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AirMaintenance UPDATE

The Magazine for Aircraft Maintenance Professionals

AMO performance vs. Air Operator requirements

Suitable alternatives to Hard Chrome

Transport Canada Approved for R/T

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Tutor project makes public appeal

Few aircraft in Canadian history illicit the emotional wow factor of the Canadian built and flown CT-114 Tutor jet. These jets have flown as trainers in the RCAF from 1967 to 2000 and have been used as the flight demonstration aircraft for the Canadian Forces (CF) Snowbirds, 431 Air Demonstration Squadron since 1970.

In late 2018, the Jet Aircraft Museum (JAM) at London Airport was offered for sale a Tutor jet, located in Campbellford, Ontario. The museum has had the aircraft reviewed by a licenced Aircraft Maintenance Engineer and has confirmed that the aircraft, though needing restoration, can be returned to flight readiness. Several companies have already covered the cost of shipping the aircraft from Campbellford to London.

JAM's mission statement is to keep Canadian history alive by restoring and flying multiple former Canadian Air Force jet aircraft. The facility also educates the next generation to learn more about aviation history and science.

But now JAM is appealing for donations to purchase the jet, after which volunteers and members will work to bring it back to its former self. A Go Fund Me page has been established with the goal of raising $60,000. JAM intends to restore the airplane back to flyable condition and repaint it into a historical livery commemorating the Royal Canadian Air Force.

So if you're feeling in a giving mood and think it might be fun or worthwhile to participate in a historical restoration project, then simply follow this link:

https://www.gofundme.com/help-jam-acquire-a-ct114-tutor ■

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Features

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AirMaintenance Update

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Upcoming Events

Former AME will enter Canada's Aviation Hall of Fame

This spring, Canada's Aviation Hall of Fame will honour five individuals who have made outstanding contributions to Canadian aviation. Among them are two fighter pilots of the Second World War who continued in aviation development for the rest of their lives. Also entering the hall in the class of 2019 is a former AME, Barry Paul Lapointe.

Born in Vancouver, BC, in 1944, Lapointe graduated with honours from the British Columbia Institute of Technology in Aircraft Maintenance Engineering in 1966. After two years in the aviation industry, he founded Kelowna Flightcraft, now known as KF Aerospace, and is credited for developing this firm into one of the largest Maintenance, Repair and Overhaul operations in the world, dedicated to military training, charter operations and commercial delivery.

In 1974, Lapointe launched KF Air Charter and from 1976 to 2015 KF operated nearly 20 aircraft carrying cargo daily across Canada for Purolator and Canada Post. Today, nearly 80 percent of the pilots who obtain their air force wings pass through the doors of the KF training facility at Portage La Prairie, Manitoba.

Lapointe earned his pilot's licence at age 16 and by 21 held a commercial pilot's licence. Chairman and CEO of KF Aerospace, Lapointe has 17,000 fixed wing flight hours, and in 2016 he added a helicopter licence to his qualifications. Among his many awards, in 2015 he received the Order of British Columbia.

The 2019 inductions will bring to 237 the number of Canadians who have been installed as members of the Hall of Fame, which is located at the Reynolds-Alberta Museum in Wetaskiwin, Alberta.

Central AME Association Conference
February 27-28, 2019
Winnipeg, Manitoba
www.camea.ca

HAI Heli-Expo 2019
March 4-7, 2019
Atlanta, Georgia
www.rotor.org/Home/HELI-EXPO

Yuma Air Show
March 8-9, 2019
Yuma, Arizona
www.yumaairshow.com

California International Air Show
March 23-24, 2019
Salinas, California
www.salinasairshow.com

AEA International Convention & Trade Show
March 25-28, 2019
Palm Springs, California
http://www.aea.net

Atlantic AME Association Conference
April 24-26, 2019
Moncton, New Brunswick
www.atlanticame.com

If you have any upcoming events you'd like to see listed, contact AMU's editor, John Campbell, at: amu.editor@gmail.com

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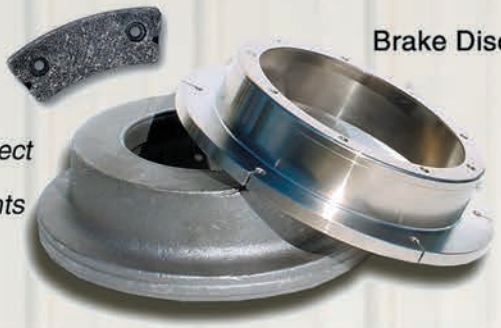

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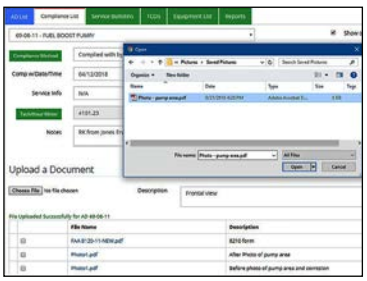


Tdata, Inc. has released its IA7 Advanced Airworthiness System for the web. IA7 has many new features and evolved from Tdata's 30 years experience with creating software for aviation maintenance and Airworthiness Directives research and reporting. IA7 is cloud based and can be used on Mac, PC or Tablet. Users can attach documents and photos to AD and aircraft records for complete recordkeeping as well as fill out and manage FAA forms. Tdata has designed IA7 for customers ranging from single users to company wide deployment. **For information visit** www.Tdata.com

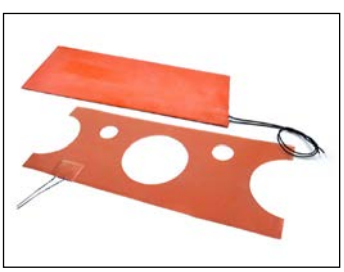
Cable scissors slits PVC and cuts foil

Xuron Corporation now offers an industrial-duty, ergonomic scissors that cuts cable jacketing, foil, and other non-aramid fibers and eliminates the bulky finger loops associated with conventional scissors.

The Xuron 440 Mini-Scissors features the mechanical leverage found in pliers, precise cutting tips, soft rubber handles, and an internal return spring. Creating a clean cut instantly, this product was developed for electronics assembly and field service personnel.

For information visit www.xuron.com

Silicone blankets provide freeze protection



BriskHeat has announced additions and improvements to its silicone heating blanket line, including features such as built-in temperature control, custom cutouts, and configurability to nearly any shape, size and power. Silicone blankets are versatile surface heaters used for freeze protection, process control, viscosity control, and condensation prevention. They're common in nearly every industry, including petrochemical, aerospace, medical, general manufacturing, plastics, food processing, and power generation.

For more information visit www.briskheat.com

Filtration systems offer high efficiency rate

KADEX Aero Supply is now distributing Donaldson filters, with an extensive variety of filters for rotorcraft, general aviation, and regional airlines. Donaldson filtration systems are easy to install and maintain, and are rated to last 500 hours, which is five to ten times longer than foam filters. These filtration systems are said to offer 98.5 percent or greater filtration efficiency.

For information visit www.kadexaero.com

Robot automates MRO processes

Invert Robotics' remote-controlled climbing robots provide efficiency improvements for airlines and the aircraft maintenance repair and overhaul (MRO) sector. A patented suction mechanism enables the robots to adhere to and traverse aircraft surfaces, even when they are wet or upside down. A high-resolution inspection camera records and transmits video images to a ground-based screen for analysis. Many labour-intensive MRO processes can now be automated with the addition of ultra-sound and thermographic technology to the robots.

For more information visit www.conv.co.nz

Scimitar prop approved for Cessna 180/182 fleets

Hartzell Propeller has received a Supplemental Type Certificate (STC) for its two-blade aluminum Scimitar propellers for Cessna 180/182 aircraft. The new swept aluminum two-blade 82-inch diameter propeller has higher180/182 climb performance and is faster in cruise at lower altitudes. Models covered by the STC include Cessna 180 through 180J and Cessna 182s through 182P, and F182P. **For information visit** www.hartzellprop.com

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BOEING PLANS TO RECYCLE COMPOSITE WASTE

Boeing and ELG Carbon Fibre recently announced a partnership to recycle excess aerospace-grade composite material, which will be used by other companies to make products such as electronic accessories and automotive equipment. The agreement covers excess carbon fibre from 11 Boeing airplane manufacturing sites and will reduce solid waste by more than one million pounds a year.

Boeing and ELG conducted a pilot project where they recycled excess material from Boeing's Composite Wing Center in Everett, Washington, where the massive wings for the 777X airplane are made. ELG put the excess materials through treatment in a furnace, which vaporizes the resin that holds the carbon fibre layers together and leaves behind clean material. Over the course of 18 months, the companies saved 380,000 pounds of carbon fibre. Boeing and ELG are considering expanding the agreement to include excess material from three additional Boeing sites in Canada, China and Malaysia.

