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# AirMaintenance

The Magazine for Aircraft Maintenance Professionals

# UPDATE

## Chemicals & Solvents: working with hazardous materials

## Magnetic Attraction: a new alternative to carbon brakes

## PAMA and AME news

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## Follow the Leader

Airbus turns to the natural world for solutions

With geese in flight as inspiration, Airbus has unveiled fello'fly, its latest demonstrator "biomimicry" project intended to boost the environmental performance of commercial aircraft and make an impact on emissions reduction. The goal of fello'fly is to demonstrate the viability of two aircraft flying together for long-haul flights.

Through fello'fly, a follower aircraft will retrieve the energy lost by the wake of a leader aircraft, by flying in the smooth updraft of air it creates. This provides lift to the follower aircraft allowing it to decrease engine thrust and therefore reduce fuel consumption in the range of five to 10 percent per trip.

The technical solution that Airbus is working on involves pilot assistance functions necessary to ensure the aircraft they are flying remains safely positioned in the updraft of air of the aircraft they are following, maintaining the same distance, at a steady altitude.

In terms of the operational solution, Airbus is working, in collaboration with airlines and Air Traffic Control (ATC) providers, to identify the operational needs and suitable solutions for planning and executing fello'fly operations. This highlights the importance Airbus places on driving industry-wide activities to achieve emissions reductions targets defined by the International Civil Aviation Organisation (ICAO) and the Committee on Aviation Environmental Protection (CAEP).

Airbus is due to commence flight tests with two of its A350 aircraft in 2020, and targeting the middle of the next decade for a controlled Entry-Into-Service (EIS). ■

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### AirMaintenance Update

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# Upcoming Events

## Earn Credits at Rotor Show



The HAI HELI-EXPO in Anaheim, California this coming January will offer a variety of education activities accepted by the FAA for inspection authorization (IA) renewal credit.

### Professional Education Courses

If you prefer to earn credit hours before the show begins, then this is the option for you.

### Manufacturer Technical Briefings

These one-hour briefings by helicopter airframe and engine manufacturers give you the flexibility to earn credit hours between other show commitments.

### Using Credit Hours Toward Renewal

You can obtain your IA certificate of completion at HAI HELI-EXPO in three simple steps:

1. Pick up an IA renewal worksheet at the Education Desk, Grand Entrance, second floor.
2. At the conclusion of an eligible session or course, have the Technical Committee monitor or course instructor sign your worksheet to verify attendance.
3. After you have earned at least eight hours of credit, return your worksheet to the Education desk to receive a certificate of completion to submit to the FAA.

Certificates will be available at the following times:

- Friday January 24 – Wednesday, January 29 (7 a.m. - 5 p.m.)
- Thursday January 30 (8 a.m. - 5 p.m.)

For HAI HELI-EXPO's complete schedule of events, visit [www.rotor.org](http://www.rotor.org)

### HAI HELI-EXPO 2020

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March 5 - 6, 2020  
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[www.camea.ca](http://www.camea.ca)

### Yuma Air Show

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[www.yumaairshow.com](http://www.yumaairshow.com)

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# STCs & new products

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For information visit [www.worksmancycles.com](http://www.worksmancycles.com)

## Sensor collects live load data

**Saelig Company** has introduced the HeliNav-LoadMaster, an intelligent load sensor designed for use in weightlifting workhorse helicopters. The wireless HeliNav TrackMaster sensing system incorporates a strain gauge into the underslung cargo load hook. Inclined meters have been added so that it can be used with three-point fixing for large loads; a new receiver wirelessly collects live load data and new touch-sense display gives real-time information to aid calculation of flight and operational profiles.



For information visit [www.saelig.com](http://www.saelig.com)

## Switch controls doors and gates

**ZF Electronic Systems** has introduced STEUTE's Series ZS pull-wire switches for on/off control switching or opening/closing electrically operated doors or gates. Models are available with powder-coated aluminum, or fibreglass-reinforced thermoplastic housings. Units feature positive-break NC contacts; IP65 or IP67 ingress protection; and EN ISO 13849-1 and cCSAus-compliance. Typical applications include machine starting, barrier gate and overhead door control.



For information visit [www.switches-sensors.zf.com/us](http://www.switches-sensors.zf.com/us)

## STC provides alternative to avionics upgrade

**CMC Electronics and DAC International** have FAA approval of their latest automatic dependent surveillance-broadcast Out STC for aircraft equipped with Honeywell's Primus II avionics suite. This new STC provides an alternative to upgrading the existing onboard Honeywell equipment while meeting the DO-260B ADS-B Out worldwide mandate. This is achieved by replacing the existing non-compliant Primus II transponder with the Becker BXT6553 Diversity Transponder, paired with CMC Electronics' CMA-3024 GPS/SBAS receiver. The STC extends the operating life of a broad range of aircraft such as Bombardier's Challenger 600 series.

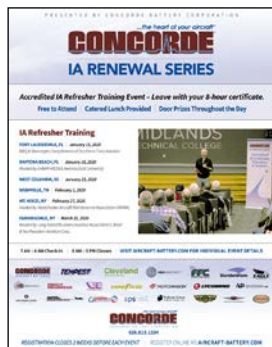


For information visit [www.cmcelectronics.ca](http://www.cmcelectronics.ca)

## IA Renewal Events are free

**Concorde Battery Corporation** has opened registration for six IA Renewal Events in 2020. Take advantage of the technical expertise Concorde has gathered in one location and leave with your eight-hour certificate at no charge. Register today to spend a day with your peers networking, engaging with manufacturers and fulfilling refresher-training requirements. Each one-day event includes free attendance, a catered lunch and door prizes. (See opposite page.)

For more information visit [www.aircraft-battery.com](http://www.aircraft-battery.com)



## Composite props coming to King Air 200s

**Hartzell Propeller** has secured an FAA Type Certificate for a new five-blade carbon fibre propeller system for the King Air 200 fleet. These custom designed props will be available through Raisbeck Engineering via STC for King Air 200, B200, and B200GT aircraft. This new propeller system, which increases performance across the board, is the first five-blade structural composite propeller certified on the King Air 200 series. The new propellers deliver more than 15 percent greater takeoff acceleration. For information visit [www.hartzellprop.com](http://www.hartzellprop.com)



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**DAYTONA BEACH, FL | January 18, 2020**  
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**WEST COLUMBIA, SC | January 25, 2020**

**NASHVILLE, TN | February 1, 2020**

**MT. KISCO, NY | February 27, 2020**  
Hosted by Westchester Aircraft Maintenance Association (WAMA)

**FARMINGDALE, NY | March 21, 2020**  
Hosted by Long Island Business Aviation Association (LIBAA)  
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## MCFARLANE IS BIGGEST COMPOSITE PROP DISTRIBUTOR



McFarlane Aviation Products has acquired Flight-Resource, thus becoming the world's largest volume MT Composite Propeller distributor. Flight-Resource is a sales and engineering company specializing in the development of FAA Supplemental Type Certificates and performance improvements using the vibration free MT-Propeller designs. The lighter weight composite propellers absorb vibration instead of generating vibration, yielding smoothness and service life improvements.

## GE WILL DEVELOP BOMBARDIER SMART BOX



Bombardier reached a Preferred Service Provider agreement with GE Aviation to power Bombardier's cockpit and cabin with connectivity solutions. This agreement is a first step toward the launch of Bombardier's Smart Link Plus connected aircraft program and Smart Link Plus box – a Health Monitoring Unit “smart” box capable of generating key data for customers, enabling them to increase operational efficiency, and minimize return-to-service times through data-driven decisions. The smart box will provide aircraft data to Bombardier's

digital platform where it will be analyzed and transferred into actionable insights.

## UNITY JOINS TWIN OTTER NETWORK

Viking Air Limited of Victoria, British Columbia has appointed Unity Aviation Canada Limited of Airdrie, Alberta to the Series 400 Twin Otter support network as a Factory Endorsed Service Centre for the Americas. Under Viking's FESC Program, Unity Aviation will provide authorized maintenance services, refurbishment, and warranty-related work on legacy de Havilland and Viking Series 400 Twin Otter aircraft.



The FESC program develops strategic relationships with specialized industry professionals to provide factory recognized service and warranty repairs for both Viking Series 400 Twin Otters and the legacy de Havilland Twin Otter fleet.

## GENX ENGINE CAPS BANNER YEAR

Just in time for its 15th anniversary, the GENx Engine Program celebrated the delivery of the 2,000th GENx engine to Boeing in mid-November, capping a banner year for the fastest-selling wide-body engine GE Aviation has ever produced.



