and CH-54B is expected this summer.

SB-10 ADDRESSES AILERON HINGE ASSEMBLY



McFarlane Aviation Products has released Service Bulletin SB-10 to address material defects found in some of the extruded material used in Aileron Hinge Assembly P/N MC0523816-1. An inspection method to identify the defective material and the corrective actions are given in SB-10. The affected aileron hinge is used at three locations along each aileron control surface to attach it to the aircraft wing in Cessna aircraft models 150, 152, 170, 172, 175, 180, 182, 185, 205, and 210. McFarland released these hinges between February 26, 2019 and January 2, 2020.

SKYCOURIER PROGRAM CONTINUES TO ADVANCE

Textron Aviation says it has now completed initial ground engine tests on the prototype Cessna SkyCourier twin utility turboprop featuring Pratt & Whitney Canada PT6A-65SC engines. These ground engine tests verified the functionality of the fuel system and engines, as well as the interface with the avionics and electrical systems.

The SkyCourier program continues to advance with assembly of the prototype and additional five flight and ground test articles. The tail was installed to the fuselage in early February 2020. Power to the aircraft's electrical system was turned on in January, and the wings were successfully mated to the fuselage in December 2019. ■

Working to reduce HAVS:

Customizable impact absorbing bucking bars are improving the riveting process while reducing vibration up to 50 percent claim some manufacturers.

Opposite: The rivteing process can be hard on workers' bodies, and normally entails two people. Above: Rivets must be reliably and evenly driven with no marring of the airplane skin, or else they must be drilled out, deburred, and redone.

a riveting concept

To speed production and increase worker safety in the aerospace industry, major manufacturers are willing to pay a higher price for quality equipment. Nowhere is that more applicable than with aircraft riveting, a high impact assembly process to join aluminum sheets/materials that typically involves two people and exposure to repetitive, hammering force.

The process, which can be hard on workers' bodies, normally entails one person using a riveting gun and another on the other side of the joined material holding a bucking bar (which serves as a hand-held anvil to form the end of the rivet, or bucktail).

Due to the repetitive impact and vibration conveyed to bucking bars during riveting, aerospace workers who continually install rivets often have health or ergonomic complaints. On average, 46 percent of workers who use vibrating power tools contract Hand Arm Vibration Syndrome (HAVS), a painful, potentially disabling condition of the fingers, hands, and arms due to vibration.

"People don't understand that the person on the receiving end [of rivet bucking] is taking highly damaging vibration to the hand," says Richard Borcicky, a retired Tool Engineer and Manager of Ergonomics, who oversaw safety at the Department of Defense's (DoD) Fleet Readiness Center East base in Cherry Point, North Carolina.

Above: Honsa Customized Bucking Bar.

According to Borcicky, the DoD is continually seeking to improve safety and ergonomics in its facilities. Through implementing industry best practices, Borcicky says that the Fleet Readiness Center East base was able to reduce carpal tunnel syndrome cases from 50 to zero annually.

However, Borcicky says that one of the things that happen to people bucking the rivets is that their hands swell up during the week, and over time this can develop into an incurable, crippling disease of the fingers and hands. "We couldn't get rid of the bucking bar issues because there was no fix," he says.

"Without an ergonomically friendly bucking bar that absorbs impact and vibration, you have to continually switch workers out because they cannot rivet all day long, but that in itself can cause some quality issues." adds Brian Lewis, lead engineer at the Tulsa, Oklahoma facility of Spirit AeroSystems, the world's largest tier-one manufacturer and supplier of aerostructures, a $7 billion global company with more than 18,000 employees worldwide. The company's core

products include fuselages, pylons, nacelles and wing components. Additionally, Spirit provides maintenance, repair and overhaul services.

However, the rivets still must be reliably and evenly driven with no marring of the airplane skin, or else they must be drilled out, deburred, and redone – and any such rework only adds to production costs. This can be a particular challenge with less than fully trained staff or new hires that are often assigned tasks like riveting.

"Due to the force and impact of riveting, rivets and bucktails can be misaligned – but these need to be just right each time," says Lewis. "So, having the right ergonomic equipment to facilitate fast, reliable production is critical."

While some bucking bars incorporate tungsten to absorb and dissipate vibration, this is seldom sufficient to address impact/vibration related repetitive injury or ergonomic issues. If dropped, tungsten bucking bars can crack and break, rendering them unusable.

Fortunately, to speed reliable aerospace riveting while minimizing injuries due to repetitive impact and vibration, the industry has developed safe, ergonomic, impact absorbing bucking bars that improve the process while reducing vibration. Because these are customizable, the bucking bars can also be tailored for ease of use in aerospace specific riveting processes.

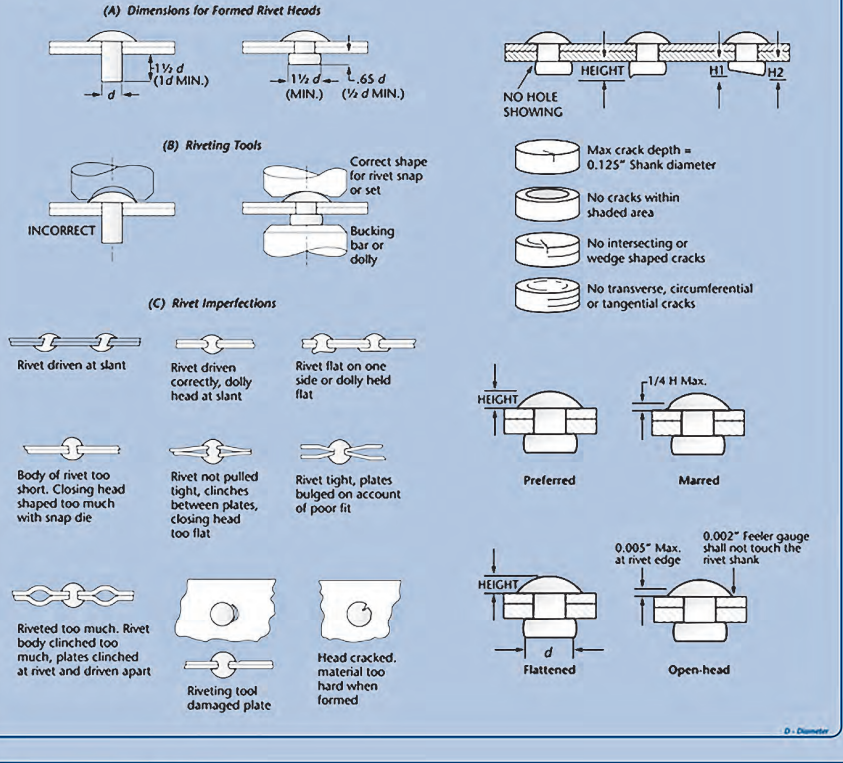
Above: Rosie the Riveter knew that aerospace workers who continually install rivets often have health or ergonomic complaints.