A220 AIRLINER WINS ETOPS APPROVAL

The Airbus A220, has received 180-minute extended operations (ETOPS) approval from Transport Canada, paving the way for A220 customers to start new direct non-limiting routings over water, remote or underserved regions. It is the first commercial airliner to obtain domestic ETOPS certification from Transport Canada.

This capability is available as an option for A220-100 and A220-300 operators, enabling them to fly for up to 180-minutes from the nearest diversion airport. Featuring Pratt & Whitney's latest-generation PW1500G geared turbofan engine, the A220 has a range of up to 3,200 nautical miles (5,920 km), and offers the performance of larger single aisle aircraft.

MOUNTIES GET THEIR AIRBUS

Airbus has delivered Canada's first H145 helicopter to the Royal Canadian Mounted Police's Air Support Unit, which will utilize the versatile twin-engine H145 helicopter for a variety of missions. It will support tactical deployments day and night over land and water for the Emergency Response Team, expand options in the area of fast roping and hoisting, assist with missing persons investigations and add capabilities to search and rescue operations. The aircraft will be based in British Columbia's Lower Mainland facility in Langley, and will support operations throughout the province.

The H145 has been equipped with a wide variety of mission specific equipment including external hoist and rope down device (for one or two persons), Trakka A800 searchlight, Enhanced Reality System, Health Monitoring System (HMS), FLIR, Night Vision Goggles, Tactical Flight Officer (TFO) workstation and internal long-range fuel tank.

GULFSTREAM SETS CITY-PAIR RECORD ON RENEWABLE FUEL

Gulfstream Aerospace used alternative jet fuel (SAJF) to power a record-breaking flight by its class-leading super-midsize Gulfstream G280 aircraft. The Savannah, Georgia-to-Van Nuys, California, journey in January covered 2,243 nautical miles/4,154 kilometres in four hours and 49 minutes at an average speed of Mach 0.85. Flying through headwinds averaging 76 knots, the G280 demonstrated the aircraft's continued high performance with SAJF. The city-pair record was part of an industry event designed to promote the development and adoption of SAJF, Business Jets Fuel Green: A Step Toward Sustainability. Gulfstream has used a 30/70 blend of low-carbon, drop-in SAJF and Jet-A in daily operations at its Savannah headquarters since 2016.

EMBRAER FAVORS CHALLENGE TO BOMBARDIER SUBSIDIES

Embraer says it welcomes Brazil's filing of a written submission to the dispute settlement panel at the World Trade Organization (WTO) in Geneva, where the panel is examining more than USD $4

billion in subsidies that Bombardier received from the Governments of Canada and Quebec.

In 2016 alone, these governments provided over USD $2.5 billion to the Canadian aircraft manufacturer. The submission provides detailed legal and factual argument regarding why the 19 subsidies to Bombardier for its C-Series aircraft (now renamed as the Airbus A-220 aircraft) are inconsistent with Canada's WTO obligations.

"Canada's subsidies have allowed Bombardier (and now Airbus) to offer its aircraft at artificially low prices," said Paulo Cesar de Souza e Silva, Embraer's President & CEO. "These subsidies, which have been fundamental in the development and survival of the C-Series program, are an unsustainable practice that distorts the entire global market, harming competitors at the expense of Canadian taxpayers."

TEXTRON AVIATION EXPANDS INTO ALBERTA

Textron Aviation Inc. announced it has established Textron Aviation Canada, Ltd., a new wholly owned subsidiary focused on expanding the company's service network. The first phase of the expansion includes the acquisition of assets of Aspect Aircraft Maintenance, Inc., an aircraft maintenance and repair provider in Calgary, where a Textron Aviation Mobile Service Unit (MSU) currently operates, and a new MSU base in Toronto.

The Calgary MSU operates as part of the Approved Maintenance Organization (AMO) certification, approved to perform maintenance and repairs on Citation, King Air and Hawker aircraft. As part of the acquisition, the MSU team based at Calgary International Airport will grow in the number of technicians and expand its capabilities to deliver AOG support and limited inspection items and engine maintenance.

TC APPROVES PT6-A CYCLE LIMIT INCREASES

Pratt & Whitney Canada announced it has received approval from Transport Canada to increase cycle limits on its PT6A-140, -140A and -140AG engines. These increases – made possible through comprehensive parts testing and model analyses – will extend the life of Low Cycle Fatigue (LCF) parts such as the power and compressor turbine disks and the impeller.

The cycle limits for the PT6A-140-series engines have now been increased by up to 60 percent for the following parts: from 12,000 cycles to 16,000 cycles for the power turbine disk, from 10,000 cycles to 16,000 cycles for the compressor turbine disk and from 19,000 cycles to 29,000 cycles for the impeller. Also as it pertains to the power turbine disk, the number of abbreviated cycles needed to count as a full cycle has increased from two to five.

BOEING FLIGHT TESTS PAV PROTOTYPE

Boeing completed the first test flight of its autonomous passenger air vehicle (PAV) prototype in Manassas, Virginia during the month of January. The prototype completed a controlled takeoff, hover and landing during the flight, which tested the vehicle's autonomous functions and ground control systems. Future flights will test forward, wing-borne flight, as well as the transition phase between vertical and forward-flight modes.

Powered by an electric propulsion system, the PAV prototype is designed for fully autonomous flight from takeoff to landing, with a range of up to 50 miles (80.47 kilometres). Measuring 30 feet (9.14 metres) long and 28 feet (8.53 metres) wide, its airframe integrates the propulsion and wing systems to achieve efficient hover and forward flight. ■

Specialized maintenance:

BY LLOYD TAYLOR

A discussion on the regulations that govern specialized maintenance, and who gets to sign off on what.

Opposite page and above: Acknowledging the distinction between maintenance arrangements for an AMO (performance) versus maintenance arrangements for an Air Operator (requirements) by looking at a part repaired by a welding shop.

AMO versus Air Operator

For this issue, I wanted to bring forward an ongoing challenge that has recently resurfaced. This relates to the maintenance arrangements requirements as well as signing responsibilities regarding repaired parts. There is an important distinction between maintenance arrangements for an AMO (performance) versus maintenance arrangements for an Air Operator (requirements).

As an example, we will talk about a part repaired by a welding shop. This came to light because the operator (the recipient of the part) was unable to produce an Authorized Release Certificate for the repaired muffler. The installer, an aircraft-rated AMO, was only able to provide a certificate of conformity from a non TC- approved welding shop (not an AMO) for the welding repair, but no release certificate (Form One).

The two questions that surfaced from this scenario are:
1. Is this type of welding repair considered specialized work?
2. If it is not, how could a Form One (a maintenance release) be produced for such repair, and by whom?

The first question if fairly easy to answer – this is not considered specialized work. Here are the regulatory references:

Specialized Maintenance

571.04 *No person shall perform the specialized maintenance set out in Schedule II to this Subpart on an aeronautical product other than an aircraft operated under a special certificate of airworthiness in the owner- maintenance or amateur-built classification, except in accordance with (amended 2002/03/01)*

(a) a maintenance policy manual (MPM) established by the holder of an approved maintenance organization (AMO) certificate issued pursuant to Section 573.02 with a rating of a category appropriate to the work to be performed; . . .

