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The Magazine for Aircraft Maintenance Professionals



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The Rebuild: Project Rosey Spitfire

Ground-to-air modular design: a Pop-Up World after all

Publication Mail Agreement No. 0041039024
and Return Undeliverable Canadian Addresses to
Alpha Publishing Group (2004) Inc.
Unit 7, 11771 Horseshoe Way, Richmond, BC, V7A 4V4
email: amumagazine@outlook.com

April - May 2017
Volume 15/Issue 6

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Hartzell turns one hundred

Ever find yourself spinning around in circles? Usually that's not a good thing but in the case of Hartzell Propeller, it's their business of course, and they've been at it now for a remarkably long time. In fact, during the summer of 2017 Hartzell will celebrate its 100th anniversary—and isn't it interesting how that number snuck up. When the topic arises of legendary American brands with long histories, the tendency is to think of Ford, Harley-Davidson, John Deere or even O-Pee-Chee but not necessarily Hartzell. Yet the lore of the company includes archetypal American figures such as Orville Wright with whom Hartzell Propeller founder Robert Hartzell shared a friendship.

It was Wright who suggested that Hartzell use walnut to manufacture more reliable aircraft propellers. Hartzell, an aviation enthusiast and aircraft mechanic, had noticed high failure rates among wood propellers in use at the time. Since then, Hartzell Propeller has built more than 500,000 propellers for piston and turbine powered aircraft of many shapes, sizes and descriptions. But Wright's suggestion marked the beginning of the Hartzell Walnut Propeller Company in Piqua, Ohio. With the help of a lone employee, Hartzell carved some of his first propellers from logs of walnut with hand axes—or so the story goes.

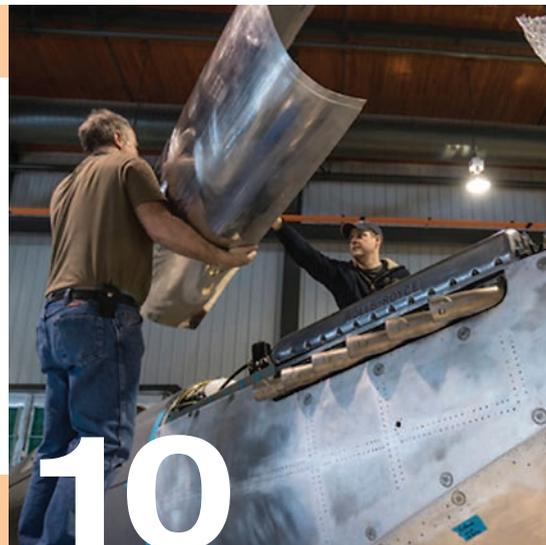
During WWI, the Hartzell Walnut Propeller Company provided Liberty aircraft propellers for warplanes. In the early 1920s, the word "liberty" was removed from Hartzell propellers and replaced with "Built on Honor," the phrase that has been emblazoned on every Hartzell propeller since. Hartzell abandoned wood blades years ago in favour of aerospace grade aluminum and structural composite, and propeller systems with "blended airfoil" technology and manufactures them with machining centres, robotics and custom resin transfer molding curing stations.

To help celebrate their 100th anniversary Hartzell will host a series of summer events leading up to a big customer bash at EAA AirVenture in July at Oshkosh, and finally the company will wrap up festivities during October at NBAA in Las Vegas. To find out if there's something going on in your neck of the woods visit, www.hartzellprop.com ■

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AMU is viewable online: subscribe and download at www.amumagazine.com

AirMaintenance Update

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Richmond BC V7A 4V4 Canada
phone: (604) 214-9824 • fax: (604) 214-9825

Published by Alpha Publishing Group (2004) Inc.
Publication Mail Agreement Number 0041039024
and Return Undeliverable Canadian Addresses to:
Alpha Publishing Group (2004) Inc.
Unit 7, 11771 Horseshoe Way
Richmond BC V7A 4V4 Canada

amumagazine@outlook.com or amumag2015@gmail.com website: www.amumagazine.com

editor: John Campbell
art director: Cliff Vickstrom
publisher: Bill Carter
sales manager: Bill Carter
Advertising inquiries: (604) 214-9824