Faster, safer riveting

According to Lewis, Spirit AeroSystems' Tulsa facility builds primarily new

Aircraft Rivets

Imperfections



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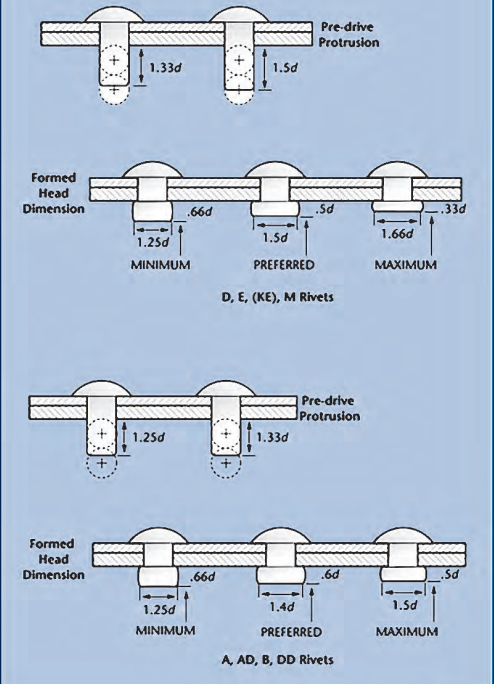

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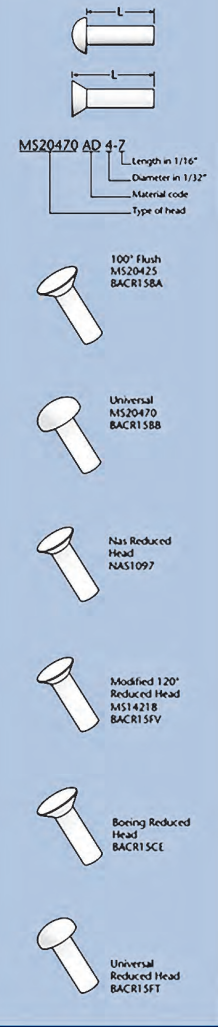

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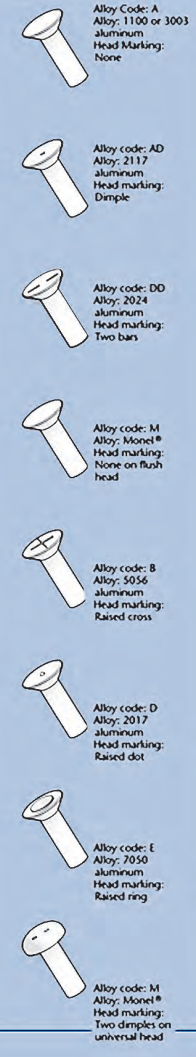

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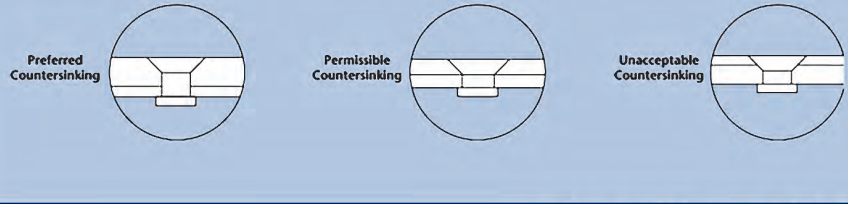


parts for wing structures, such as slats and flaps, which require the use of large quantities of rivets. In the past, when the Tulsa facility used regular, off the shelf bucking bars of tungsten or tube steel the result was not satisfactory in terms of production or ergonomics.

"With the traditional bucking bars, riveters can develop elbow or shoulder issues so it is not prudent to leave people in that role for very long," says Lewis. "Also, the rivet bucktails sometimes are not the same height; and the bucking bars can leave marks on sheet metal surfaces, which is not acceptable in our industry."

In search of a solution, Lewis was receptive to the recommendation of an airline maintenance employee at a nearby facility, who had successfully used an advanced bucking bar called the ISOVIB Guardian "Torpedo" from Honsa, a Milan, Illinois based manufacturer of ergonomic bucking bars and anti-vibration power tools that improve productivity and reduce injuries for aerospace/industrial use.

The advanced bucking bar, which was developed in collaboration with Richard Borcicky's expertise in safety, ergonomics and injury reduction, provides three levels of vibration protection including a wave spring, tungsten inserts, and a cushioned palm pad. Compared to traditional bucking bars, this reduces vibration up to 50 percent.

According to Lewis, after the bucking bar manufacturer came to the Tulsa facility, demonstrated the bucking bars and let the mechanics test them, a test batch was ordered.

"One of our mechanics had shoulder surgery after an unrelated injury, and so was unable to rivet using typical bucking bars," says Lewis. "When we let her try the Honsa bucking bar, she was able to rivet without the impact and vibration hurting her shoulder. She spoke to our leadership team to get the first order pushed through, and later several more orders were placed for different areas in the plant."

In the advanced bucking bars, a precision non-mar height gauge also helps to eliminate over-bucking and damage to metal and/or painted surfaces when this is required.

Above Top: Honsa Torpedo Bucking Bar Cutaway. Below: Honsa Isovib Bucking Bar.

In regard to quality control, this helps to ensure that even less experienced riveters produce the same height bucktail on every rivet.

According to Lewis, over time, experienced riveters get a "feel" for properly set rivets. The more advanced bucking bars allow "someone that may not be experienced at doing that particular job to install rivets faster, with better feel," says Lewis.

Because bucking bars can be required in potentially thousands of different shapes and sizes to suit specific aerospace applications, customization of the modular bar with interchangeable end effectors can also allow operators to reach a wide variety of difficult rivets.

"Honsa was able to custom make a solution for pretty much every area we had – it was not one product for the whole plant," says Lewis, who notes that the manufacturer was able to turn rough drawings from workers on the plant floor into fully engineered drawings.

"We went back and forth with their design team to get a truly custom solution and they were very easy to work with."

According to Lewis, utilizing the advanced bucking bars has significantly improved production as well as safety in Spirit AeroSystems' Tulsa facility.

"The ergonomic bucking bars have definitely helped our production flow and reduced riveting redos by about 10 to 20 percent," says Lewis. "Anytime we can move the needle in terms of quality, it's a good thing for us and the customer."