Schedule II
(Section 571.04)

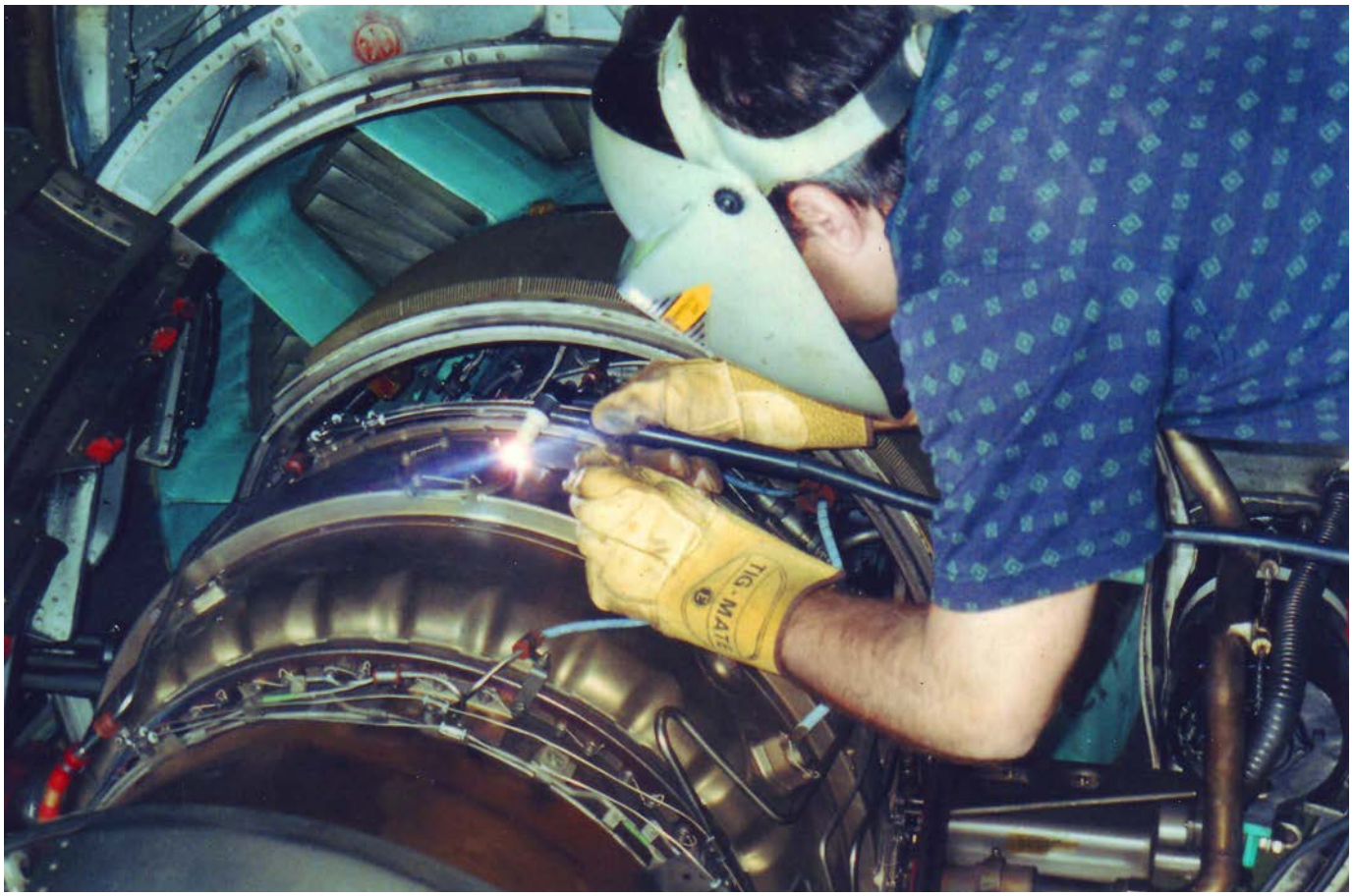
Welding

7. The welding of the following parts is welding specialized maintenance: (amended 2003/06/01)

(a) any part of the primary structure, including a wheel, an axle and a passenger restraint or cargo restraint system;

(b) any part of an aircraft system, including a fuel tank, an oil tank and a pneumatic or hydraulic reservoir; and

(c) any structural or dynamic engine part.



For the second, most important question: What are the responsibilities of the AMO installing the repaired muffler, how could a Form One be produced for such repair, and by whom? The regulatory references are: **Maintenance of Aircraft Operated under Part IV or VII (amended 2000/12/01)**

571.05 *Except in the case of a balloon, no person shall perform maintenance on an aircraft operated under Part IV or VII, or install on one of the foregoing a part that has undergone maintenance, unless the maintenance on that aircraft or part has been performed in accordance with (amended 2000/12/01)*

(a) a maintenance policy manual (MPM) established by the holder of an approved maintenance organization (AMO) certificate issued pursuant to Section 573.02 with a rating of a category appropriate to the work to be performed;

Persons Who May Sign a Maintenance Release (amended 2000/12/01)

571.11 *(1) Except as provided in subsections (2) and (7), no person other than the holder of an aircraft maintenance engineer (AME) licence issued under Part IV, specifying a rating appropriate to the aeronautical product being maintained, shall sign a maintenance release as required by section 571.10.*

(2) A person other than a person described in subsection (1) may sign a maintenance release if:

(c) in the case of maintenance performed on a part that is intended for installation on an aircraft, the person has been authorized to sign by the holder of an approved maintenance organization (AMO) certificate issued under section 573.02, and

(3) Except as provided in subsection (7), no person shall sign a maintenance release in respect of maintenance performed on an aircraft operated under Part IV or VII, or on parts intended to be installed on the aircraft, unless

(a) the person is authorized to sign in accordance with a maintenance policy manual (MPM) established by the holder of an AMO certificate issued under section 573.02 with a rating of a category appropriate to the work performed;

(6) If a maintenance release is signed by a person in respect of work performed by another person, the person signing the maintenance release must personally observe the work to the extent necessary to ensure that it is performed in accordance with the requirements of any applicable standards of airworthiness and, specifically, the requirements of sections 571.02 and 571.10.

Maintenance Arrangements

573.11 (1) Except as provided in subsection (2), no approved maintenance organization (AMO) certificate holder shall permit an external agent to perform maintenance on its behalf unless

(a) the external agent holds an AMO certificate with a rating of a category specified pursuant to Section 573.02 that is appropriate to the type of work to be performed or the aeronautical product to be maintained;

(b) where the work is to be performed outside Canada, the external agent has been authorized to do the type of work to be performed or to perform maintenance on the type of aeronautical product to be maintained under the laws of a state that is party to an agreement with Canada and the agreement provides for the recognition of maintenance functions; or

(c) in all other cases, the performance of the maintenance by the person or organization has been approved by the Minister as being in conformity with these Regulations.

(2) Subject to subsection (4), an AMO certificate holder may permit work to be performed by an external agent other than an agent described in subsection (1) where the work is performed in accordance with an arrangement that provides for it, under the direct supervision of the person appointed pursuant to Section 573.03 or 573.04 and certified by persons authorized to do

so in accordance with the approved procedures set out in the AMO's maintenance policy manual (MPM).

(3) Arrangements respecting work to be performed by external agents pursuant to subsection (2) shall be made in accordance with procedures governing maintenance arrangements set out in the MPM or, if no such procedures are set out in the MPM, shall be approved by the Minister as ensuring conformity with the requirements of this Subpart.

(4) An AMO certificate holder that requests an external agent to perform work shall:

(a) where the work is to be performed pursuant to subsection (1) or (2), be responsible for specifying the tasks to be performed by the agent and ensuring completion of the work; and

(b) where the work is to be performed pursuant to subsection (2), be responsible for ensuring the conformity of that work with the requirements of Subpart 71.

So based on these references, the "who can sign" must be an AMO that is appropriately rated for the repair in question (welding). If this AMO wishes to include an external agent (a shop) that does not hold an AMO, they must extend their AMO privileges to this "sub-contractor. This would be covered by a procedure described in their MPM, the extension of their QA System and certification privileges to the external agent, usually in the form of a Shop Certifying Authority (SCA).

Or . . . The rated AMO (for welding) can have one of their ACA or SCA individuals directly supervise the work, ensure conformity to the specified task(s) and certify the work in accordance with the procedures described in their MPM and the standards for welding.

(With our appreciation to the Atlantic AME Newsletter) ■

Chrome components:

As well as an alternative to chrome Airbus has expanded its use of carbon-based PVD coating to copper alloys; coating already approved for steel, titanium and Inconel.

Opposite: Hard chrome was not without its performance issues, including spalling under stress. Above: In many cases, chrome is used due to its low coefficient of friction.

suitable alternatives

The search for a suitable replacement to hard chrome on aerospace components has been a key supply chain priority for aircraft manufacturers. This is because of the documented health risks to workers and the impact on the environment from exposure to hexavalent chromium, a carcinogen that occurs during the chrome plating process and the most toxic form of chromium.

As a result, chromium is a highly regulated chemical in major markets worldwide. In the European Union, hexavalent chromium falls under the domain of the EU regulation, REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), which establishes guidelines for the safe use of chemicals throughout the supply chain. Chromium is also closely regulated in the United States by OSHA.

However, replacing hard chrome with a suitable alternative remains a significant challenge for the aerospace industry because of its widespread use as a surface coating on many components. Long prized for its hardness, ability to minimize sliding wear, corrosion protection and for extending the life of metal parts, it can be found on many applications such as aero structures, landing gear, engine mounts and airframes. In many cases, it is used on components where there is metal-to-metal contact between moving parts due to its low coefficient of friction.

Above: Chrome has been long prized for its hardness and ability to minimize sliding wear on many applications such as landing gear.

Above: Previously, Airbus had approved the PVD coating for use on steel, titanium and Inconel substrates.