The GENx is said to have the best fuel efficiency in its thrust class, enabling it to power many of the longest routes, including Qantas' 787-9 record-breaking non-stop flight from New York to Sydney last month. The flight carried a total of 49 passengers and covered 10,200 miles in 19 hours and 16 minutes. The keys to the GENx engine's performance are its high-pressure compressor, lean-burning combustor and lightweight durable composite materials.

## FAA WON'T BE RUSHED ON MAX RETURN



The U.S. Federal Aviation Administration's review of the grounded 737 MAX will not be rushed, FAA administrator Steve Dickson told Reuters in mid-November. On the continuing review of the 737 MAX, Dickson said his team would take “whatever time is needed,” having previously pledged a data-driven methodical analysis, review and validation of the systems and pilot training required to safely return the MAX to commercial service.

Dickson reiterated that the FAA is not following any timeline for the model's return to service. Boeing has said it expects the FAA to issue an order approving the MAX's return to service in December 2019.

## NEW FLAT-FEE DEAL FOR LANDING GEAR

Boeing has announced a partnership with Vertex Aerospace to provide customers who own Beechcraft airplanes a new flat-fee, 21-day door-to-door solution for landing gear overhaul services through its Aviall global distribution

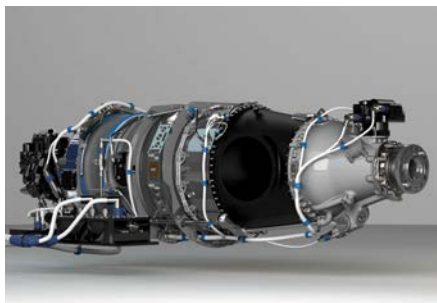


system. This new capability will expand beyond Beechcraft landing gear, providing customers with quick door-to-door shipping, maintenance and ship back for parts across a variety of business and general aviation aircraft on a flat-fee pricing structure.



“Partnering with Boeing’s Aviall team for an advanced distribution system strengthens our ability to provide quality services to customers when they need it, wherever they need it,” said Ed Boyington, president and CEO of Vertex Aerospace.

### P&W SERVICE PROGRAM SEES UPGRADE



Pratt & Whitney has launched its new PC-12 NGX aircraft, powered by the also new PT6 E-Series engine, said to be the first turboprop engine in general aviation to offer a dual-channel integrated electronic propeller and engine control system. The company is also enhancing its new Eagle Service Program (ESP) for the PT6 E-Series.

Owners who enroll in the ESP have access to the engine’s performance data, which will be sent for trend monitoring and, if required, for troubleshooting. Armed with this information, Pratt & Whitney’s predictive analytics team provides personalized recommendations to equip customers and maintainers with

new insights about their engine and the latest technical information to maximize the engine’s time on wing and reduce operating costs.

### GARMIN EARNS AUTOPILOT STC



Garmin has received Federal Aviation Administration Supplemental Type Certification for the GFC 500 autopilot in additional models of the Piper PA-28 and select models of the Piper PA-32. Intended for piston single-engine aircraft, the GFC 500 autopilot integrates with the G5 electronic flight instrument while the mode controller contains large dedicated keys and knobs, a control wheel that allows for easy adjustments to aircraft pitch, airspeed and vertical speed and a level button that returns the aircraft to straight-and-level flight.

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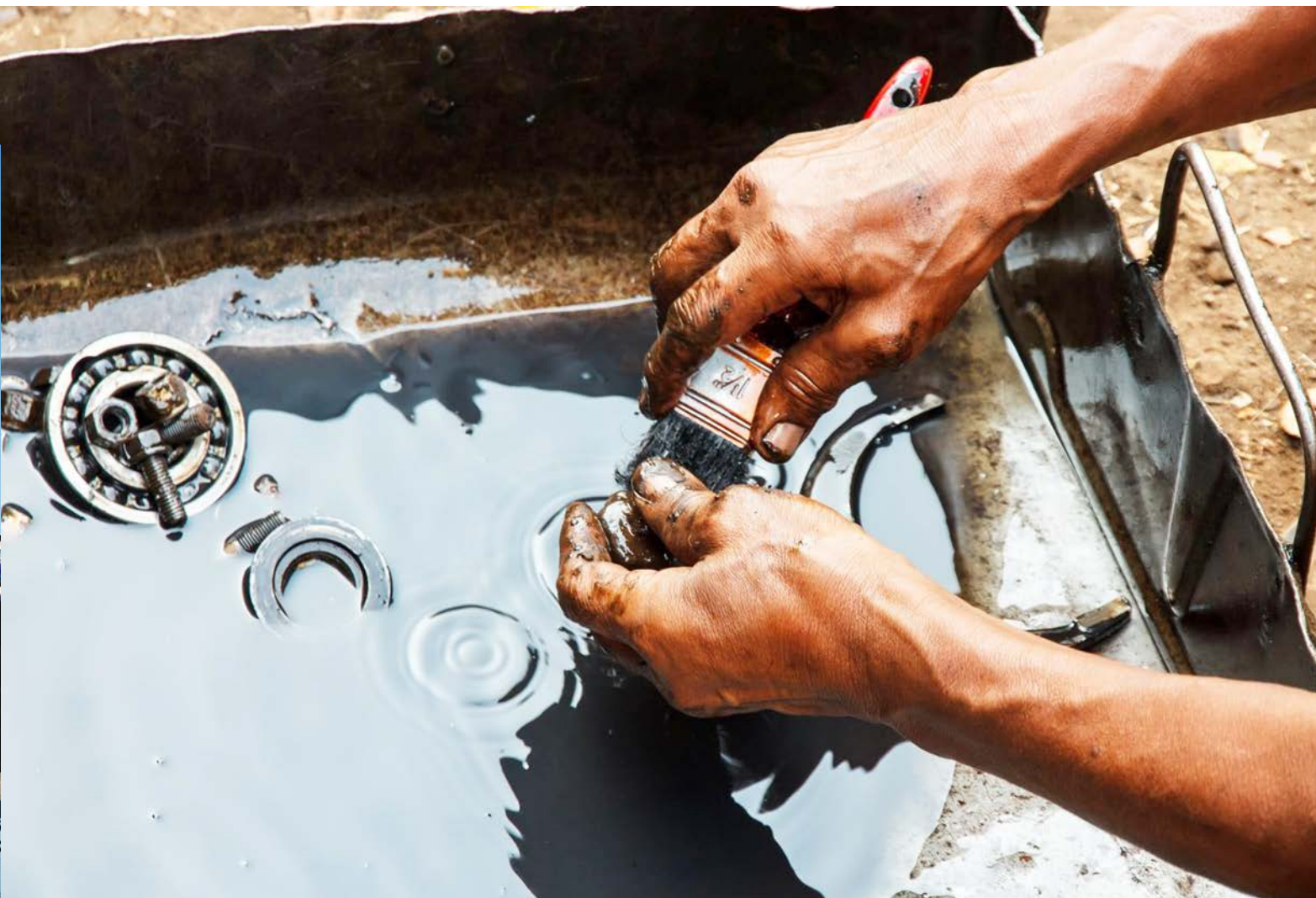
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# Workplace chemicals:

BY MELVIN D. CREWE

What's in that can, tube, or spray bottle you're holding? An AME's work environment can resemble a science experiment at times, and it could be worth your life to know some chemistry.



**Opposite:** Cleaning operations can produce dangerous atomized particles. **Above:** Working with bare hands and old school attitudes opens the door to enormous health risks.

# knowing the hazards

**W**ith the introduction of the airplane in the early 1900s, early aircraft mechanics and technicians were faced with the problems of oil leaks, seal leakages, propeller seal failures and other similar types of issues. They relied on AVGAS in a spray container to ascertain the source of the leak. After cleaning the engines and the successful completion of a ground run, they could identify a positive cause of the leak. Prop seals, shaft seals, etc. were checked and replaced when necessary to return the aircraft to service.

As times changed during WWI and WWII, chemicals and other organic compounds were introduced as cleaning agents. Chemicals such as trichloroethane, methyl ethyl

ketone, Brulin 512M, Varsol, acetone, and many more were introduced as approved cleaning agents. Various paints and thinners were also introduced at that time. The aircraft mechanics and technicians did not realize the impact that these new products would have on their health.