Lewis adds that using the impact and vibration reducing tools has also been a real morale booster for the work crew. As a result, he has already recommended their use to other

Spirit AeroSystems facilities in the U.S. and overseas.

"Our work crew tends to do the same riveting tasks over and over," concludes Lewis. "So, anytime we can help them do their job better and prolong their career, it is a win-win. For anyone doing aerospace riveting, switching over to advanced bucking bars is really a no brainer." ■

Electric aircraft?

BY DUNCAN WALKER

Electric planes are here but they won't solve flying's CO_2 problem, says one researcher.

Opposite: The E-Fan X project, which involves Airbus, Rolls-Royce and Siemens teaming up to develop a hybrid-electric propulsion flight demonstrator. Above: With conventional energy, the Airbus A380 can fly 600 passengers 15,000 kilometres in a single flight.

adding up the numbers

The UK government plans to ban the sale of new conventional petrol and diesel cars by 2040. Clearly the plan is for all citizens to be driving electric or hybrid-electric cars, or – better still – riding bicycles. But can electrification help cut emissions from that other carbon-intensive form of passenger transport, flying?

This is a complex question and one where size matters. It is possible for small aircraft to be powered by electricity. In fact several companies are already developing small electric aircraft and they could come on the market within the next few years.

But for the large aircraft we all use more frequently it is unlikely to happen anytime soon. The problem isn't the propulsion technology but the energy storage. Jet fuel contains around 30 times more energy per kilogram than the most advanced lithium-ion battery currently available.

The world's largest passenger plane, the Airbus A380, can fly 600 passengers 15,000 kilometres in a single flight. But, according to my calculations, with batteries it could only fly a little over 1,000 kilometres. Even if all the passengers and cargo were replaced with batteries, the range would still be less then 2,000 kilometres. To keep its current range, the plane

Above: Unfortunately, for the type of flights most of us make there is currently no practical alternative to jet-fuelled turbofans.

would need batteries weighing 30 times more than its current fuel intake, meaning it would never get off the ground.

This trade-off is particularly bad for long-haul flights because the fuel makes up half of the aircraft's weight at take-off. What's more, a conventional plane gets lighter as the fuel is consumed, but an electric aircraft would have to carry the same weight for the entire flight. As I said, size matters.

For a five- to 10-seat light aircraft, fuel is likely to make up 10 percent to 20 percent of the aircraft's weight. Simply swapping the fuel for batteries might still reduce the distance the plane can fly by an impractical amount. But replacing two or three passengers with additional batteries would give a range of 500 kilometres to 750 kilometres, compared to a fuel-powered range of over 1,000 kilometres.

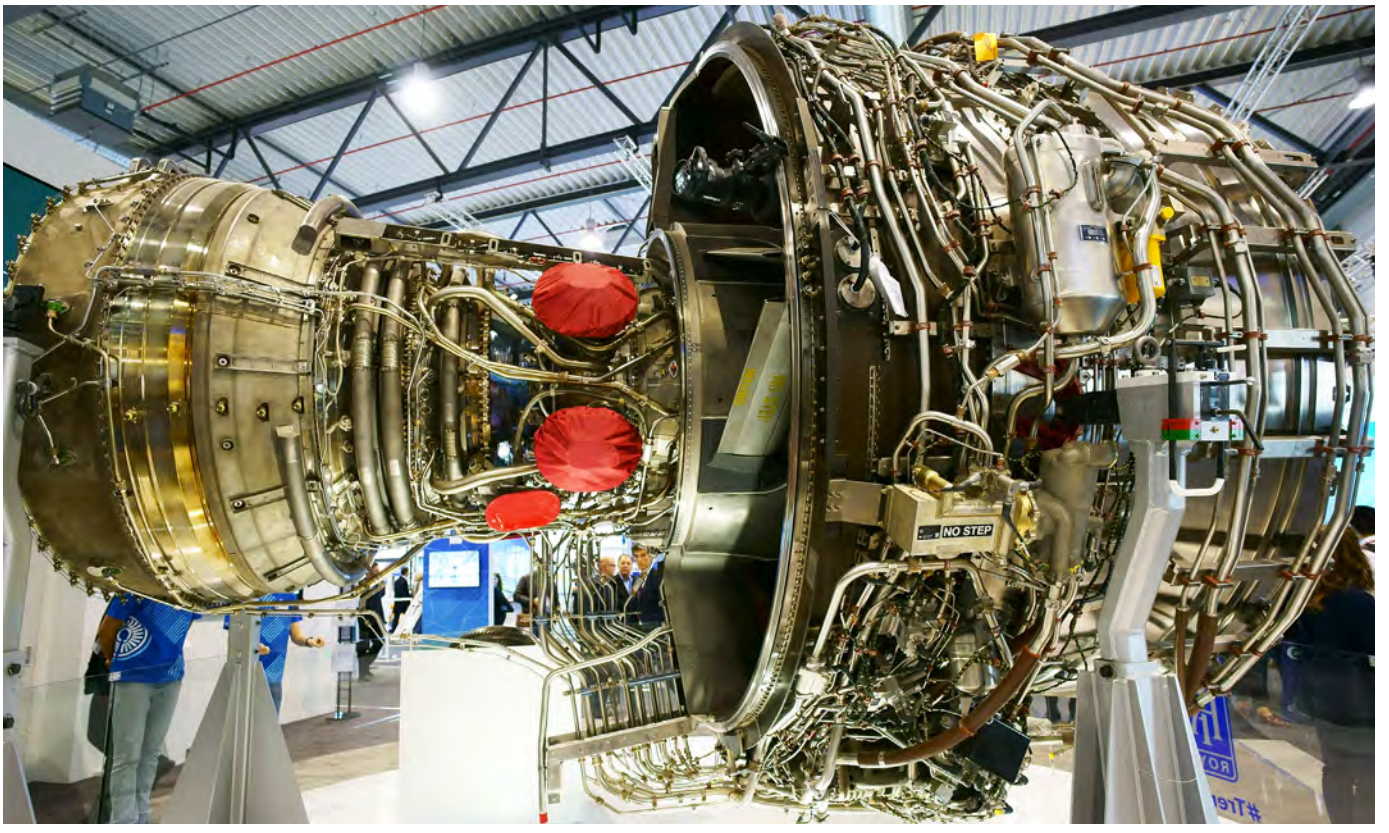
First commercial model

However, there could be another option. Israeli firm Eviation recently revealed a prototype version of what it claims will be the world's first commercial all-electric passenger aircraft. The aircraft, named Alice, doesn't just swap jet fuel for batteries but is a whole new design concept that improves the way the propulsion system is integrated into the airframe. Carrying nine passengers with a range of 1,000 kilometres, Alice is expected to enter service in 2022.