As a result, the process of replacing hard chrome requires aerospace companies to critically evaluate why they used hard chrome in the first place and to identify what problems it was addressing as they now seek to replace it with an alternative. This is a huge undertaking as each part that currently uses hard chrome needs to be reviewed for its functionality, its connectivity to other parts, wear mechanisms, lubrication needs, and environmental operating conditions. This analysis is necessary as there is no exact replacement for hard chrome.

There is also an opportunity to achieve superior performance as replacements to hard chrome are evaluated. Despite its widespread adoption, hard chrome was not without its performance issues which include limits to its hardness and corrosion protection, difficulties with applications in recesses and threads, and the risk of pitting and spalling (flaking) under high stress conditions.

One alternative that is increasingly being utilized in the aerospace industry is PVD coating, a strong non-hazardous, REACH-conforming replacement option to hard chrome. Physical vapor deposition (PVD) coatings offer many of the same benefits and, in some ways, are superior to hard chrome.

Physical vapor deposition describes a variety of vacuum deposition methods that can be used to produce thin coatings. PVD is typically used to coat components at relatively low coating temperatures of 160-500C. These temperatures are ideal because they are below the tempering temperature of steels so as to avoid altering the fundamental material properties.

Among the PVD options are several carbon-based coatings available that provide a unique combination of extreme surface hardness, low friction coefficient and anti-corrosion properties. One example, BALINIT C from coatings provider Oerlikon Balzers, has attracted the attention of some of the largest aerospace manufacturers in the world, including Airbus.

In November, Airbus announced it was expanding the use of BALINIT C to include copper alloys – a substrate commonly used for bearings and bushings in aircraft landing gear and its connectivity to an airframe. Previously, Airbus had approved the PVD coating for use on steel, titanium and Inconel substrates.

The technical qualification of BALINIT C, as a non-hazardous and REACH-conforming option to hard chrome plating, completes the Airbus Industrial Qualification Process for production centres at Oerlikon Balzers UK and Oerlikon Balzers France.

"Airbus has confirmed that our BALINIT C coating meets their technical and industrial requirements," said Oerlikon Balzers Global Aerospace Segment Manager Toby Middlemiss.

Oerlikon Balzers uses a mixture of metal and diamond-like carbon to create BALINIT C, a tungsten carbide/carbon (WC/C) coating. The coating applies to a thickness of one to five microns enabling its use on roller bearings and landing gear parts. It creates a bright finish and with the uniformity of this coating, the need for post-finishing is eliminated saving time and money. This is a distinct advantage over hard chrome, which needs to be ground back to tolerances and polished to achieve a uniform finish.

BALINIT C offers a stronger adhesion to metal substrates than hard chrome, a high load bearing capacity, and a high level of resistance to scuffing (adhesive wear) and because of its low friction coefficient; it reduces pitting and fretting corrosion on sliding or moving parts on an aircraft such as those found in actuators, flap track systems and pumps. This makes the coating ideal for low lubrication and even dry running applications.

Bearings are another component that suffer from disproportionately distributed abrasive wear. The coating is particularly suitable for case hardening as well as ball- and roller-bearing steels because it can be applied at temperatures below 200C. The coating can be applied not only to inner and outer races and cylinders but also to the balls in ball bearings in a uniform coating thickness of 0.5-1 micrometres. The slight increase in roughness is offset by the good burnishing qualities of the coating, which smooth the raceway of the inner and outer rings, providing additional protection against scuffing and pitting.

With the increasing adoption of PVD coatings by industry leaders such as Airbus, the opportunity to eventually eliminate hard chrome entirely from the aerospace industry is becoming more certain.

"It has been a big task for the aerospace industry to replace hard chrome because it isn't as easy to find an exact replacement – every alternative will be a bit different," says Middlemiss. "So, manufacturers have had to go back to the drawing board and evaluate why hard chrome was used in the first place, what the application is and what the suitable alternatives are that might work."

"It will continue to take a rigorous, evidence-based evaluation surface-by-surface, component-by-component to ensure that safety, performance, reliability and cost criteria are all addressed," adds Middlemiss. ■

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Western AME Association

A Wager on Wages

Since becoming the president of an association that lobbies for the interests of a segment of the working class, I have taken a keener notice of events that have an impact on workers in Alberta. One development that seems to have attracted the most attention, and the most controversy, is the change to the minimum wage on October first to $15 an hour province-wide.

On June 26 of this year, General Electric, the last original component of the Dow Jones was removed from the index and replaced with Walgreens, a retail giant. Just as big box stores seem to pop up and dominate the physical landscape, so too do they show their presence on the stock market. Walgreens has set up shop on the Dow alongside Walmart, Home Depot, and McDonald's, a setting familiar to any suburban shopper.

What isn't seen is the once proud American auto industry; the last carmaker was delisted in 2009. Most oil companies have vanished as well with only the Exxon listed after the super merger with Mobil Oil. The other heavy industries are gone too, from Bethlehem Steel to Amalgamated Rubber; the 30 biggest publicly traded companies in America are completely different than those of the recent past.

Massive retail has also become the largest employer in America by far. In a country where once the largest employer was GM with highly paid union jobs and retirement and benefit plans, the largest employers now are Walmart, Amazon, Kroger, and Home Depot whose employees can expect to take home between $20-30,000 a year on average. Despite the differential in pay scales, the workers in the past possessed fewer marketable skills and had less education than those of today. They did, however, benefit from living in a different era, a time where the value of labour was appreciated, and having a job, any job, was worthy of a respectable wage.

Rewind a little further back and this was not always the case. Before the labour movement in the industrialized world, there was no middle class, only the elite and the working poor. For those toiling in the coal mines or the cotton fields, the elite did not seem to think they deserved more than sustenance wages. After all, they had their lot in life, and a great deal of that was due to the decisions they made, their capabilities, and the class they were born into. They did not do anything to earn a higher standing in society.

Today, the coal miners and quarrymen do not make up the labour market. The labourers of yesteryear are the baristas and shelf stockers of today, and the minimum wage battle is the labour movement of the 21st century. What hasn't changed is the discourse. Retail, minimum wage employees are said to not be deserving of a higher wage, their labour is diminished as that of little importance, done by people who earned their lot in life through their own choices and circumstances.

What people fail to realize is that retail work has to be done, people need work, and they will take the jobs that are available. They are every bit as deserving of a living wage as anyone else who works full time at a job that brings prosperity to their employers (largest publicly traded companies in the USA, remember?)

In this economy, we all contribute, and we should all reap the benefits. The days where huge segments of the population were made up of working poor made up a big part of history and without strong protections for the labourers of the biggest component of the workforce, we risk seeing those days again. For this reason, I give my full support to the fight for 15 movements across Canada and the USA.

— Jarrah Elhalabi, President WAMEA
(Disclaimer: Mr. Elhalabi says the preceding article is purely his opinion as an individual. It should not be construed as the policy of WAMEA or any of its directors.)

Symposium and Trade Show

The Western AME Association is pleased to announce we have confirmed the date and time of the next symposium and trade-show. You can find us at the Coast Plaza in Calgary on March 20-22, 2019 with the theme "The AME, Guardian of the Vested Interest."

Election of Directors and Officers AGM

The Western Aircraft Maintenance Engineers Association meeting for the election of Directors and Officers, and Annual General Meeting will take place during the UPDATE 2019 Airworthiness Symposium on March 21st, in Calgary.

During the first meeting the election of Directors and Officers for the New Year, April 1, 2019 to March 31, 2020 will be held. Directors elected at this meeting will take office after the adjournment of the AGM that follows. The following positions are open for nomination:

- Director (six in total)
- Other Officer positions (Treasurer, Secretary), are elected by the Directors at the first board meeting after the AGM.

If you are nominating or being nominated, be sure that the Nominating Committee receives your nomination paper before the start of the elections meeting.

Please submit completed nominations by mail to the address on the form, or fax them to the WAMEA office at 1-780-413-0076, or email them to info@wamea.com.

In the event that you are unable to attend and wish to vote by proxy through another active member, please complete and submit the proxy form. Your proxy vote may be presented at the meeting by your appointee, returned by mail to the address below, or faxed to 780-413-0076.

Nominating Committee Chairman Western AME Association
202, 5405 99 Street
Edmonton, AB T6E 3N8

www.wamea.com

AME Association of Ontario

c/o Skyservice F.B.O. Inc., PO Box 160, Mississauga, Ontario L5P 1B1
tel: 1-905-673-5681 fax: 1-905-673-5681
email: association@ame-ont.com website: www.ame-ont.com

Eye on the Future

This past year has seen some very positive synergies and coming together in the various AME associations and industry stakeholders. It is a very welcome change to see both the regulatory framework and industry aligning to create a very positive working relationship. We have seen Transport Canada reach out to us to enable and provide input for updating our out-dated governing regulations.