Mechanics and technicians have also long relied on chemicals and other agents to clean aircraft parts for inspection. Many of these chemicals have been hazardous to a person's health. One such chemical is trichloroethylene (TCE). This chemical was widely available in the 1960s and 1970s. Often it was used for cleaning engine oil filters. These filters were immersed in TCE, placed in an ultrasonic cleaner,



**Above: Who is responsible for the safe handling of hazardous chemicals in the workplace? Below: Heavy gloves for cleaning parts are effective, but strong vapors become airborne easily, and can be ingested via the lungs.**



cleaned, removed, air dried and reinstalled in the components. Often the mechanic or technician would not be wearing protective gloves, capes or respirators. Toxic vapors and these fluids could enter the body through the pores in the skin. These strong vapors could also be ingested into the lungs.

In the 1970s, TCE was reclassified and made available as P-D 680. This agent has been identified as a cancer-causing agent and has been documented as causing the following:

- Kidney cancer
- Non-Hodgkin's lymphoma
- Adult leukemia
- Aplastic anemia and other myelodysplastic syndromes
- Bladder cancer
- Liver cancer
- Multiple Myeloma
- Hodgkin's lymphoma
- Parkinson's
- Cardiac defects

Further information may be found at <http://www.qtsde.cdc.gov/sites/lejeunne/tce.pce>. This chemical agent is still widely used and operators should ensure their staff is aware of its serious implications. The internet has been a wealth of information in preparing this essay.



**Above: All employees should be certified in OSH and WHMIS training.**

There are literally hundreds of sites available on the net. Some topics searched and referenced are as follows:

- Mortality of aircraft workers exposed to trichloroethylene (TCE) and other chemicals
- Aircraft and avionics mechanics and technicians exposed to loud noises in workplace environment
- The relationship between Multiple Myeloma and six chlorinated solvents
- Exposure to asbestos by aircraft maintenance technicians and mechanics working on older types of aircraft, soundproofing, insulation used for silencing, and noise abatement. Asbestos was often used in brake assemblies of older aircraft

Another sweet-smelling chemical introduced to the industry is methyl ethyl ketone. MEK is often used as a paint reducer, to clean paint spray guns and brushes, for sealant cleaning and general cleanup of the job site. It is a very toxic agent and should be used in a well-ventilated area.

Widely-used as a degreasing agent and a gas path cleaner is Brulin 512M. This aggressive solvent and emulsion cleaner is used to clean compressors and fuel nozzles and for gas path cleaning. Some of the hazards associated with the use of Brulin 512M are:

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**Above: Protective eyewear and nitrile gloves are now ubiquitous among AMEs, but this was not always the case.**

- acute toxicity
- acute toxic dermal
- skin corrosion and irritation
- serious eye irritation

When Brulin is mixed with hot water, it can be used in an atomized state and the fumes can be strong and toxic. Properly rated respirators, gloves, aprons and goggles should be used at all times.

Another solvent widely used is Varsol, also known as Naptha. It is a dry cleaning solvent that can cause irritation to the eyes, lungs and skin.

There are basically hundreds of products being used today, parts cleaning solvents and other lubricants, that pose a danger to the user and extreme care should be used in work situations. Safety precautions as outlined on the MSDS (Material Safety Data Sheet) should be adhered to and all precautions taken.

Who is responsible for the safe handling of hazardous chemicals in the workplace? Every workplace should have an Occupational Safety and Health program and an Occupational Safety and Health Officer. The OSH representative is responsible for maintaining the storage and safe use of the product. The size of the committee depends on the number of employees. Federal offices come under the jurisdiction of the Canada Labour Code and Labour Canada, while others come under the control of the Provincial Department of Labour. Both are aimed at providing a safe working environment

for all employees. Education, awareness and dissemination of information regarding new products should be passed on to co-workers.

All hazardous materials should have a Material Safety Data Sheet. It is advisable at your regular monthly meeting to review the storage, use and handling of these products. If use and unsafe practices are noticed, the employee has an obligation to bring it to the attention of the OSH representative to rectify the unsafe practice.

All employees should be certified in OSH and WHMIS training. For students enrolled in the various aircraft maintenance technical training programs, an important segment of their training is OSH and Workplace Hazardous Material Information Safety (WHMIS). The students receive extensive training and are very familiar with the requirements of these subjects. It is an important segment of their training.

When an audit is carried out, the OSH representative has a time period to rectify any deficiencies. A complete report will be reviewed by the auditing inspectors.

In conclusion, all AMEs, mechanics, technicians, apprentices and general workers should be made aware of the dangers and hazards involved in the products used in the completion of their duties. Adherence to the safety requirements outlined on the MSDS forms could save a life.

*(This story originally appeared in the June 2019 edition of the AME Atlantic newsletter.) ■*

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# NBAA 2019 highlights:

The industry's premier business convention hosted in Vegas was again a showcase of new ideas and energies.





Opposite: As in previous years, product demonstrations were a feature of NBAA 2019. Above: The Bell Nexus on display.

# a look at the year's big event

**T**he National Business Aviation Association (NBAA) wrapped up an inspiring 2019 Business Aviation Convention & Exhibition (BACE), reflecting a changing industry, and driving it to embrace the future on all fronts.

The show, which ran October 22 to 24 in Las Vegas, opened with NBAA President and CEO Ed Bolen declaring that this year's NBAA-BACE would be "the most exciting convention NBAA has ever hosted." At the conclusion of the show's three days, that outcome was indisputable.

Energy was high from the convention's start – when basketball legend and entrepreneur Earvin "Magic" Johnson

jumped off the opening keynote stage to tell the crowd he could never accomplish all that he has off the court without a business airplane – to the closing day, when every refueling turbine aircraft departed Henderson Executive Airport (HND) powered by sustainable aviation fuel (SAF).

## Innovation in Focus

This year's NBAA-BACE put new modes of transport, such as unmanned aircraft systems (UAS) and urban air mobility (UAM) vehicles, front and center. Attendees in the all-new



Above: An overview of the Display of Aircraft at this year's NBAA-BACE. Below: Uber is developing shared air transportation — planned for 2023 — between suburbs and cities, and ultimately within cities.



UAS/UAM Innovation Display Area thronged full-scale prototypes and concepts for the vehicles.

On the show floor, an inaugural New Product Showcase introduced 11 new, distinctive products from a host of innovative companies. Inside the convention center and at Henderson Executive Airport, nearly 100 of the latest business aircraft were on display. Also at the airport, Gulfstream unveiled its new G700, Bombardier displayed its Learjet 75 Liberty mockup for the first time; Textron Aviation's newly certified Citation Longitude was on hand; and Pilatus introduced the NGX, and other aircraft, including Tecnam's P2012 Traveller.

## Sustainability a Priority

Sustainability in business aviation was a dominant theme throughout the show, with around two-dozen aircraft fueling enroute with SAF, a non-fossil power source that can reduce aviation's carbon lifecycle emissions by up to 80 percent.

Local civic and business leaders issued a proclamation recognizing the business aviation community's long-standing commitment to sustainability, with an estimated 150,000 gallons of SAF pumped into aircraft at Henderson Executive Airport. ■



Above: Gulfstream revealed its new flagship business jet G700 at NBAA-BACE 2019. Below: The Airbus Vahana vertical takeoff and landing (VTOL) prototype on display.



# Western AME Association



## AMEC/TEAC regulatory updates

### Regulatory Development

#### Upcoming Notices of Proposed Amendments (NPA):

- NPA on Undocumented Parts – with Advisory Circular (AC) – January 2020
- NPA on AME licensing – Validity, Photo and SFAR 41C – with AC – March 2020
- NPA on Evaluation Program – CAR 406 and 706 – being drafted
- NPA on Person Responsible for Maintenance (PRM) interview – Spring 2020
- ELT maintenance Standards – Published August 1, 2019

#### New AC coming addressing:

- Maintenance on and off aircraft – considerations and precautions
- Classifying operational test as elementary work
- Classifying performance test as specialized maintenance
- Precautions on 406 ELTs – self test, duration, etc.

- Importance on 406 ELT registration, shipping, disposal, etc.
- Providing alternatives to test 24 bit address – e.g. third party OEM, Canadian Beacon Registry Verifier
- AC to be consulted soon within TC and with ELT Focus Group members

### New Guidance – Advisory Circular (AC)

#### AC 566-003 Issue 1 dated 2019-04-10:

- Provides information on the changes on the licence based on new design
- Compliant with ICAO Annex 1 requirements for the licence
- Removed photo
- Validity period from 6 to 10 years
- Added Date of Birth and Country of Citizenship
- AC available on the web

[www.wamea.com](http://www.wamea.com)

# Atlantic AME Association



## Details regarding the main levels of membership

### Regular Membership

All voting members of the Association must currently hold an AME licence in any category, or a non-licensed aviation maintenance technician, technologist or individual meeting a recognized aviation trade standard (CGBS, Mil Standard, CAMC, SCA) or holding a position named in a MCM, MPM, ATO.