Alice may be a practical alternative for small, regional journeys but not for most scheduled passenger flights, even short-haul ones. So how can electrification help here? Improving battery technology is one option. A new technology known as lithium-air batteries can theoretically reach the same energy density as jet fuel. However, they are still at the laboratory stage. Given the extremely safety conscious nature of the aviation industry, it is unlikely to plan future aircraft on unproven technology.

What we are more likely to see for short-haul flights in the next 20 to 30 years is hybrid aircraft that combine current turbofan engines with new electric propulsor systems. This more flexible hybrid system could be optimised to provide the high thrust required for take-off and the energy density needed for a long cruise.

Above: The next generation of Rolls-Royce engine, the UltraFan, will offer a further 20 percent to 25 percent reduction in fuel consumption and CO_2 emissions and is due to enter into service in 2025.



Above: The Trent XWB from Rolls-Royce powers the new Airbus 350 and is said to be the world's most efficient large aero-engine. Batteries as a viable alternative don't even come close.

Above: The wind tunnel testing for the E-Fan X was carried out at Airbus' wind tunnel centre in Filton, UK.

The hybrid E-Fan X Airbus

This is an area being actively pursued in the E-Fan X project, which involves Airbus, Rolls-Royce and Siemens teaming up to develop a hybrid-electric propulsion flight demonstrator. Using a BAe 146 aircraft, which usually carries around 100 passengers, they plan to replace one of the aircraft's four Honeywell turbofan engines with a propulsor fan driven by a two-megawatt electric motor.

In the project's initial phases, the electricity will actually be supplied by a Rolls-Royce AE2100 gas turbine housed in the aircraft's fuselage (main body). But the E-FanX will still be an important step in the evolution of hybrid electric technology. Airbus says it wants to make this technology available for 100-seat aircraft by the 2030s. It's also possible to equip a plane with multiple small electric propulsors in a so-called distributed propulsion system that is more efficient than traditional designs that use two large turbofans. This idea can be taken further by combining the separate fuselage and wings into a single "blended-wing-body," more efficiently integrating the propulsors with the airframe in a more aerodynamic design. This could reduce the amount of energy the aircraft would need by 20 percent. But neither of the world's two main aircraft manufactures, Boeing and Airbus, is actively pursuing blended wing technology. Such a major design shift has too many technical challenges to make it commercially viable right now. For example, most airports wouldn't be able to accommodate a blended-wing aircraft.

Above: Israeli firm Eviation recently revealed a prototype version of what it claims will be the world's first commercial all-electric passenger aircraft.

No alternative

Unfortunately, for the type of flights most of us make there is currently no practical alternative to jet-fuelled turbofans. For this reason, the main aircraft engine manufacturers are investing heavily in improving their current engine technology. The International Air Transport Association estimates that each new generation of aircraft is on average 20 percent more fuel-efficient than the model it replaces, and that airlines will invest US$1.3 trillion in new planes over the next decade.

For example, Rolls-Royce's most recent engine, the Trent XWB that powers the new Airbus A350, is marketed as "the world's most efficient large aero-engine." Airbus claims the engine will help the A350 to achieve "25 percent lower operating costs, fuel burn and CO_2 emissions when compared with previous-generation aircraft."

The next generation of Rolls-Royce engine, the UltraFan, will offer a further 20 percent to 25 percent reduction in fuel consumption and CO_2 emissions and is due to enter into service in 2025.

But it's worth remembering that aviation currently contributes only two percent to three percent of global CO_2 emissions. This compares to about 30 percent to 35 percent for the whole transport sector, and another 30 percent to 35 percent for electricity generation.

The number of air passengers is expected to double over the next two decades but so are total emissions so this is unlikely to make aviation a bigger part of the problem. Reducing aviation emissions by 20 percent per generation of aircraft probably might not a sustainable improvement. But if hybrid aircraft are made a reality then flying really could become even less of a contributor to total emissions than it is today.

(Duncan Walker is Senior Lecturer in Applied Aerodynamics, Loughborough University. This article was originally published at www.theconversation.com) ■

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WESTERN

Western AME Association

Airworthiness Symposium & Trade Show Postponed

It is with heavy hearts that the WAMEA board stands united in our decision to postpone the 2020 WAMEA Symposium. We cannot provide an optimal or safe experience for attendees in the face of travel restrictions, health concerns, and the implications for your business should a quarantine situation arise.

Thank you everyone for your patience and understanding as we've navigated this difficult situation. We have been working tirelessly this week to gather facts, information, and contingency plans to bring you a Symposium experience that would help you navigate one of the most troubling times our generation has seen. In light of recent events, it has become clear that is not possible. We hope that this proactive and transparent move allows us to stay safe and conduct business in a less uncertain October timeframe. That is why we are pivoting the 2020 WAMEA Symposium to October 1–2, 2020 (Registration will reopen in May 2020).

We are grateful that you chose to register for the 2020 Symposium and it is important to us that we provide you with options. We hope that you will join us for the new dates so that we can work together in the economy and industry building that is going to be needed.

Option 1 is to transfer your registration, sponsorship, or exhibitor booth to the new dates.
Option 2 is an outright refund.

Please contact Candace from the WAMEA office at candace@managewise.ca to let us know which option you would like to exercise. The Best Western Premier Calgary will automatically cancel your hotel reservations for the Symposium. There is no need to call and cancel your hotel reservation.

The conversations we've had over the last couple days has proven how lucky we are to be part of the supportive, tight-knit industry. We thank you for your support of the Western Aircraft Maintenance Engineers Association and look forward to seeing you at the 2020 Symposium in October.

Sincerely,
WAMEA Board of Directors

www.wamea.com

ATLANTIC

Atlantic AME Association

ARAMC 2020 Update

Due to the ongoing global COVID-19 situation, it brings us great pain to announce the cancellation of the 2020 ARAMC, originally scheduled for April 22 to April 24 in St. John's. If you didn't book your hotel room using the event link, we recommend that you contact the hotel directly to ensure cancelation.

The ARAMC will return to Halifax next year, and the golf tournament will take place in September, also in Halifax. We wish you all good health through this very challenging time.

www.atlanticame.ca

AME Association of Ontario

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Getting more youth engaged in the AME profession

The AME Association of Ontario has several ongoing initiatives for getting more youth engaged in the AME profession. We attend various career days in our region and participate in the high school and college skills completions. You will also see us with a booth at airport open houses where we provide advice to youth and parents about the opportunities available in the aircraft maintenance field. We have produced a handout that describes the different skills that are required and the educational requirements for them. The six Ontario Colleges that have aircraft maintenance training are also listed.