The industry as a whole has been given a great opportunity to be a part of this innovative process. Through the diversification of our members and the members of other like-minded associations, we look to the future to make our industry an example of best practices across our great country and globally. The Canadian Federation of AME Associations (CFAMEA) was created to bind our regional AME associations together into a cohesive working group, formed specifically for the purpose of giving a collective voice to all Aircraft Maintenance Engineers. Government and industry need a clear and powerful voice from AMEs regarding changes to aircraft maintenance.

The initiative that our regional associations have taken to work together will ensure that we will keep our regional strengths, but forge a much stronger nationwide organization.

We look forward to how all the positivity of the last year can result in prosperity and a shift toward more joint activities for all involved in the coming year.

— Submitted by Stephen Farnworth
For the Board of Directors

About Our Association

The Aircraft Maintenance Engineers (AME) Association of Ontario is one of five similar associations across Canada. These associations represent regional interests as well as concerns of national importance. The membership is comprised of AMEs, non-licenced personnel working in the industry, students and apprentices, as well as corporate members.

Central AME Association

Manitoba's 24th annual aviation symposium

(February 27-28, 2019)

Speakers at this year's symposium:

Transport Canada

- Prairie Northern Region Panel on Local Issues – Tom Bennet
- Investigations and Continuing Airworthiness – Jean Grenier

Soft Skills

- Crew Resource Management – William Grassick
- Component Reliability & Impact on Operations – Maze Hobeyn/Jazz
- Avoiding Technician Shortages / Attrition and Basic training options for developing new talent – Niel Lavoie / RRC
- Developing a Training Program – Brian Deane
- Marijuana in the workplace
- Aviation Insurance: A brief overview – Joel Wisneski
- AMOs and their Regulation – Dennis Lyons
- AME and Pilot Shortages – John Kliewer
- Health and Safety – SAFE Manitoba

Technical

- Continental Continuous Flow Fuel Injection System Adjustment – Wayne Cathers /Aero Recip
- What Does Your Overhaul Shop Often Hear? (Frequently Asked Questions) – Wayne Cathers /Aero Recip
- Marvel Schebler Aircraft Carburetors & RSA Fuel Injection Systems, maintenance and troubleshooting – Alan Jesmer /Tempest
- PT6A Hot Section Inspection Overview – Patrick Guerreiro /Standard Aero
- King Air Troubleshooting Tips and Techniques – Robert Horne / Textron Aviation Inc.
- Component Reliability & Impact on the Operation – Maze Hobeyn / Jazz

APS Brakes
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Michelin Tires

Hotel Accommodations

Special Rates are available at the Canad Inns Destination Polo Park. Call the hotel at (204) 775-8791 to make reservations. Mention the CAMEA Aviation Symposium 2019 and reference number 356181.

www.camea.ca

ATLANTIC

Atlantic AME Association

Our Objective

To provide a forum of AMEs elected by AMEs or AMEs voluntarily offering to serve on such a body, to act as a vehicle to represent the views and objectives of the AME Association (Atlantic) Inc. at any level required to preserve or alter as the case may deem necessary, the rights, privileges and legislation of AMEs as a whole.

ARAMC 2019

ARAMC 2019 will be held in Moncton, at the Delta Hotels by Marriott Beausejour, New Brunswick from April 24-26. More information will be added as it becomes available.

www.atlanticame.ca

PACIFIC

Pacific AME Association

www.pamea.ca

About Us

PAMEA is a non-profit association comprised of aircraft maintenance engineers, aircraft maintenance personnel and aviation industry corporate members. PAMEA is an active member of the Canadian Federation of AME Associations (CFAMEA).

Mission Statement

The Pacific AME Association promotes and protects the professionalism of the AME, while developing, maintaining and improving our relations with regulatory bodies affecting our industry. We represent the views and objectives of our members, while promoting proficiency through educational collaboration with other groups on matters of mutual interest.

DALLAS - FT. WORTH

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 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

PAMA SoCal Chapter

2019 Chapter Scholarships
(www.SoCalPAMA.org)

A&P Student Scholarship A&P/IA Continuing Education Scholarship
Deadline: April 1, 2019

Awards Presentation: June 11, 2019
Open to all Southern California residents currently enrolled in good standing in an accredited A&P or IA Training School/Program.

www.socalpama.org

Central Ohio PAMA

COPAMA: The first Decade

COPAMA officially incorporated as a 501(c)(3) Non-Profit Organization in 2002, with a mission of providing educational opportunities for it's members, AMT Students and the aviation community of Central Ohio. The first meetings were held in the Lane hangars and later moved to their Media Room where we currently meet.

COPAMA made its first large public appearance with a booth at the Ohio Aviation Maintenance Symposium in March 2003. June of that same year brought the first golf outing, September the first Pig Roast and Scholarship Awards. December brought the first Christmas Party at 95th Aero Squadron with a presentation about "Glacier Gal," a P-38 from the Lost Squadron that was retrieved from glacier ice in Greenland. COPAMAs first website appeared that year with Big Planet being our first web provider.

The website later moved to its current home thanks to the help of Cliff Kelling, our first internal webmaster and John Clem, a local pilot who also hosts our domain on his web service. Thanks to them the COPAMA.ORG website has increased in web traffic over these many years of operation.

www.copama.org

Farewell to THE KING

After 55 years of loyal service to this nation, the venerable old CH-124 Sea King has finally been officially retired. Here we look back on some of the history of this remarkable aircraft.

A parade held in early December 2018 in Victoria, British Columbia was the Canadian Armed Forces' final salute to the CH-124 Sea King maritime helicopter following more than five decades of service.

Based on the Sikorsky SH-3A and originally designated as the CHSS-2, but renamed the CH-124 after the unification of the Canadian military in 1968, the Sea King was officially retired from service by the end of December '18, as the RCAF completed its transition to the new CH-148 Cyclone maritime helicopter.

Over the course of its long service history, literally thousands of men and women were involved in the operations and maintenance of the CH-124 Sea King fleet. It was truly a remarkable helicopter, whose story dates back to 1956. It was in that year when Sikorsky started preliminary design work on a twin-turbine, boat-hulled helicopter concept. Shortly afterwards, the United States Navy issued a new competition for an improved anti-submarine warfare helicopter, and on March 11, 1959, the one and only prototype Sikorsky XHSS-2 Sea King made its first flight, departing from Stratford, Connecticut. Work on HSS-2 production models commenced shortly afterward and the aircraft carried the HSS-2 designation until 1962, when the SH-3A Sea King surfaced as the first of the S-61 series of military and civil helicopters. This was a large twin-engine helicopter with a single main rotor/tail rotor configuration.

The fuselage was designed to allow landing on water, in keeping with its original assignment as an ASW helicopter.

The SH-3A was 72 feet, seven inches long and 16 feet, 10 inches high with all rotors turning. The main rotors and tail folded for more compact storage aboard aircraft carriers, shortening the aircraft to 46 feet, six inches. The main rotor had five blades and a diameter of 62 feet, while the tail rotor also had five blades and a diameter of 10 feet, four inches.

The SH-3A was powered by two General Electric T58-GE-6 turboshaft engines, which had a Military Power rating of 1,050 horsepower, and a maximum speed of 96.31miles per hour at sea level. Sikorsky produced the last S-61 helicopter in 1980, having built 794. Production was licensed to manufacturers in England, Italy, Canada and Japan, which produced an additional 679 Sea Kings.

The initial SH-3A model of the Sea King would be progressively converted into the improved SH-3D and SH-3H variants, which featured more powerful engines and improved sensors.

Above: Royal Canadian Navy personnel wave and salute as 423 Maritime Helicopter Squadron conducts its final flight.
Below and opposite page: Drills testing the Sea King's search and rescue capabilities.

The Royal Canadian Navy (RCN) became a major operator of the type and it was to become the longest-serving aircraft in the RCAF fleet. Procured by the RCN in 1963 mainly for anti-submarine warfare, its versatility enabled it to serve in a variety of roles and operations throughout its history.

On his website, naval history writer Jerry Proc notes that between 1998 and 2002, Canadian Forces Sea Kings had their 1250-hp T58-GE-8F turboshafts upgraded to T58-GE-100 standards. These 1500-hp powerplants were the most powerful available for Sea Kings.

Proc writes that, "By 1998, each of the operational helicopters had accumulated between 10,000 and 12,000 hours of flight time and also showing serious signs of wear. At the time each aircraft required 25.2 hours of maintenance for every hour of flight time.