### Student Membership

Student membership is available at a reduced rate and this specified membership can only be renewed over a six year period. Student members attaining AME licences may become full voting members by paying the difference between student membership fees and regular fees.

### Corporate Membership

A corporate member is any corporation supporting the objectives of the association, and which is actively involved in the aviation industry in the Atlantic Region.

01. A representative of a Corporate member shall have the right to attend all meetings but no Corporate member shall be entitled to vote or hold office in the Association.
02. Membership is limited to AMEs, students and corporations in good standing with dues paid to date. Lapsed membership may be re-instated with the payment of annual dues.
03. The Association's President shall call executive meetings as are

deemed necessary. Normal notice of meetings will be thirty days. Emergency meetings will be called as required.

04. Executive decisions can only be made with a quorum of 5 members of the executive, one of which must be the President or Vice-President.

05. An annual meeting of the general membership will be held to coincide with the Atlantic Region Aircraft Maintenance Conference.

06. All committee chairmen will report to the general membership at the annual general meeting.

07. An election of executive officers will be held annually at the general meeting. In the event that an elected committee chairman resigns, for whatever reason prior to the expiry of his term, the President shall appoint another elected director to fill this position for the remainder of the resignee's term.

08. The executive committee will be comprised of a maximum of eight (8) and a minimum of six (6) directors who will manage the affairs of the Association.

09. Half of the executive will be elected at each annual general meeting. All nominations must be accompanied by one signature of a member in good standing. Elections will follow the nominations. Nomination forms must have the nominee's signature of acceptance or the acceptance must be verified by phone call by the nominator.

10. If a serving member of the executive is nominated to another position of the executive, he shall tender his resignation upon accepting the nomination.

11. Elections will be by secret ballot.

12. Members serving on the executive should be prepared to offer

their services for two years, and attend executive and other meetings as required.

13. The president will not be a voting member, with the exception of a tie breaking vote.

14. An agenda will be required for the general meeting for discussion and action on items proposed during the year, and will be mailed thirty days in advance.

15. Membership fees (regular, student and corporate) will be established on an annual basis by the members at the AGM.

16. Any amendments to the AME Association Objectives and By-laws will be approved by the general membership at the AGM.

[www.atlanticame.ca](http://www.atlanticame.ca)



## AME Association of Ontario

c/o Skyservice F.B.O. Inc., PO Box 160, Mississauga, Ontario L5P 1B1

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email: [association@ame-ont.com](mailto:association@ame-ont.com) website: [www.ame-ont.com](http://www.ame-ont.com)



### Regular Meetings

The Board of Directors of AME Association of Ontario meets monthly throughout the year. Attended by area directors, directors at large and numerous resource personnel, the dedicated volunteers who lead the association discuss the concerns of the members and plan future activities. Those who cannot physically attend, telephone in to participate.

Each of these individuals who gives freely of their time and energy believes in the future of our profession and the role that our association has to mentor and promote. The realization that maintenance personnel are in demand and that this is an attractive vocation for our

youth is a great incentive to us.

Our board members attend many events throughout the year representing AMEs within the region. Whether it is attending networking events in Ottawa, providing industry insight to the many college program advisory committees, or attending themed events at some of our smaller airports and aerodromes, our aim is to educate and provide expertise where possible.

— Submitted by Stephen Farnworth  
For the Board of Directors

## Pacific AME Association



### Now Up and Running

Our new website is up and functioning. Moving forward, the membership list for benefits, magazines will now be coordinated through the website. It is imperative that members go to the website [www.pamea.ca](http://www.pamea.ca) and sign up to maintain their membership and association.

The membership period has always been October to October but now it will be handled through the website it will be every 12 months from when you last signed up on the website. It will save us a lot of time and that is something we are all short of these days.

All current news will be on the website and also on our LinkedIn account:

[www.linkedin.com/company/pacific-aircraft-maintenance-engineers-association-pamea](http://www.linkedin.com/company/pacific-aircraft-maintenance-engineers-association-pamea)

We will get our Facebook account up and running soon, and we are looking for a volunteer to help us with the PAMEA Facebook.

[www.pamea.ca](http://www.pamea.ca)

# AirMaintenance UPDATE

The Magazine for Aircraft Maintenance Professionals



We invite you to contribute your AME association and PAMA newsletters to AMU magazine. Keep in touch with your membership, and promote upcoming symposiums and social activities.

Contact  
[amu.magazine@telus.net](mailto:amu.magazine@telus.net)



## 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 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 AMEs, AME apprentices, students, non-licensed persons working in the industry and corporate members.

### Manitoba's Annual Aviation Symposium

We're looking forward to next year! Stay tuned for more information as we start planning the 25th Annual Aviation Symposium March 5-6, 2020.

[www.camea.ca](http://www.camea.ca)

## PAMA SoCal Chapter



### September 2019 Meeting Wrap

The PAMA SoCal Chapter thanks everyone at Extraord-N-Air for hosting dinner.

Thanks also to Mike Broderick, Product Applications at Trace Worldwide for delivering an excellent technical presentation on "Mechanics, Pilots, Safety and Maintenance" on September 10, 2019 at the 94th Aero Squadron Restaurant in Van Nuys, CA.

or product and service information, visit their web sites at [www.trace-ww.com](http://www.trace-ww.com) and [www.extraordnair.com](http://www.extraordnair.com)

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[www.socalpama.org](http://www.socalpama.org)

## Central Ohio PAMA



### COPAMA Annual Meeting

Our Non-Profit 501-C3, Charitable Organizational Status requires the oversight by our seven members of the Board of Directors. Those members serve for a two-year term and are elected on an alternating basis during a meeting held each November.

This year, three members' terms are ending and up for re-election. They were Joe Lippert, Charles Jenkins and Steve Brown. After receiving no nominations, they have agreed to continue on for the next two years. Many thanks to them for help in steering the COPAMA group.

Time requirements are minimal with an organizational meeting in November and most decisions made through email communications. If you're interested in COPAMA, our Scholarship Fund and fund raising events, please consider becoming a board member next year to help provide guidance to this generous organization.

The annual meeting was held Tuesday November 12th at 6:30 pm, at the Columbus State AMT Facility, 5355 Alkire Road, Columbus, Ohio 43228. We want to thank those extra members who attended the meeting.

## Farewell to an Aviation Hallmark: Glenn L. McCauley

A good friend and pioneer of PAMA has gone on his Flight of Glory. Glenn passed away after a medical struggle on September 22nd, leaving behind the McCauley family, friends and the staff of Aero Battery. Our hearts go out to them as we share their sorrow.

A Celebration of his Life was held Saturday October 26th at the Airmen's Club at Cincinnati Lunken Airport.

## COAGO 2019 Was a Great Event!

This year's Central Ohio Aviation Golf Outing was held Friday September 6th at the Willow Run Golf Course. The day could not be more perfect for the sponsors and players who participated!

This year's event entertained 116 golfers and made just over \$10K with all proceeds going to the COPAMA Scholarship Fund. Its primary goal is providing help paying for certification testing of new AMTs. Thanks you to all the sponsors, players and volunteers who attended and Willow Run Golf Course and their staff for providing the venue!

[www.copama.org](http://www.copama.org)

## PAMA Dallas – Fort Worth



### About us

The DFW Chapter of PAMA is a non-profit association dedicated to promoting professionalism and recognition of the Aviation Maintenance Technician through communication, education, representation and support, for continuous improvement in aviation safety.

Since 1997 we have been coming together for a day of golf and fun in support of our local aspiring Airframe & Powerplant mechanics! Our annual PAMA DFW Golf Classic is a charitable event whose proceeds benefit scholarships for students pursuing a career in Aviation Maintenance at Tarrant County College. The chapter partners the Tarrant County College Foundation to offer a full scholarship to at least one student every year.

However, this goes beyond just the classes leading to the Airframe and Powerplant certificate. The scholarship pays for the tuition,

student fees, textbooks, and all of the FAA examinations (written, oral and practicals). These are all accomplished at Tarrant County College Northwest Campus, Aviation Department.

The cost for a full scholarship is approximately \$6,500. A selection committee set up by the college chooses the winner of the merit-based scholarships. The scholarship is open to anyone who meets the criteria.

Since the Foundation began administering this scholarship in 2009 we have collected over \$97,000 and awarded 16 full scholarships. These successes are possible with the support of our aviation community, so we are always looking for hole sponsors and major raffle donors to support this just cause.

Our mission to educate, train, and provide encouragement to our industry's aviation technicians does not waiver.