We work together with other groups to identify opportunities to improve, enhance, and embark on new initiatives in support of getting more youth engaged in the AME profession. We continue to look at other steps to further engage in establishing some new initiatives with other organizations and in support of youth training towards AME careers.

In a recent discussion with the Air Cadets we discussed some new options or examples that could involve:

- Offering 'modular' training for youth who could secure some certifications towards their AME license if they decide to pursue this route...an initiative to expose and interest youth who may not have had previous exposure to this option.
- New methods to offer youth some workplace exposure, learning or training under the mentoring of an existing AME.
- Integrating high school or college level students involved in an apprenticeshiptraining program, such as mechanics or welders, and providing an aviation/aerospace venue and engagement with an AME to expose them to this profession in a hands-on, direct manner as they make further education and career decisions.

Overall, new methods and concepts will need to be established that can link more youth to the field and training streams for AMEs and aviation as a whole. We would hope that TC and the training institutions are open to supporting new initiatives that can start to address the known concerns for the industry.

There is much work and opportunity to address the current and forecast need for AMEs in Canada. We look forward to continue our collaboration on helping to improve and increase youth involvement in the AME profession.

— Submitted by Stephen Farnworth
For the Board of Directors

Pacific AME Association

April 22 Workshop and AGM

Due to the COVID-19 virus, our April 22 Workshop/AGM at BCIT is cancelled until further notice, we hope to carry out the Workshop once this pandemic has passed. The AGM will go ahead in a digital format, all voting/paid members will have AGM documents emailed to them, followed by a voting survey to decide on any vote-able issues.

Headings for February's minutes

1. Approval of Agenda

2. Approval of Minutes from previous meeting

3. Financial:
- Bursary discussion with BCAC Update
- Bank Accounts
- Bursary Update- Peter

4. Workshop / AGM
- Discussion on what presentations and organization / planning

5. Update on Robert Hope Award

6. AMEC meeting update

7. Membership:
- Update on phone lists
- Update from AMEC re blended membership

8. Website

February's full meeting minutes can be downloaded at:
www.pamea.ca

CENTRAL

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 supports the national body CFAMEA (Canadian Federation of Aircraft Maintenance Engineers Association). Our organization works with Transport Canada in the formulation of new rules and regulations and provides a collective viewpoint for all AMEs.

CAMEA is a not-for-profit organization run by a volunteer group of AMEs. 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.

SOCAL

PAMA SoCal Chapter

Who we are

The purpose of SoCal PAMA is to promote a high degree of professionalism among aviation maintenance personnel; to foster and improve methods, skills, learning, and achievement in the field of Aviation Maintenance; to conduct local meetings and seminars; to publish, distribute, and disseminate news, technical bulletins, journals, and other appropriate publications dealing with the trade of Aviation Maintenance; to collaborate with other organizations in aviation in the queries of governmental agencies pertaining to maintenance rules and guidelines.

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Hammer & the Warbird

Many who wrench on and fly aircraft have historically held intense feelings for motorcycles. This month, we present slightly different fare for AMU readers. Here's a story about an old AME and his love affair with bikes and vintage planes.

STORY AND PHOTOS BY JOHN CAMPBELL

Everything about Chris Walker is precise. He responds to emails and phone calls immediately. He arrives at appointments prepared and exactly on time. An Aircraft Maintenance Engineer and commercial pilot in a former life, Walker now builds high-end custom homes on Vancouver Island though he's still a hobbyist flyer.

He was in the midst of formation drills with fellow low-wing vintage aircraft enthusiasts when I first made the acquaintance of his motorcycle, parked on the tarmac of the Victoria Flying Club where I was attending a local show 'n' shine. While he was in the air being drilled, his bike was on the ground getting judged. When I asked who owned the custom Victory Hammer motorcycle that had caught my attention, one of the show 'n' shine organizers pointed skyward where Walker was at that very moment motoring overhead in his Chinese-built Nanchang.

Looking at the bike it didn't surprise me then that its owner would also own and pilot a 1960s-era warbird. For me, it's still an easy association to make. This particular Victory is from the 100-cubic-inch series of Hammers that first surfaced in 2005 with a 250-section rear tire and six-speed transmission. It

was pitched to compete in the muscle bike segment with a low-slung saddle, wide, aggressive bars, dual staggered pipes and twin disc brakes riding beneath inverted forks.

When Victory Motorcycles was still alive as a company (the former holding of Polaris Industries folded in 2017), it had traditionally flirted with strong paint tones, and the Hammer was no exception. If it was intended as a swashbuckling bike for spirited riders, then it's fair to say an aviator in a classic plane fits the bill.

Yet Walker didn't arrive naturally to the cruiser community. Early in life he'd taken the sportbike route, with a successive series of Kawasaki firebrands like the Ninja 900 and turbo GPz750. But like many others approaching 50, he found his preferences changing. He began researching chopper styles and builds, looking for a particular type with clean, simple lines. This is how the Victory entered his world.

The essence of the stock bike is still easy to detect with a custom treatment that's "not too much, not too overdone, but still reeks of testosterone," said Walker, when we met at the private hangar near Victoria Airport where he parks his Nanchang, a trainer-fighter that was a licence-built version of Russia's Yak-18.

Aircraft like the Yak and Nanchang, built in former Communist bloc countries, have risen in popularity among western flyers to a degree there's even an enthusiast group: the RedStar Pilots Association.

Indeed, even as Walker points out the finer aspects of the Nanchang and its relationship to the Yak, he takes sudden notice of a new arrival in the hangar across from his. "There's a Yak now!" he says, with some amazement. When we stroll over to mind the business of the AMEs working on the Cold War aircraft, we're told that the great Soviet pilot and cosmonaut Yuri Gagarin once flew this very plane. He was famously the first human in space, but Colonel Gagarin was killed in 1968 while piloting a MiG-15.

Yet for all that, Walker's Victory does not carry an aviation-themed custom treatment. In fact, the paint scheme pays tribute to a classic Ford muscle car, the Mustang GT350H. A variation of the


H.JC

race-ready GT350, the H-car was a small-production-run model built specifically for a sportscar rental program operated by Hertz. A mere 1,000 units were built, all of which arrived bearing the colours and stripes of the rental giant—a livery that now details Walker's custom, and evokes the notion of American muscle.

The fabrication and paint is the work of Conquest Customs who added chrome details and reshaped the stocker's shrouded tail section for an abbreviated presentation that isolates the matte-finished 2-into-1 Assault tail pipe for a sinister, phalanx-gun look. Highlighted beneath the red-stitched solo seat is the toothed belt final drive and the big Dunlop tire, spooned onto red-accented wheels complementing red Brembo calipers.