"Fatigue cracking in load bearing frames, caused largely by the extended life of the aircraft and operational loads, necessitated a comprehensive solution if the helicopters had to remain operational until 2005. This was addressed by

the Centre Section Repair (CSR) program. By the spring of 1998, eight aircraft had their centre sections replaced at a cost of $500,000 per helicopter. Another eleven refits were also authorized at that time.

"The centre section replacement was incorporated into the Depot Level Inspection and Repair (DLI) program which was performed by IMP Aerospace, Halifax at the rate of four aircraft per year, Each Sea King undergoing the DUR required approximately 7,500 person hours of work and a 120 working day turnaround time. The centre section work increased the turnaround time to 145 days.

"Over a seven month period, four Sea Kings had problems with their tail wheel struts. Two of them broke upon landing, and cracks were found in two others. A reinforced tail wheel strut program was then proposed to address the problem...

"By 1998, the helicopter's inverters and the transformer rectifier units were replaced in order to improve the quality of the available power. The power supplied by the original electrical system was not pure enough to power digital equipment.

"IMP Aerospace did some of the major periodic inspections, and each one took 66 days to complete. These inspections were done both at their own hangar and in the main hanger at Shearwater, with IMP crews working alongside Canadian Forces crews, each with their own aircraft."

In all, the CH-124 Sea King fleet has flown more than 550,000 hours, which, at a cruising speed of 162 kmh, is

roughly equivalent to flying 7,200 times around the Earth, or the equivalent of the distance from Earth to Mars.

Over its long history, the CH-124 Sea King participated in a wide variety of operations, including NATO and other international maritime operations; search and rescue; disaster relief; counter-narcotic operations; international peacekeeping; counter-piracy; and pollution and fisheries patrols. Most recently, a CH-124 Sea King was deployed in a transport role during Operation Lentus 18-05, the Canadian Armed Forces' support to fire-fighting operations in British Columbia during the summer of 2018. The last overseas deployment for the Sea King came during the first half of 2018 aboard Her Majesty's Canadian Ship (HMCS) St. John's as part of Operation Reassurance.

On January 26, 2018, the last operational Sea King flight for 423 Maritime Helicopter Squadron, based at 12 Wing Shearwater, Nova Scotia, was marked with a flypast in Halifax-Dartmouth.

As the fleet nears final retirement, disposal planning for the CH-124 Sea King is ongoing. This includes some aircraft being put up for sale and some being retained by the Department of National Defence and the Canada Aviation and Space Museum for display or training purposes. Those going to museums will continue as ambassadors of maritime aviation. ■

A case of BAD TIMING

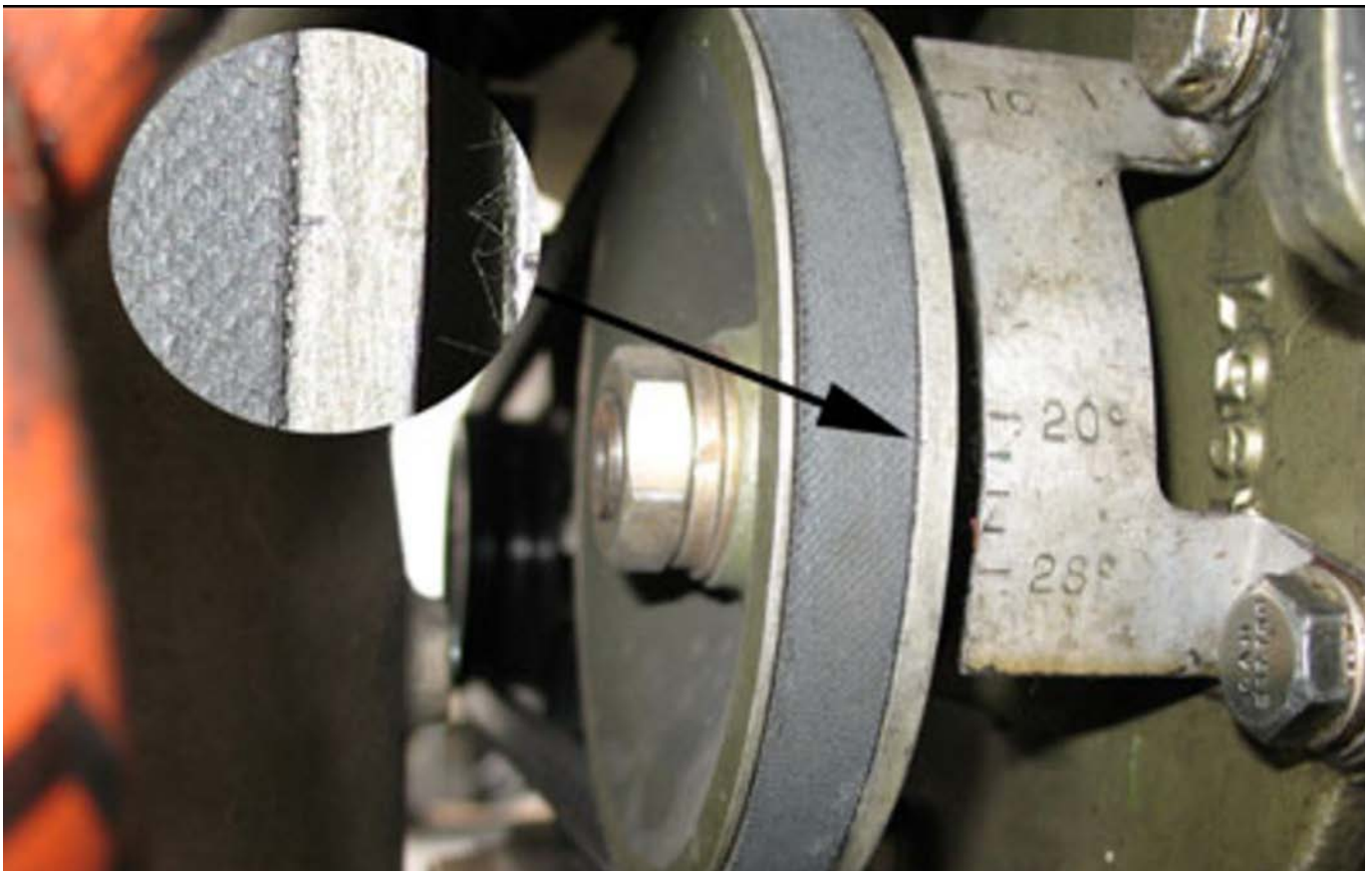
While installing a magneto, an AME's vision deficiency leaves him slightly off the mark.

On August 8, 2008, the Northway Aviation Ltd. Cessna 207A (registration C-FBHP, serial number 20700647), operating as Northway Flight 841, was departing from Winnipeg/St. Andrews Airport, Manitoba, en route to Bloodvein River, Manitoba, with one pilot and three passengers on board.