Subscription Rates: 1 Year: \$40 2 Years: \$60
AirMaintenance Update is published 6X annually.
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Copyright 2016 Printed in Canada

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circulation: Anne Gervin



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Publications Mail Registration No. 0007198278

ISSN 1703-2318

Upcoming Events

HAC Convention & Tradeshow moves to new format



The Helicopter Association of Canada's 2017 Ottawa Convention dates have shifted slightly from November 10-12 (Friday-through-Sunday) to November 9-11, 2017 (Thursday-through-Saturday) to a format to accommodate attendance by delegates at the 2017 Remembrance Day services at the War Memorial, nearby the host hotel, the Ottawa Westin.

The Remembrance Day services in Ottawa promise to be one of Ottawa's most memorable ever. This year marks Canada's 150th Birthday, as well as the 100th Anniversary of the Battle at Vimy Ridge.

Remembrance Day services on Saturday would have conflicted with our tra-

ditional Saturday Keynote Lunch, so we have shifted the Keynote Luncheon and our Award Presentations to a Closing dinner on Saturday night. We have preserved our popular Chair's Opening Reception on the trade show floor, followed by a full day trade show and a reception on Saturday on the floor, before the Closing Dinner.

Any longer-term changes to the format and timing of our Convention will be guided by the results of our recent survey of Members and Associates, and input from the HAC Board. These issues will be discussed at the Board's DFW HAI meeting.

— Fred Jones
HAC President.

CANADA

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www.adse.ca

Canadian Aerospace Summit

November 7 – 8, 2017
Ottawa, Ontario
www.aerospacesummit.ca

HAC 2017 Convention & Trade Show

November 10 – 13, 2017
Ottawa, Ontario
www.h-a-c.ca

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www.flysnf.org

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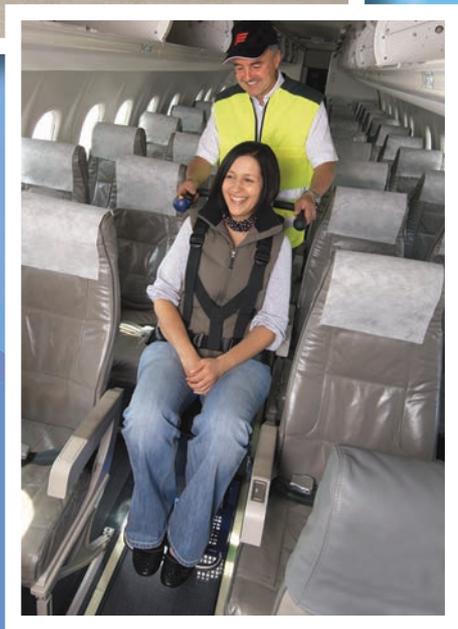
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STCs & new products

Gill sealed lead acid battery good to go on Bell 407s

Gill Batteries announced it has received an FAA Parts Manufacturer Approval (PMA) to install its new-generation 7407-28 sealed lead acid battery on all models of the Bell 407 helicopter. This sealed lead acid battery is said to provide a number of advantages over a NiCad battery, including more initial start up power, more residual power after start up, and a recharge rate that is claimed to be up to 50 percent faster. The company says that its product can be run up to 18 months or 1,800 hours before requiring an in-shop recharge and capacity check.

For more information visit www.gillbatteries.com



Jurblami nozzles reduce time for sealing operations

Chemetall's Jurblami application nozzles for sealing operations are said to significantly reduce the time required for applying sealant to rivets on fuel tanks and fuselages. The specially shaped nozzles are intended for the application of Chemetall's Naftoseal polysulphide sealants. Its bell-shaped head application nozzles encapsulate rivets and nuts creating a mold for the sealant coating, in order to provide high corrosion protection for those parts exposed to water, corrosive oils or sudden temperature changes. These nozzles are offered in different sizes to fit various dimensions of nuts and rivets.