Whiplash Customs of Vancouver Island added to the appearance with a molded, frenched-in tail lights, and fabricated rotating licence plate holder.

In many ways the first-generation Hammers were groundbreaking. They were the first big-inch production cruisers fitted with six-speeds and the first to carry 250-series rubber. If the factory horses weren't enough, Victory entered into an agreement with S&S to produce stroked 106 cubic inch upgrades of the OEM 100-incher, thus signaling Victory's mutually beneficial relationship with the aftermarket.

Distinctively shaped handlebars that flare out into a flying-V configuration put Hammer riders into quite specific hot-rodding. With double-disc braking, big motors, six-speeds, and sporty suspension, the Hammers have always been about creating an impression on the street, and there's never been any doubt they were meant to customize.

But they were also meant to ride with controlled aggression—they offer the kind of focused performance that a guy who demonstrates precision in all other aspects of his life might appreciate. And dressed up, they look killer. ■

Dragon Slayer

Above: Historical information indicates that the Dragon Rapide is more difficult to handle during crosswind takeoffs than most tail-wheel-equipped aircraft

A short ride on a windy day illustrates how flying vintage aircraft is tricky business.

History of the flight

The vintage de Havilland DH-89A MKIV Dragon Rapide biplane (U.S. registration N683DH, serial number 6782) operated by Historic Flight Foundation (HHF) was part of the static aircraft display at the Abbotsford International Airshow at Abbotsford Airport (CYXX), British Columbia. Following the conclusion of the airshow that day, the aircraft was being used to provide air rides. At approximately 1731on 11 August 2018, the aircraft began its takeoff from Runway 25 with the pilot and 4 passengers on board for a local flight to the southeast.

During the takeoff, the aircraft encountered strong, gusting crosswinds. It climbed to about 30 feet above ground level before descending suddenly and impacting the runway, coming to rest on its nose immediately off the right edge of the runway.

Wreckage and accident site

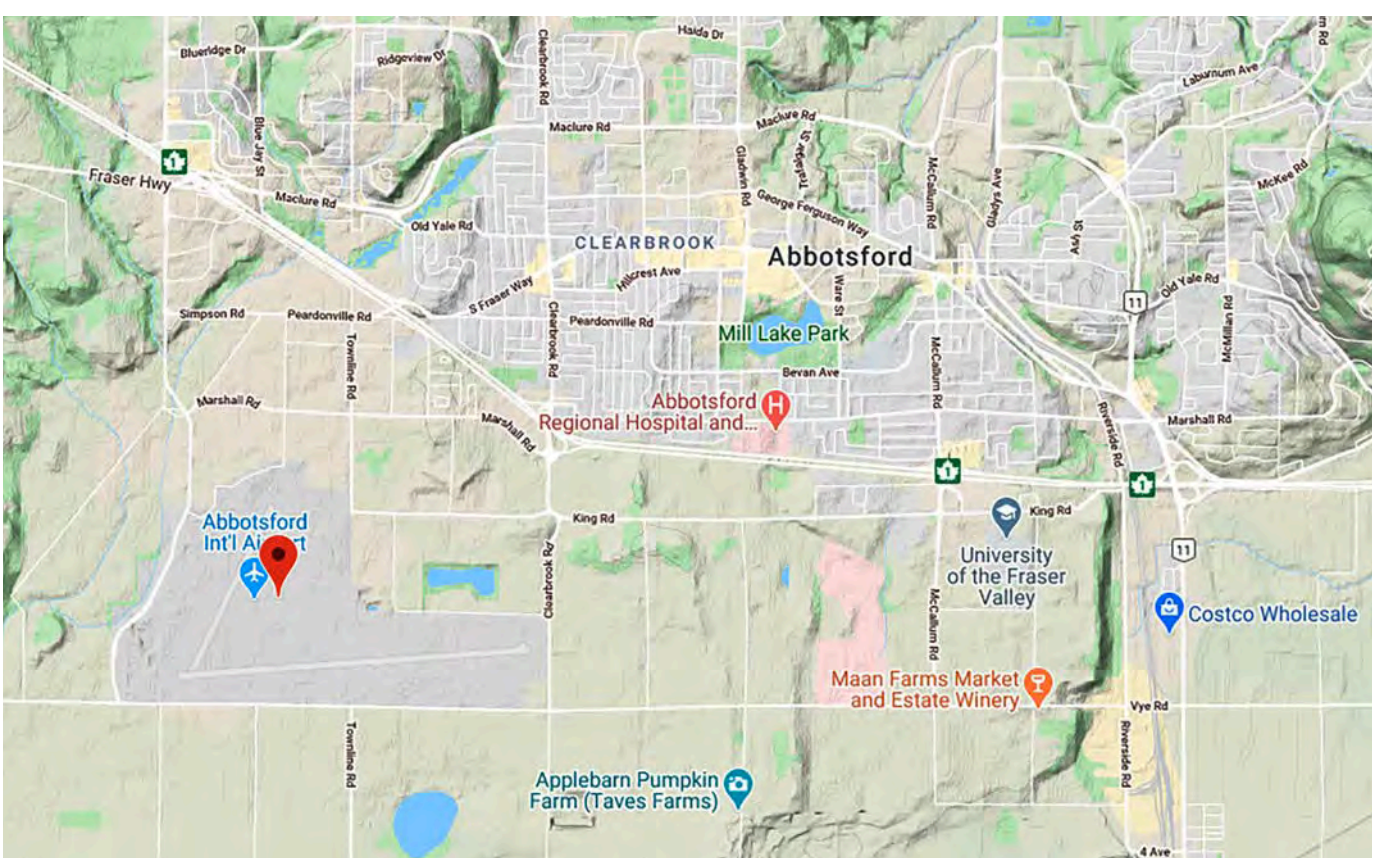
Within 2 minutes, 2 aircraft rescue firefighting trucks arrived on the scene along with an operations/command vehicle. About 10 minutes later, 2 St. John Ambulances arrived. A representative of the HFF was escorted to the scene to ensure all electronics on the

aircraft were turned off. Shortly thereafter, two BC Ambulance Service ground ambulances arrived, followed by two City of Abbotsford fire trucks. Two BC Ambulance Service air ambulances arrived after that. The fire trucks stabilized the aircraft, and the first responders who arrived with the fire truck finished evacuating the occupants.