[www.pamadfw.com](http://www.pamadfw.com)

**If you'd like to contribute your professional association's newsletter to AMU magazine contact our editor, John Campbell via email :**



[amu.editor@gmail.com](mailto:amu.editor@gmail.com)

# Magnetic Attraction



A University of Toronto mechanical engineering student may have an alternative to the costly, wasteful convention of carbon brakes.

**B**ecause aviation must become more sustainable in order to address the global threat of climate change, aerospace manufacturers worldwide have committed to reducing aviation carbon emissions by 50 percent from 2005-2050. Yet, one of the most wasteful systems on a modern aircraft, in terms of money, natural resources, and energy, is brakes. Their high-wear rate means that every year an aircraft's brakes must be completely replaced. University of Toronto mechanical engineering graduate Nikola Kostic believes he has developed an alter-

native in the form of his Aeroflux Contactless Brake, which uses the principle of 'eddy current braking' to stop an aircraft as opposed to a conventional multiple-disc carbon brake that relies on friction.

His vision was born from a love of flying and the desire to increase sustainability in aerospace in a tangible way. And now Kostic's Aeroflux has been selected for 2019's James Dyson Award (JDA), an international design award that celebrates, encourages and inspires the next generation of engineering and product design students to submit a project that



solves a real world problem. Only 20 entrants are shortlisted globally.

But Kostic admits he did not pull his design out of thin air.

“With the creation of Aeroflux, we’ve taken a technology that’s been used in other applications and made dramatic improvements to finally make it feasible on commercial aircraft,” he says.

“While we’re the first to bring it into the aerospace industry, we have a proven track record to build on, and the JDA would be the last piece of the puzzle to take us from prototypes and drawings to a full scale demonstrator. The JDA would provide us the means to start knocking on the doors of the big players in the industry and prove the viability of our design without question.”

This is essentially how the Aeroflux works. A magnetic field is applied to both sides of two conductive, non-ferromagnetic discs (rotors). The rotors are keyed to the aircraft wheel and rotate through the magnetic field when the wheels are spinning. As the rotors move across the stationary magnetic field, small circular electric currents (eddy currents) are



Above: Aeroflux contactless brake.

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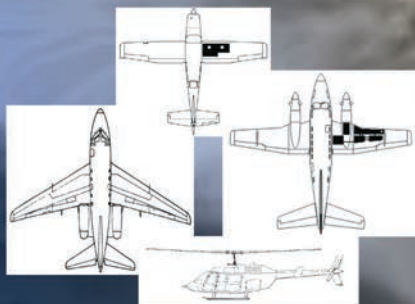
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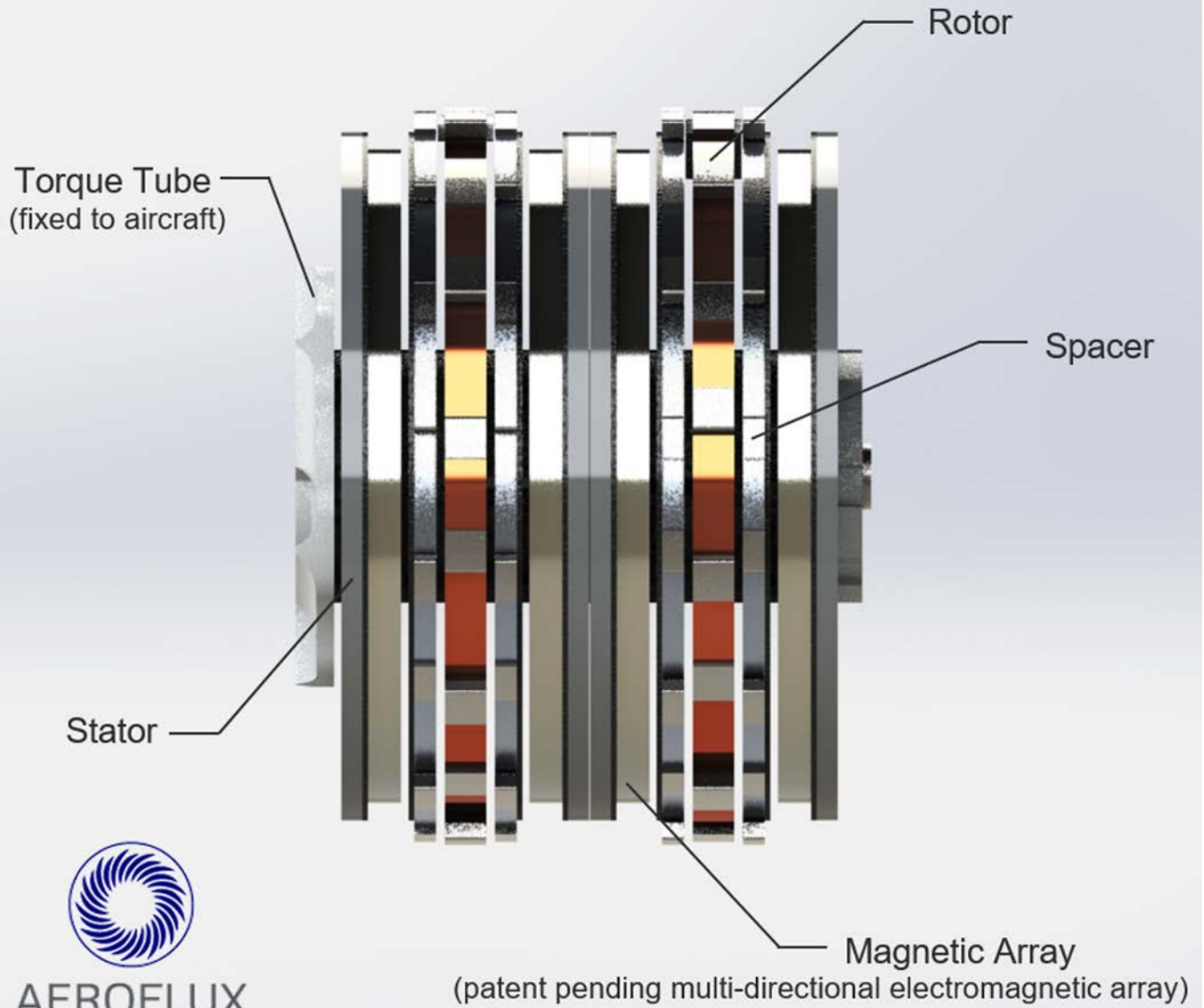
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AEROFLUX

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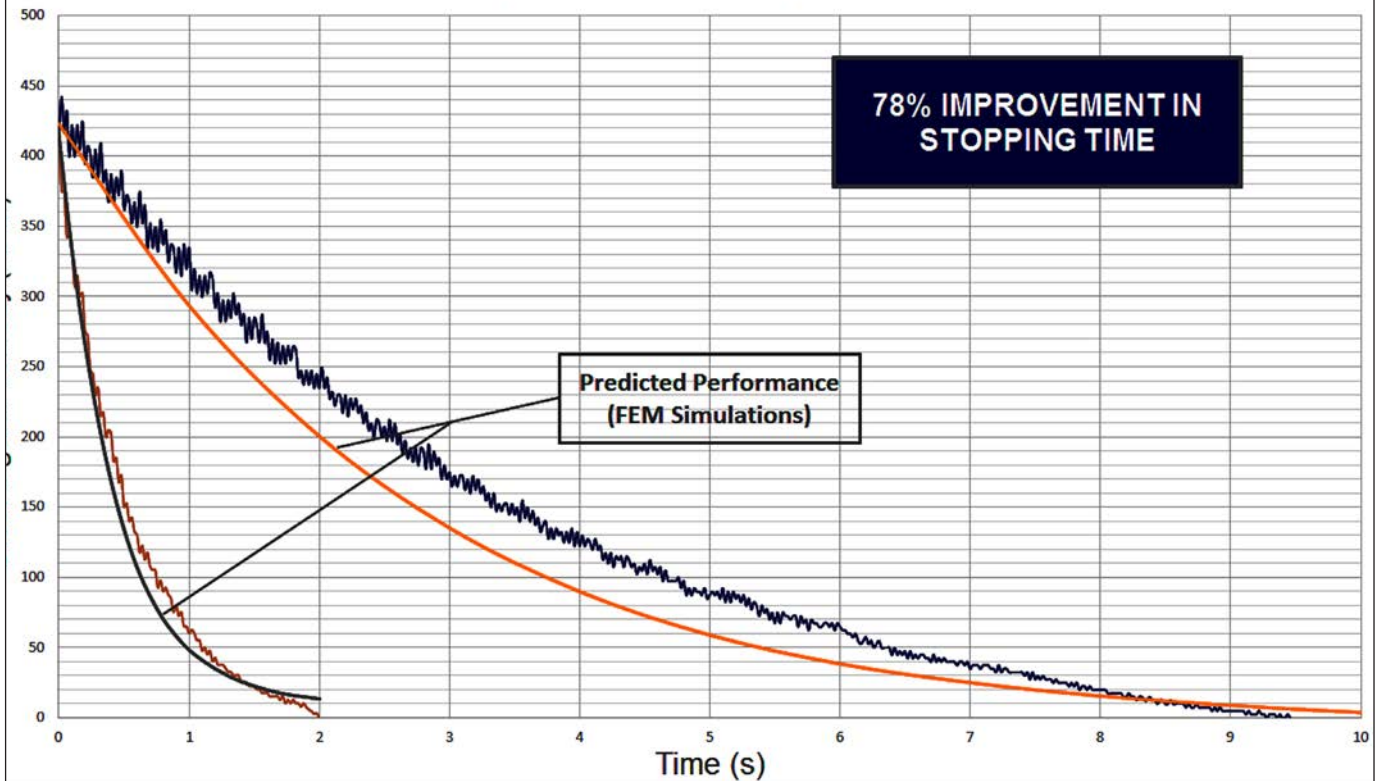
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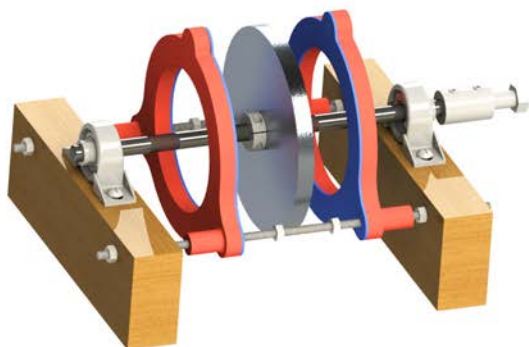