For information visit www.chemetall.com



Towbar-less electric aircraft tug moves up to 30,000 lbs.

TNA Aviation Technologies is now distributing the TowFLEX 120e HG aircraft tow tug designed to move aircraft in the weight range of 10,000 to 30,000 pounds. This towbar-less electrical tug is said to be able to move aircraft up to medium size corporate jets, both with single or twin nose wheel configuration. No special adapters are required and its tiller steering control can be operated with one-hand. Visible markers and anti-slip covering allow for improved wheel tracking while multi-speed transmission drive technology is designed to increase ease of maneuvering.

For information visit www.tna-aviation.com



Non-slip tool tray from Grypshon

Grypshon's new Grypmat non-slip tool tray is said to allow users to focus on their work without having to worry about runaway screws or misplaced hardware. Made from a polymer-silicone blend, the Grypmat reputedly holds tools at angles up to 70 degrees on a variety of work surfaces, which theoretically makes it compatible for working on aircraft wing, engines and fuselage. The manufacturer says Grypmat is resistant to chemicals such as Skydrol, MEK, JP8, and hydraulic fluid, and can be cleaned of grease, dust or dirt with soap and water.

For more information visit www.grypshon.com



Xuron introduces close cutter with soft touch

Xuron's LX micro-shear flush cutter employs bypass cutting technology to produce a square cut on soft wire up to 16 AWG (1.29 mm) with minimal squeezing. Featuring an ultra slim profile, this flush cutter is suited for jobs requiring an extremely sharp tip to let users reach into highly restricted areas. Requiring far less effort than a compression-type cutter, it has ground cutting edges and 0.100-inch thick high carbon steel blades that are polished for a glare-resistant finish. This tool also features cushioned rubber grips and a Light Touch return spring.

For more information visit www.xuron.com



Stop liquids with under-grate drain block valve

Inland Technologies' Glycol Guard is an under-grate drain block valve designed to prevent liquids from reaching stormwater systems. It is used to contain spent aircraft deicing fluid and fuels. The Guard is said to be easy to operate and virtually impervious to freezing. Under normal conditions, the Guard is opened for uninterrupted stormwater flow. In the event of a spill or as a preventative containment measure the valve can be sealed within seconds.

For more information visit www.inlandgroup.ca



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VIH AEROSPACE EYES GROWTH IN MANUFACTURING



Victoria, British Columbia-based VIH Aerospace has seen substantial growth in its recently launched manufacturing sector, but the company is not willing to stop there as it anticipates more of the same coming.

“In late 2015, VIH management determined that in addition to manufacturing mission specific Supplemental Type Certified products including vertical reference windows, auxiliary fuel tanks and various others; we should leverage our decades of manufacturing know-how and quality processes to enter the general aviation manufacturing market,” says Dave McGrath, Director of Business Development, Sales and Marketing for VIH Aerospace.

Since 2015, the company has quickly evolved to a supplier of choice for several fixed wing and helicopter fleet operators, providing support ranging from the manufacture of single-unit piece parts to large run manufacturing, kit development and provisioning, custom panel fabrication and more. “We have a highly adaptable manufacturing structure and a dedication to quality assurance that enables us to scale up or down in regard to project complexity and quantities, that positions us to meet the unique requirements of our customers,” McGrath explains. “We expect 2017 to be a banner year for our manufacturing activities.”

REPLACEMENT CABIN HEATERS FROM HARTZELL

Hartzell Engine Technologies announced that as a result of its asset purchase of C&D Associates in 2016, the

company is now producing a line of South Wind replacement heaters under the Janitrol Aero brand. “Our new Janitrol Aero brand replacements for South Wind cabin heaters are FAA certified and/or PMA approved and will not be affected by the FAA’s proposed Airworthiness Directive on South Wind aircraft cabin combustion heaters,” said Mike Disbrow, president of Hartzell Engine Technologies.