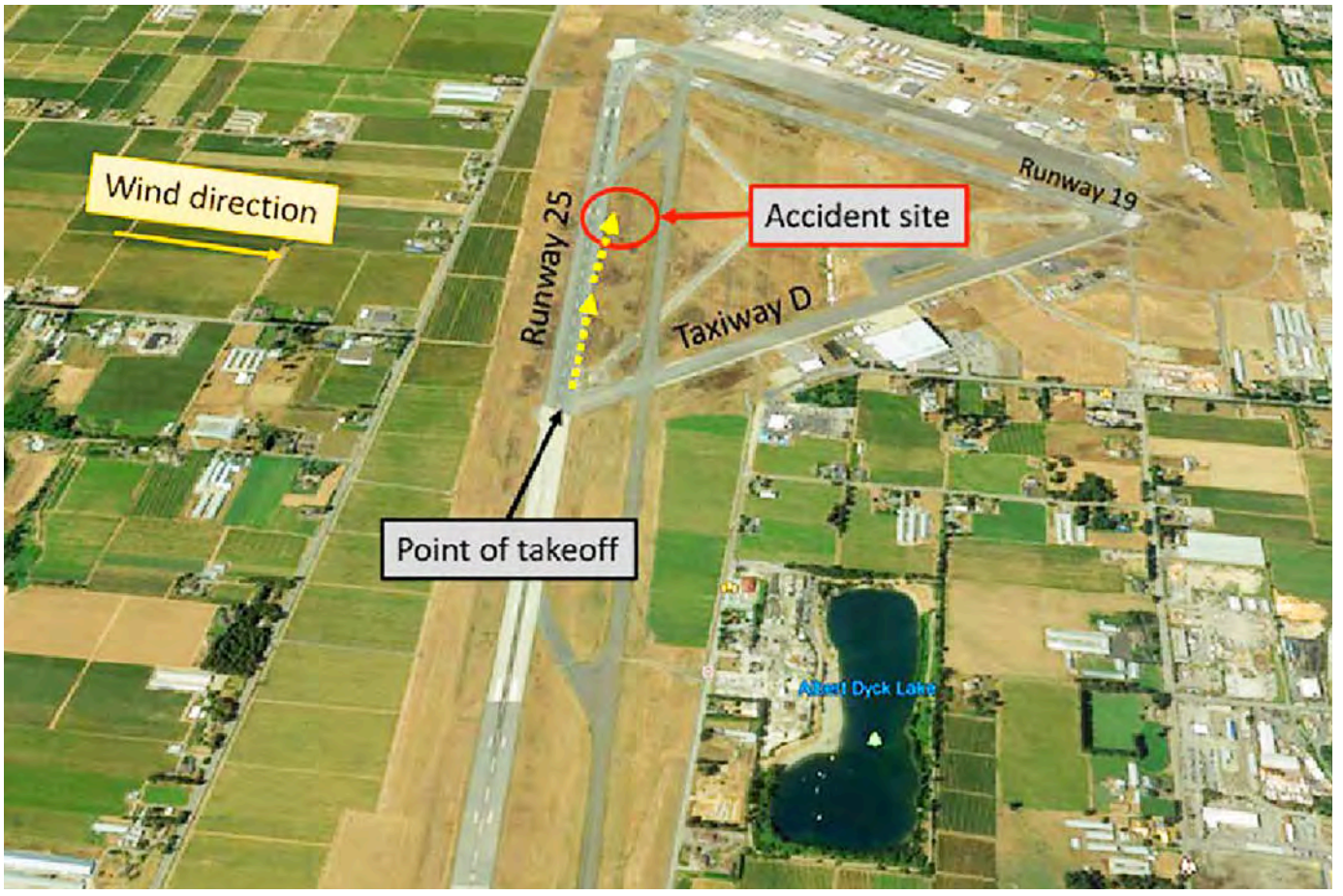
The pilot and one passenger received serious injuries; the other three passengers received minor injuries. All of the aircraft occupants were taken to the hospital. The aircraft was substantially damaged. There was a fuel spill, but no fire. The emergency locator transmitter activated.

Weather information

The accident occurred during daylight hours and in visual meteorological conditions. The forecast called for convective activity around the time of the occurrence. A weather cell, which included lightning and rain squalls, had moved through the area immediately east of the airport shortly before the accident.



Above: Map showing the location of the occurrence.



Above: Point of takeoff and accident site. Below: Wreckage at the accident site.

Before taxiing, the pilot listened to the automatic terminal information system broadcast, which had been issued at 1700 (about 31 minutes before) and reported winds from 180° at 14 knots, gusting to 19 knots. The pilot then contacted the Abbotsford ground controller to request clearance to taxi for takeoff and was told that winds were from 180° at 11 knots, gusting to 18 knots.

Runway 19 was the active runway at the time and was best oriented for an into-wind takeoff, however, about 60% of that runway was unavailable because of aircraft displays. As a result, the occurrence pilot elected to depart from Runway 25 at the intersection with Taxiway D. While issuing the takeoff clearance, the tower reported the winds to be from 180° at 10 knots, gusting to 15 knots.

While taking off, the aircraft encountered swirling winds, resulting in a sudden loss of airspeed shortly after becoming airborne. Video footage from multiple sources confirmed strong, gusting winds at the time of the accident.

Pilot information

The pilot held a valid U.S. airline transport pilot licence and a valid medical certificate. These qualifications also allowed the pilot to fly in Canada. He had accumulated about 10,000 total flying hours over a 35-year period on many types of aircraft, including 2,500 hours on tail-wheel-equipped aircraft. He was endorsed to operate a variety of vintage aircraft. He had obtained flight instruction from a world expert on the Dragon Rapide, and had accumulated about 20 hours total time on type, including about 5 hours on the occurrence aircraft in the month prior to the accident. He had also conducted another flight with passengers on the morning of the accident.

Aircraft information

The occurrence aircraft, a de Havilland DH-89A MKIV Dragon Rapide was manufactured in Britain in 1944. The aircraft is a biplane equipped with a free-castering tail wheel and is constructed primarily of fabric-covered wood.

The pilot's seat is located in the nose, on the aircraft's centreline, and 8 passenger seats are located aft, with 4 seats on each side. The Dragon Rapide is powered by 2 de Havilland Gypsy Six engines, each producing about 185 hp. Metal fixed-pitch propellers are driven by the engines. The aircraft's maximum gross weight is 6,000 pounds and its stall speed is about 54 knots. The aircraft is considered underpowered by modern standards.

Occurrence aircraft

Over 700 aircraft of this model were built; 17 still exist, and about 9 of these are still flying. The HFF bought the occurrence aircraft in 2017 and completed its restoration. The U.S. Federal Aviation Administration (FAA) issued a Special Airworthiness Certificate – Experimental for the occurrence aircraft; although the aircraft was considered airworthy, it did not meet modern aircraft safety standards. This was the first year the occurrence aircraft had participated in the Abbotsford International Airshow.