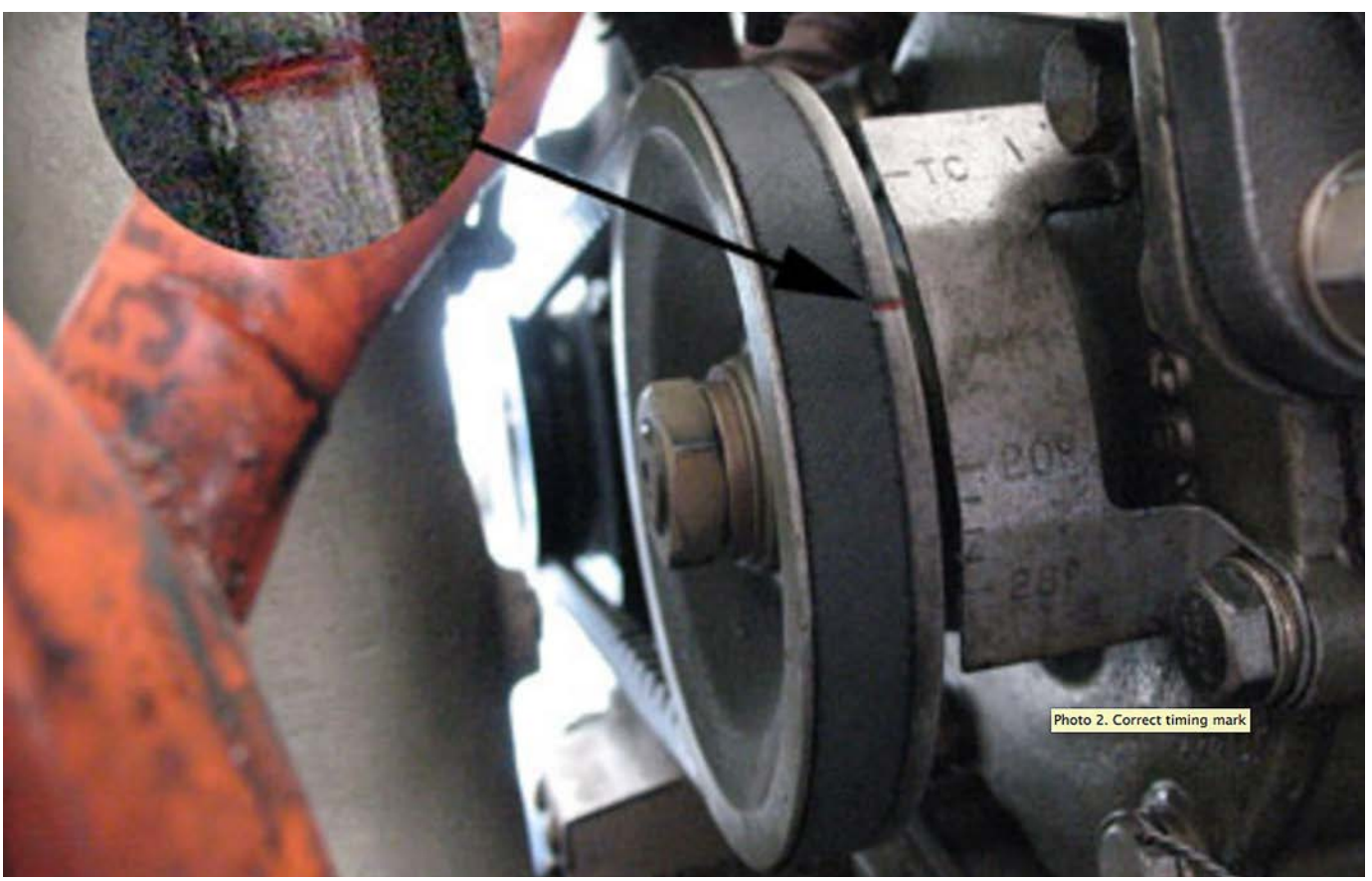
Shortly after take-off, the aircraft's engine performance deteriorated and several engine backfires were noted. The pilot attempted to return to Winnipeg/St. Andrews Airport but the aircraft could not maintain altitude. The pilot carried out a forced landing on Provincial Highway Eight, approximately two nautical miles north of the airport at 1356 central daylight time. The aircraft was not damaged and none of the aircraft occupants was injured.

Other Factual Information

The passengers consisted of two adults and one infant, all seated in the second row of cabin seats. The adult passengers were restrained by lap belts; the infant was held in the arms of one of the passengers. In addition to the passengers, the aircraft carried some hand luggage and a stroller restrained in the rear of the cabin. The aircraft weight and centre of gravity were within the prescribed limits.



Above: Mistaken timing mark with debris removed. Below: Correct timing mark.



The 1400 central daylight time meteorological report for Winnipeg/James Armstrong Richardson International Airport, located 12 nm southwest of Winnipeg/St. Andrews Airport, was as follows: wind 160° true (T) at six knots, visibility 15 statute miles, a few cumulus clouds at 5,500 feet above ground level (agl), scattered cloud at 25,000 feet agl, temperature 27°C and dew point 14°C.

The pilot completed a pre-flight inspection and engine run-up before departure. All aircraft and engine parameters were normal. During the take-off run on Runway 36, the aircraft did not accelerate as expected. Though engine rpm and manifold pressure were normal, the poor aircraft performance was attributed to the high ambient temperature.

After lift-off, climb performance degraded; the cylinder head temperature rose rapidly to its maximum allowable value and beyond. The engine began to vibrate and the pilot turned left to join a downwind leg to return to Runway 36. Despite full throttle, a fine propeller pitch and rich mixture, the aircraft could not maintain altitude.

The pilot noticed that a two-lane section of Provincial Highway Eight was momentarily clear of traffic and landed the aircraft in a southerly direction on the highway. Two oncoming vehicles left the paved roadway to make way for the aircraft. One of the drivers sustained minor injuries when his vehicle entered a ditch adjacent to the highway. After the aircraft came to a stop, it was pushed onto a private driveway by the pilot with the help of several bystanders.

After the occurrence, the aircraft was towed back to the company's hangar at the Winnipeg/St. Andrews Airport for examination. The engine magneto timing was checked and both magnetos were found to be incorrectly timed. The required timing is 22° BTDC (before top dead center) on the compression stroke on the number one cylinder piston. The magnetos were found to be timed to approximately 50 to 60° BTDC. Such an advanced timing of the magnetos leads to pre-ignition or detonation of the combustion gases in the engine and results in high cylinder head temperatures and engine power loss.

A 50-hour inspection of the aircraft was started on July 28, 2008 and completed on the day of the occurrence. In conjunction with this inspection, a 500-hour inspection of the Slick 6310 magnetos was carried out in accordance with Slick Service Bulletins SB2-08 and SB3-08. These service bulletins require the magnetos to be removed from the engine and sent to an engine overhaul facility for inspection. The facility completed the inspection of the magnetos and returned them to Northway Aviation Ltd. The magnetos were reinstalled on the aircraft eight days after they were removed.

The maintenance engineer who removed and installed the magnetos began employment with Northway Aviation Ltd. approximately two months before the occurrence. The engineer had approximately 15 years' aviation maintenance experience, the last seven of which as a licenced aircraft maintenance engineer (AME). Though there is no colour vision requirement to hold an AME licence, the engineer has a red/green colour vision deficiency and is incapable of discerning reds or greens.

The engineer was familiar with the various timing procedures on this engine, but this was the first time he timed the magnetos on this particular aircraft. Before starting the work, the engineer referenced the Cessna 207 series service manual, Chapter 12-78, Magnetos – Installation and Timing to Engine, to re-familiarize himself with the job task.

Chapter 12-78 indicates that the advanced firing position of the number one cylinder may be determined by the use of a timing disc and pointer, Time-Rite piston position indicator, protractor and piston locating gauge, or external engine timing mark reference.

The external engine timing marks are located on a bracket attached to the starter adapter, with a timing mark on the alternator drive pulley as the reference point. These marks consist of indented lines on the parts in question.

The engineer chose the external engine timing mark reference as the method of timing because the external magneto timing indicator plate was present on the engine. The external magneto timing indicator plate is located on the rear of the engine, in a dimly lit area of the engine bay. The mark on the alternator drive pulley had been painted red for conspicuity during the last engine overhaul.

The engineer brought the engine around to the compression stroke on the number one cylinder piston and aligned the mark on the alternator drive pulley with the 22° BTDC position on the external engine timing plate. The engineer removed the magnetos and sent them to the engine overhaul facility for the 500-hour inspection compliance.

During the eight-day period in which the magnetos were away for inspection, the engineer completed other maintenance tasks on the aircraft as required by the 50-hour inspection chart. The engine bay was dirty and the engine and belly of the aircraft was washed with solvent. Upon return of the magnetos, the engineer reset the engine timing to the 22° position because the propeller had been turned during the servicing of the aircraft.

As the engineer rotated the propeller to align the timing marks, the first mark that came into view on the alternator drive pulley was a scratch that had snagged debris from the engine washing. The scratch, with the embedded debris, looked similar in appearance to the correct timing mark.

The engineer was not able to discern the red paint colouring to cross-reference the mark and chose the scratch as the timing mark of reference. The correct timing mark was out of view on the opposite side of the pulley. The engineer installed the magnetos using the scratch with the embedded debris as the reference point.

After the magneto installation was completed, the engineer carried out an engine run to ensure correct operation. During the five-minute ground run, the engine achieved full static rpm with normal engine operating temperatures. The full static rpm run was limited in time because of the difficulty encountered in holding the aircraft stationary using only the aircraft brakes.

A magneto drop test was conducted at 1700 rpm. The magneto drop was observed to be 25 rpm per side, well within

the 150 rpm allowable drop per side but considerably lower than the normal 50 to 75 rpm drop per side. The aircraft was brought back into the hangar and the engine cowlings were removed as a final check for engine leaks and security.

The engine seemed unusually hot for the brief time that it was run, but because the engine operating temperature and pressures were normal, the hot engine was attributed to the high ambient temperature. The inspection was signed out as being completed and the aircraft was returned to service. The engine power loss occurred on the first flight after the completion of this inspection.

The Cessna 207 series service manual, Chapter 12-80, Magneto Check, states: "advanced timing settings in some cases is the result of the erroneous practice of bumping magnetos up in timing in order to reduce rpm drop on single ignition."