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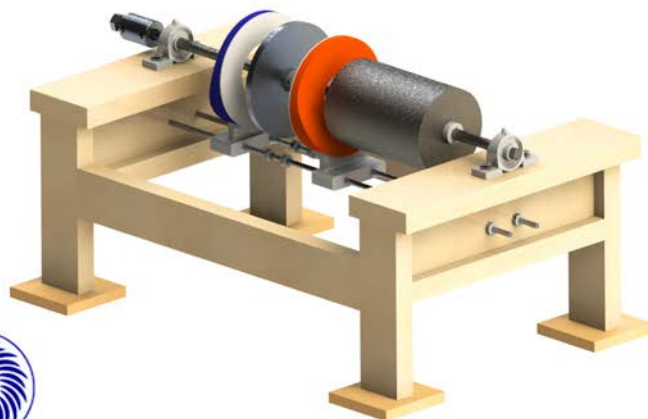
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PROTOTYPE 1



PROTOTYPE 2



AEROFLUX



INITIAL DESIGN



FINAL DESIGN

Above: As a follow-up to the concept phase of development, prototypes and initial designs for the AeroFlux were determined and finalized. Below: Features of the AeroFlux braking system, noting how AeroFlux can be integrated into an aircraft's components and its maintenance regimen.

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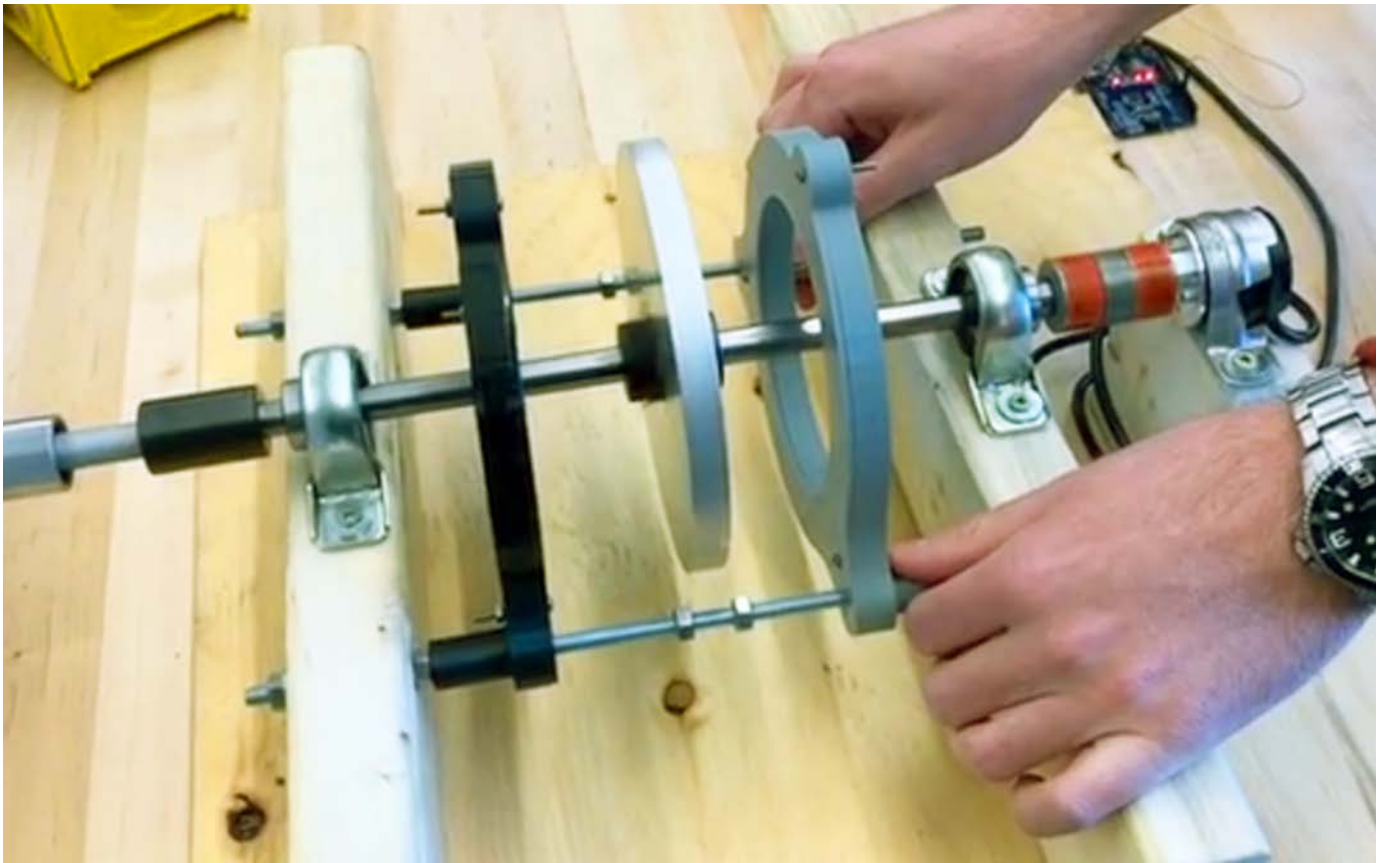
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**Above: The Aeroflux at work.**

induced in the rotors according to Faraday's law of induction, which is a basic law of electromagnetism predicting how a magnetic field will interact with an electric circuit to produce an electromotive force (EMF)—a phenomenon called electromagnetic induction.

The eddy currents primarily circulate on the surface of each rotor. According to Lenz's law (stating that the direction of an induced current is always such as to oppose the change in the circuit or the magnetic field that produces it), the eddy currents generate their own magnetic field in a direction that opposes the stationary magnetic field.

The interaction of these fields applies a drag force on the rotors that results in a braking torque. The torque produced is proportional to the angular velocity of the wheel. The kinetic energy of the aircraft is converted into heat through the electrical resistivity of the metal rotors. The particular method of generating the magnetic field and its exact distribution is patent pending.

Kostic says he developed this design as a capstone project in his final year as

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a mechanical engineering undergraduate. “My design was ultimately chosen by my capstone team as the final design for the project,” he says. “[But] I did not limit myself based on the constraints of existing brakes, which would have prevented me from developing a conceptually different brake design. Instead, I started from a blank slate.”

To push for design creativity Kostic used a variety of conceptual methodology including the TRIZ method that draws on the past knowledge and ingenuity of thousands of engineers to examine patterns of system evolution and speed up creative problem solving for project teams.

“By using different concept generation methods, I created a wide variety of alternative conceptual designs,” he says.

“I evaluated my alternative designs against important design objectives using an objective tree analysis and weighted decision matrix. When I made a major design decision, I always went back and checked how it impacted the satisfaction of objectives. Prototyping was critical to my design process.”