Historical information indicates that the Dragon Rapide is more difficult to handle during crosswind takeoffs than most tail-wheel-equipped aircraft, particularly from paved (rather than grass) runways. According to pilot notes, the maximum allowable crosswind component for takeoff is 17 knots. This is not a limitation of the aircraft; rather, it is a cautionary speed, meaning that operating in winds above that value would require above-average flying skills. Because the aircraft is equipped with a single pilot seat, it does not have dual controls, which can make pilot training difficult.

The wheel brakes are hand-operated by a floor-mounted lever to the pilot's left, rather than on the top portion of the rudder pedals as in most aircraft, and—along with the throttles, rudder, and control yoke—require constant manipulation to maintain directional control during taxi and takeoff. This results in high workload while taxiing and during takeoff.

Flying vintage aircraft

In the United States, the FAA can issue a Special Airworthiness Certificate – Experimental to allow the operation of experimental, vintage, and other aircraft that do not qualify for a normal Certificate of Airworthiness. These aircraft are subject to multiple restrictions and limitations, including a prohibition from carrying passengers for hire or reward.

Above: The annual Abbotsford Air Show is an enormously popular event in British Columbia's Lower Mainland region, but are gifts of rides on vintage aircraft really such a good idea?

The FAA has a policy in place that allows the owners of certain vintage aircraft to apply for exemptions that would permit the carriage of passengers for compensation. Other HFF aircraft—including a Grumman TBM that was also flying at the Abbotsford International Airshow—had been granted this type of exemption; however, the occurrence aircraft had not. Additionally, these exemptions are not valid for operations outside of the United States.

In Canada, the Canadian Aviation Regulations (CARs) prohibit Canadian aircraft that have been issued a Special Certificate of Airworthiness from carrying persons for hire or reward. Transport Canada can grant an exemption to commercial air service operators to perform aerial work while carrying passengers on board for hire or reward in Canadian-registered historical aircraft; however, this exemption does not apply to U.S.-registered aircraft, such as the occurrence aircraft, and the HFF is not considered a commercial air service operator.

> Transport Canada issued a Foreign Flight Authority Validation of the Special Airworthiness Certificate . . . This validation did not permit the carriage of passengers for hire or reward . . .

In certain circumstances, Transport Canada may grant an exemption to an aircraft that holds a Special Certificate of Airworthiness; however, the aircraft requires an exemption from the issuing State first. Transport Canada would then develop a specific exemption for the aircraft based on that exemption. Because no such exemption had been granted by the FAA, the occurrence aircraft was not eligible for this type of exemption.

Transport Canada issued a Foreign Flight Authority Validation of the Special Airworthiness Certificate – Experimental to the HFF, which allowed it to fly the occurrence aircraft to, from, and at the Abbotsford International Airshow from August 1 to August 30, 2018. This validation did not permit the carriage of passengers for hire or reward.

Historic Flight Foundation

The HFF is a vintage aircraft museum located at Snohomish County (Paine Field) Airport (KPAE), Everett, Washington. It was founded by the occurrence pilot in 2003. The HFF has participated in the Abbotsford International Airshow for 11 years with both static displays and flying aircraft. For most of that time, it has offered rides in its aircraft to people who buy an HFF museum membership. The Abbotsford International Airshow organization allowed the HFF to advertise and book rides through the airshow's website and ticketing agency. Rides could also be booked during the airshow at the HFF's static display. The airshow organization recorded the names of the people who had pre-booked rides.

However, many of the rides had been purchased as gifts; therefore, the people who had booked the rides were often not the passengers on board the aircraft for the flight. Passengers are required to sign a release for liability purposes because they will be flying in a historic aircraft. The HFF updated its passenger manifest with the names of the actual passengers; however, this new updated manifest was not carried on board during the flight. Therefore, an accurate passenger manifest was not readily available to the first responders. The absence of an accurate passenger manifest, or passenger name record, can make the identification of passengers difficult during an emergency response.

Safety messages

It is important to be familiar with all regulatory requirements related to the operation of vintage aircraft. Emergency response equipment needs to be available to prevent injury; and it is important to have an accurate passenger manifest so that first responders can confirm the identity of passengers.

(This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 20 March 2019. It was first released on 28 March 2019.) ■

Aviation Services

Aviation Services

Aviation Services

Low-Energy Solution

Testing at a NASA facility has proved-up a new hybrid technology to prevent icing on aircraft and drones.

In mid-January, Invercon Inc. and NEI Corporation announced their newly developed de-icing system was tested successfully at the NASA Glenn Research Center's Icing Research Tunnel. Engineers and scientists at the Research Center, as well as from the industry, witnessed the test. The team met the objective of demonstrating a low power anti-ice system in conjunction with NEI's NANOMYTE SuperAi anti-ice coating that prevents ice accretion on the leading edge of an airfoil. The test was performed on a full-size airfoil under simulated in-flight conditions, following nearly two years of development and laboratory testing.

All commercial aircraft have a built-in ice protection system, which could be a thermal, thermo-mechanical, electro-mechanical, or pneumatic system. A common issue with de-icing devices is that they consume substantial power. Aircraft generally look to reduce power consumption, and with the advent of battery-powered aircraft, mechanisms or features that reduce power consumption are critical.

Icing presents a particular challenge for commercial and military drones and the current practice is not to fly drones when icing conditions are predicted. Applying a passive anti-ice coating that functions with an active de-icing device is an attractive hybrid approach, which the team of NEI and Invercon has now demonstrated on full-scale prototypes.

NEI's NANOMYTE SuperAi anti-ice coating leads to a lubricating surface that drastically reduces the adhesion strength of ice – by as much as 80 per cent, compared to bare polished aluminum. The coating is usually applied by spraying, similar to conventional painting.

Invercon has developed an electro-pneumatic deicing system that requires very low power (≤ 2.5 kW), is retrofittable on any airfoil, adds only 50 pounds, and is durable enough to last the life of the aircraft once retrofitted. The company completed icing tests of the system at NASA Glenn's Icing Research Tunnel (IRT) under a full range of representative icing conditions. The system provided continuous deicing of the wing section leading edge over all of the test conditions from temperatures of -3C to -20. Typically, the system allows ice to accrete for about two minutes and then completely sheds upper and lower surface ice upon system activation.

The testing at NASA's IRT, which is the longest running icing facility in the world, has moved the hybrid technology to a readiness level of six (i.e., TRL6), which is a scale used by NASA and Department of Defense to gauge the maturity level of a technology. ■

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