The manual further states: "an absence of an rpm drop should be a cause for suspicion that the magneto timing has been set in advance of the setting specified." The service manual cites: "never advance timing beyond specifications in order to reduce rpm drop."

On June 19, 1984, the engine manufacturer, Teledyne Continental Motors (TCM), issued service bulletin (SB) M84-8 to remove the external engine magneto timing indicator plate (bracket). TCM found that magneto timing errors were occurring due to improper alignment of the timing marks after removal or replacement of the starter adapter.

TCM eliminated the use of the external magneto timing indicator plate on all new and rebuilt engines, and recommended that the external magneto timing indicator plate be removed at the next starter adapter rework or engine overhaul.

On November 30, 2004, the work described in SB M84-8 was accomplished on the occurrence aircraft at engine overhaul. The external magneto timing indicator plate was removed and returned to Northway Aviation Ltd. along with the overhauled engine.

Before the removal of the external magneto timing indicator plate, the engine overhaul facility made sure that the alignment of the plate to pulley mark was correct and that the mark on the pulley was painted red. This was done to ensure that, if the plate was to be re-installed, the timing marks would be properly aligned. The red paint was used to highlight the correct timing mark in case of confusion with other markings on the pulley.

The overhaul facility was aware that some operators preferred the use of the external magneto timing indicator plate because it is an easier and more precise way of timing the magnetos as compared to the other methods.

Upon receipt of the engine, Northway Aviation Ltd. reinstalled the external magneto timing indicator plate because it was part of original equipment on the engine. SB M84-8 was not supported by an airworthiness directive and, as such, was not considered mandatory. In addition, the Cessna 207 series service manual still referenced the external engine timing mark as an approved timing procedure and the timing mark

alignment was verified as being correct by the engine overhaul facility. Canadian Aviation Regulations Standard 571, Maintenance – Information Note, states, in part:

"Where the recommendations of the aircraft manufacturer are incompatible with those of the engine, propeller, or appliance manufacturer, the recommendations of the aircraft manufacturer shall be used."

On April 25, 2007, TCM issued Mandatory Service Bulletin MSB94-8C to provide magneto to engine timing procedures for all TCM engines. TCM's preferred and most accurate method of timing was through the use of a positive top dead center locator, protractor and pointer device. Mandatory Service Bulletin MSB94-8C did not reference the external engine timing mark as an optional timing method because it was no longer supported by TCM.

Northway Aviation Ltd. holds an Air Operator Certificate and maintains its aircraft in accordance with its Air Operator Maintenance Control Manual (MCM) approved pursuant to Section 706.08 of the CARs. Subsections 25.4.f and 25.4.g of the MCM, entitled Approved Maintenance Schedule Evaluation, state: "changes in the manufacturer's recommendations for maintenance, including service manuals, bulletins, letters or other instructions shall be considered mandatory until evaluated as per Section 25.2.c"; and "exceptions to the manufacturer's recommendations shall be recorded on a Maintenance Evaluation Sheet and retained on the applicable aircraft file." Subsection 25.2.c states: "All discrepancies and findings found during evaluation are recorded on the Audit Finding sheet and a report along with the findings are sent to the Maintenance Coordinator/Certificate Holder."

Upon receipt of TCM's Mandatory Service Bulletin MSB94-8C, Northway Aviation's Director of Maintenance evaluated the service bulletin against its fleet of aircraft. The bulletin was only applicable to the occurrence aircraft. The DOM chose not to incorporate the bulletin into its approved Cessna 207 maintenance schedule because the external engine timing mark was the reference being used on that aircraft in accordance with the Cessna 207 series service manual. After completion of the evaluation, the DOM did not prepare a maintenance evaluation sheet as required by the MCM.

Analysis

The engineer was experienced and qualified to work on the aircraft. He was new to the company and had not previously timed the magnetos on this particular aircraft. The engineer has a red/green colour vision deficiency that demanded greater effort on the task at hand when using coloured references in maintenance work.

Unable to discern the red paint on the timing mark, the engineer chose a mark, similar in appearance, as a reference for timing the magnetos without having rotated the pulley completely to confirm that selection. The subsequent engine ground run was not of sufficient duration to indicate any timing anomalies. The engineer attributed the lower-than-normal rpm drop on single magneto operation and the higher-than-normal after-run engine temperature as being consistent with the high ambient temperature of the day. The misalignment of the pulley mark with the indicator plate led to a timing discrepancy that resulted in pre-ignition or detonation of the combustion gases in the engine, which, in turn, caused high cylinder head temperatures and engine power loss after take-off. Although the alignment of the timing marks was verified as correct in this occurrence, the use of an incorrect reference mark (scratch) had the same effect as if the alignment was incorrect to begin with. The company chose to re-install the timing indicator plate due to its ease of use and precise way of magneto timing. Use of the external engine timing mark is an approved timing procedure referenced in the Cessna 207 series service manual and, therefore, the company has the option of using it. The decision to use the magneto timing indicator plate was supported by CARs Standard 571. The engine manufacturer issued Mandatory Service Bulletin MSB94-8C in 2007 to address preferred magneto to engine timing methods. The external engine timing mark was not listed as an optional timing method because it was no longer supported by the engine manufacturer. The company evaluated the Mandatory Service Bulletin against the requirements of its company MCM and decided not to incorporate the bulletin into its approved Cessna 207 maintenance schedule. A maintenance evaluation sheet was not completed as required.

Finding as to Causes and Contributing Factors:
During maintenance work, both engine magnetos were incorrectly timed. This condition was not detected during the subsequent engine ground run or before the flight. The incorrect magneto timing led to pre-ignition or detonation of the combustion gases in the engine, which resulted in high cylinder head temperatures and engine power loss after take-off.

Finding as to Risk:
Service Bulletin (SB) M84-8 and Mandatory Service Bulletin MSB94-8C regarding preferred magneto timing methods were evaluated by the operator and not incorporated into its approved Cessna 207 maintenance schedule. The continued use of the external engine timing mark method increased the risk of a magneto timing error.

Other Findings:
A maintenance evaluation sheet addressing the evaluation of Mandatory Service Bulletin MSB94-8C was not prepared by the company in accordance with its Maintenance Control Manual (MCM).

Safety Action Taken

Cessna indicated that it would be incorporating information in Mandatory Service Bulletin MSB94-8C into the next scheduled revision of the Cessna 207 maintenance manual. The operator indicated that it would be making changes to its policy regarding the implementation of service bulletins.

(This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on January 29, 2009.) ■

Aviation Services

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Widebodies for WestJet

WestJet's stay-at-home business model has worked well in the past, but the Calgary firm is now going global with a new fleet.

January 17th marked the start of a new era of global expansion for WestJet as the airline took delivery of the first of ten 787 Dreamliners.

Having long operated a fleet of Boeing single-aisle jets, WestJet will use the long-range 787-9 Dreamliner to serve new international routes.

"Today's delivery marks a new chapter for WestJet," said Ed Sims, president and CEO of Calgary-based WestJet. "Boeing's 787 Dreamliner is one of the most technologically advanced aircraft ever flown and is the perfect platform for our transition to a global network carrier. We look forward to bringing Canadians to the world and the world to Canada in comfort and style."

This spring, WestJet will use the 787-9 – the longest-range Dreamliner that can fly 7,635 nautical miles (14,140 km) – to offer the first-ever flight connecting Calgary and Dublin. The airline will also offer non-stop Dreamliner service between Calgary and London Gatwick and Calgary and Paris.

The 787 Dreamliner – the fastest-selling widebody jet in history with about 1,400 orders – allows airlines to reduce fuel use and emissions by 20 to 25 percent and serve far-away destinations. The combination of super fuel efficiency and long range has helped airlines save more than 30 billion pounds of fuel and open more than 210 non-stop routes.

WestJet's 787-9 will accommodate 320 passengers in a three-class configuration. The Dreamliner's interior includes large windows, lower-cabin altitude and smooth-ride technology, to complement the all-new business cabin featuring the carrier's first lie-flat seats.

"We are excited to welcome our friends at WestJet to the Dreamliner family. The airline has achieved impressive growth with the Boeing 737 and will now use the 787's unmatched performance and passenger comforts to profitably launch a new 'global era'," said Ihssane Mounir, senior vice president of Commercial Sales & Marketing for the Boeing Company.

In preparation for its new Dreamliners, WestJet recently added digital solutions powered by Boeing AnalytX, to optimize its operations. These include Airplane Health Management, which provides predictive analytics to optimize WestJet's 787 fleet operations, as well as Toolbox, which delivers real-time information for technicians to quickly resolve maintenance issues and keep airlines on schedule. ■

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