The UofT student credits his team for helping build a prototype to prove the superiority of his design compared to existing eddy current brakes. “The prototype was also used to validate finite element models that predicted the braking performance of my final design,” says Kostic. “Experimental data showed a 78 percent reduction in stopping time for the Aeroflux brake compared to existing eddy current brakes of equal volume and weight.”

So, how does Kostic’s Aeroflux differ from, say, high-speed trains that use electromagnetic disc eddy current brakes to slow down? Well, locomotive brakes require extremely powerful electromagnets that use a lot of power, are extremely heavy, and very large. This makes them impossible to use on an aircraft, where space in the landing gear bay is incredibly constrained and weight savings are paramount to fuel efficiency.

“The key to my design is a patent pending electromagnetic array that creates a very specific magnetic field distribution across the discs,” says Kostic.

“The magnetic field is distributed in just the right way so as to concentrate magnetic flux in areas of the disc that result in the greatest constructive interference between circulating eddy currents.

“This results in a much higher eddy current density in the disc and therefore a larger braking torque. This technology means that my design uses almost no power, weighs only slightly more, and fits within the exact same envelope as a conventional aircraft brake.” ■

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# Punch Test Failure

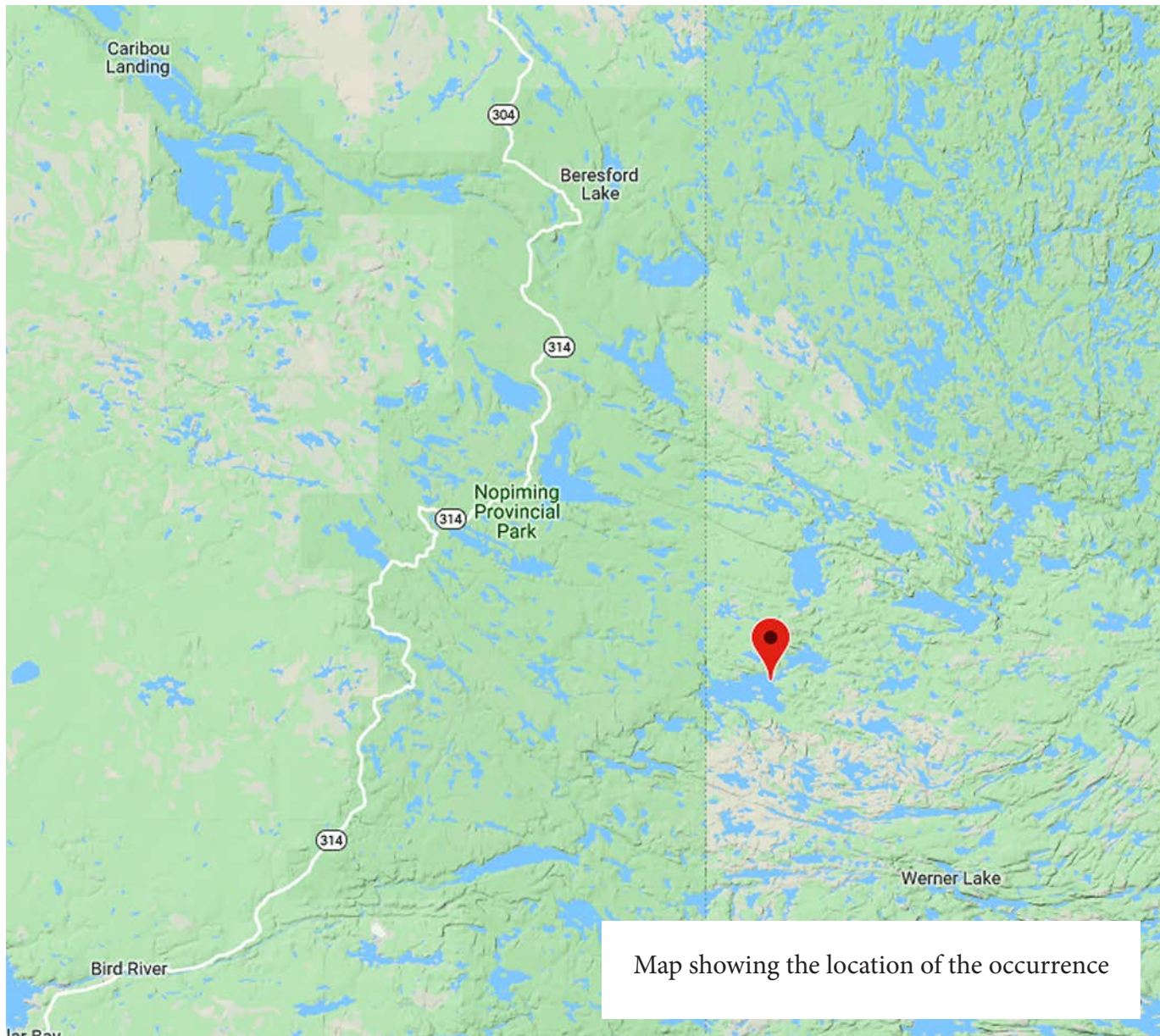


Investigators track down a failed wing lift strut assembly.

On 30 March 2019, a privately registered, ski-equipped Piper J3C-65 aircraft (registration C-FLDQ, serial number 16839) was conducting a visual flight rules (VFR) flight from Gun Lake, Ontario, to Snowshoe Lake, Ontario, approximately 53 nautical miles (NM) northwest of Kenora Airport (CYQK), Ontario, with the pilot and 1 passenger on board. The purpose of the flight was to transport the passenger to a hunting and fishing outpost lodge to complete some renovations. The passenger was an employee of the pilot, who owned both the aircraft and the lodge.

On arrival at Snowshoe Lake, at approximately 1319, the pilot conducted a low pass from a north-northwest direction, near the outpost lodge, to advise lodge guests of their arrival. During the low pass, control of the aircraft was lost and the aircraft struck the frozen surface of the lake. Bystanders at the lodge responded immediately and called for emergency services. The pilot was fatally injured. The passenger received serious injuries and died 6 days later. The aircraft was destroyed; there was no post-impact fire. The aircraft was not equipped with an emergency locator transmitter (ELT), though one was required by regulation.





Map showing the location of the occurrence



# AirMaintenance UPDATE

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## Aircraft information

The occurrence Piper J3C-65 was a single-engine, high-wing, 2-place (tandem) airplane with a conventional landing gear and was manufactured by the Piper Aircraft Corporation in 1946.

The aircraft was later modified with a Continental C90-12F engine and was equipped with skis for operation on snow and ice surfaces. It had a total fuel capacity of 12 U.S. gallons and was certified for day-VFR operations only.

The occurrence aircraft was subject to U.S. Federal Aviation Administration Airworthiness Directive (AD) 2015-08-04, which required inspection of the main spar wing lift strut assemblies for corrosion.

The AD became effective in June 2015 and is required to be complied with every 24 months. A review of the aircraft's maintenance records did not find any record of compliance with AD 2015-08-04.

## Weight and balance

The aircraft had an empty weight of 741 pounds and a maximum take-off weight of 1220 pounds (on skis). The investigation was unable to determine how much fuel was on board the aircraft at the time of the accident.

A review of the aircraft empty and operational weight and balance determined that the aircraft was operated within the specified weight and centre of gravity limitations.

## Pilot information

The pilot held a Canadian commercial pilot licence – aeroplane, which had been issued on 04 September 1990, and a valid Category 3 medical certificate. Information gathered during the investigation indicated he had accumulated approximately 3000 hours total flight time, of which approximately 2500 hours were on the occurrence aircraft. Records indicated that the pilot was certified and qualified for the flight in accordance with existing regulations.

## Weather information

The aerodrome routine weather report (METAR) issued at CYQK—the nearest source of aviation weather, located 53 NM southeast of Snowshoe Lake—indicated that the weather at 1300 (approximately 19 minutes before the accident) was as follows:

- winds from 320° true (T), varying from 280°T to 360°T, at 12-19 knots;
- visibility 15 statute miles;
- few clouds at 4300 feet above ground level (AGL) and broken ceiling at 7200 feet;
- temperature -4C

The weather was not considered a contributing factor in the occurrence.

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## Wreckage examination

The aircraft struck the frozen surface of the lake in an inverted position and at a shallow angle, with a high rate of vertical descent and at high forward speed. The aircraft came to rest in an upright position approximately 125 feet from the initial point of impact, facing north.

The pilot flew the aircraft from the front seat and the passenger was seated in the rear of the aircraft. Only the front seat was equipped with a flight control stick. The aircraft was equipped with front and rear lap belts, and did not have the rear passenger seat installed. The investigation determined that the pilot and passenger were not wearing their lap belts at the time of the occurrence. The aircraft was loaded with miscellaneous items that had not been secured.

An inspection of all flight control cables did not reveal any pre-impact anomalies. Damage to the engine and propeller suggests that the propeller was rotating and that the engine was producing substantial power at the time of impact.

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Above: Piper J3C-65 aircraft on the ground.

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An inspection of the airframe at the site revealed that the left main spar wing lift strut assembly separated near the lower fork end attachment. A visual examination of the wing lift strut assembly revealed excessive corrosion in the area of the separation. The failed wing lift strut assembly was sent to the TSB Engineering Laboratory in Ottawa for further analysis.

The aircraft wing structure consists of a front and rear aluminium spar, aluminium leading edge and several aluminium rib assemblies, and is covered in fabric. The wings are attached to the top of the fuselage structure and supported approximately mid-span on each wing by front and rear wing lift strut assemblies. The wing lift strut assemblies are attached from the lower fuselage structure to each front and rear spar assembly of the wing. Wing lift struts transfer flight loads to the wings and are in tension during flight. The wing lift struts are in compression when the aircraft is on the ground.



The TSB analysis of the failed wing lift strut assembly revealed that the failure was initiated by excessive corrosion and thinning of the load-bearing wall inside the wing lift strut, followed by fatigue and overload failure ... a punch test prescribed in the MSB 528D states that if the test procedure creates a perceptible dent, the wing lift strut assembly metal is corroded beyond specified limits ...

The Piper J3 series of aircraft was originally manufactured with wing lift struts equipped with 3/8-inch threaded fork ends. However, shortly after, the wing lift strut fork ends were increased in size to 7/16-inch threaded fork ends. Both types of wing lift struts were made of carbon steel and open at either end when the fork ends are removed. The occurrence aircraft was equipped with open-ended wing lift struts and 7/16-inch threaded fork ends.

In 1989, new sealed carbon steel wing lift strut assemblies were manufactured using 5/8-inch threaded fork ends. Installation of the new sealed wing lift strut assemblies terminates the recurring 24-month inspection requirement of AD 2015-08-04.

## Wing lift strut examination

The TSB Engineering Laboratory's analysis of the failed wing lift strut assembly revealed that the failure was initiated by excessive corrosion and thinning of the load-bearing wall inside the wing lift strut, followed by fatigue, and eventual overload failure. AD 2015-08-04 stipulates that either a punch



Left: Damage on the upper half of the left main spar wing lift strut assembly. Above: Result of the failed wing lift strut assembly.

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test method outlined in the Piper Mandatory Service Bulletin (MSB) 528D or an ultrasonic method described in the AD itself may be used to inspect the wing lift strut assemblies to satisfy its requirements. If either of these tests identify significant corrosion, the AD requires that the wing lift strut assembly be replaced. The AD also allows for the replacement of the wing lift strut assembly instead of conducting one of the two permissible inspection methods.

The TSB Engineering Laboratory conducted further examination of the failed wing lift strut assembly and completed the punch test inspection prescribed in the MSB 528D, which states that if the punch test procedure creates a perceptible dent using a punch tester, then the wing lift strut assembly metal is corroded beyond specified limits and the wing lift strut assembly is to be replaced before further flight.

If no perceptible dent is evident then the wing lift strut assembly can remain in service. Representatives of Piper Aircraft Inc. and Transport Canada (TC) observed the tests. Several punch tests were completed in areas immediately surrounding, and further from, the fractured area on both the lower and upper halves of the failed wing lift strut assembly.

The alternative inspection method described by the AD is the ultrasonic method. Whereas the typical thickness of a wing lift strut assembly wall is between 0.034 and 0.041 inch, the ultrasonic inspection procedure specifies that wall thickness measurements of 0.024 inch or less require replacement of the wing lift strut assembly prior to flight.

Although an ultrasonic inspection was not completed

on the failed wing lift strut assembly, an examination using a scanning electron microscope was accomplished to take accurate measurements of wall thickness. This examination determined the following:

- the heavily corroded area on the lower half of the failed wing lift strut assembly had a remaining wall thickness between 0.002 and 0.019 inch, well below the required minimum. Punch tests applied to this area revealed one perceptible dent.
- the corroded area of the upper half of the failed wing lift strut assembly had a remaining wall thickness between 0.021 and 0.031 inch; therefore, some areas were below the required minimum. Punch tests applied to these areas did not produce any perceptible dents.

### Safety action taken

On July 31, 2019, the TSB issued a safety advisory to regulators and the manufacturer of the occurrence aircraft advising them of the risk associated with the use of the punch test method mentioned in AD 2015-08-04 and prescribed in the MSB 528D.

*(These are excerpts from the Transportation Safety Board of Canada's investigation report into this occurrence. The Board authorized the release of this report on 18 September 2019. It was officially released on 08 October 2019.)* ■

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## Flash and Dash

### Mirabel-outfitted 407GXi arrives in Nova Scotia

In mid-November Bell Textron announced the delivery of Canada's first 407GXi to Nova Scotia-based business, Municipal Enterprises Limited. The aircraft is outfitted in newly certified on-board equipment and features a custom designed interior. Municipal Enterprises Limited will use the aircraft for various purposes among its group of companies.

"We are excited to take delivery of the Bell 407GXi, and we are confident the aircraft will provide customers with an enhanced travel experience," said Harold Johnson, vice president, Municipal Enterprises Limited. "The Bell 407GXi provides improved pilot awareness, higher precision navigation, enhanced engine controls, and improved in-flight connectivity to smartphones and tablets. It's a great addition to our business in eastern Canada."

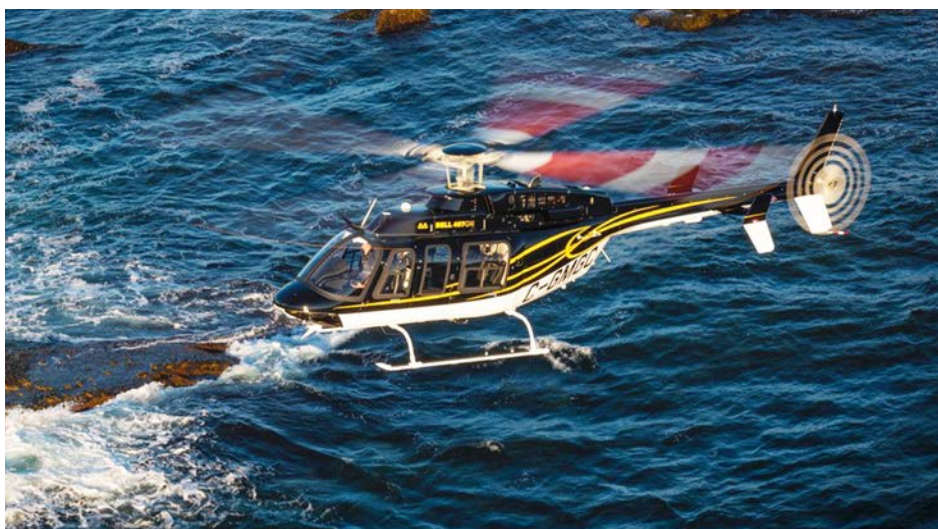
In 2018, Bell introduced the enhanced Bell 407 platform at the Helicopter Association International's annual Heli-Expo. The Bell 407GXi features the Garmin G1000H NXi integrated flight deck and a new Rolls-Royce M250-C47E/4 engine with dual channel FADEC, which delivers better high and hot performance, full automatic relight, and the ability to cruise at 133 knots.

"The Bell 407GXi delivers a more robust customer experience while providing best-in-class speed, performance and reliability," said, Susan Griffin, executive vice president, Commercial Business. "Canada is home to Bell's final assembly centre for all current commercial aircraft, and we are proud to have completed and delivered Municipal Enterprises Limited's customized Bell 407GXi at our Mirabel facility."

Since 1986, Bell has assembled and delivered more than 5,000 helicopters from its Mirabel facility and employs 1,200 personnel across Canada. More than 1,000 Bell aircraft operate in Canada including those with

the Royal Canadian Air Force and the Canadian Coast Guard.

Additional options for the 407GXi include the Garmin FlightStream 510 that allows pilots to upload flight plans from smart devices, Garmin SurfaceWatch that provides runway identification and alerting technology, a 3,100-pound. cargo hook, and Health Usage Monitoring (HUMS) for aircraft system diagnostics. ■



Above: Bell 407GXi. Below: GXi-Interior.



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