Once issued, the AD related to the FAA’s most recent Notice of Proposed Rule Making will require that owner/operators with the affected South Wind heaters comply within the next 10 hours of heater operating time or next scheduled maintenance activity, whichever occurs first. “The FAA estimates that there are over 6,300 aircraft affected by this AD; we think it may be closer to 8,000,” Disbrow said. “Even if some operators choose to disable their cabin heater, there are still thousands of piston singles and twins that will need to comply.”

GLOBAL SUPERTANKER SETS WORLD RECORD



During its deployment in Chile, the Global SuperTanker set a world record for liquid dropped in a single day by a land-based aerial tanker at 134,400 gal-

lons (508,000 litres). The SuperTanker achieved this milestone through seven sorties on February 1st, which far surpassed the previous known world record of 110,000 gallons. The record was achieved while the aircraft assisted the country’s military and firefighters to combat the worst forest fires Chile has ever seen. The SuperTanker has flown approximately 11,500 miles on 36 separate missions spanning several regions of the country, amassing over 40 hours of flying time in Chile. It has dropped a total of over 670,000 gallons (over 2.5 million litres) of water on spreading fires. The SuperTanker has been highly effective and its efforts have been well received by the people of Chile. A local official credited the Supertanker with saving five firefighters and a village on the verge of being overrun by quickly spreading fire. The wildfires have destroyed over 900,000 acres of land and 1,100 homes since January.

AIRBUS HELICOPTERS GAINS MARKET SHARE IN NORTH AMERICA



Airbus Helicopters Inc. and Airbus Helicopters Canada Ltd. solidified their position in the North American civil and para-public helicopter market as they delivered a combined 60 new helicopters to that market in 2016 (50 percent of the total deliveries in North America). The two companies booked a total of 64 orders for new aircraft, or an estimated 73 percent of all new helicopter bookings in North America. New aircraft orders in 2016 included 33 H125 AStars built in the United States. The H125, which is produced by Airbus Helicopters Inc. at its plant in Columbus, Mississippi, is the

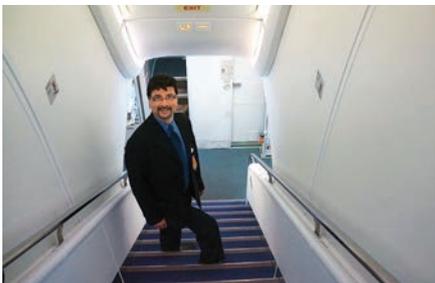
highest performance single-engine helicopter available and is a market leader for law enforcement, air medical transport, utility and corporate/VIP customers. Airbus also booked orders for five earlier models in the H145 family, nine H130s and seven H135s.

PRATT & WHITNEY PARTNERS WITH NASA



Pratt & Whitney has been chosen by NASA's Aeronautics Research Mission Directorate to be a part of NASA's Ultra-High Bypass Advanced Nacelle Technology Flight Demonstration. The goal of the three-year partnership is to develop engines for commercial airliners that produce less pollution and are more fuel-efficient. With technologies based on the learning developed through this partnership, the hope is for another 10 percent above the 16 percent efficiency improvement from the first generation geared turbo fan engines.

AIRBUS MAY DITCH A380'S GRAND STAIRCASE



Reuters has reported that Airbus is considering doing away with one of the hallmarks of its A380 superjumbo, a "grand staircase" echoing the era of cruise ships, as it looks to revive sales of the world's largest airliner. The idea of a slimmed down staircase, as well as adding fuel-saving wingtips, is aimed at lowering

the huge double-decker's operating costs and boosting its fuel efficiency. The provisionally dubbed A380-Plus makeover would add 40-50 seats to increase the standard interior's capacity to more than 600 seats, which would help airlines reduce their costs per passenger. To make room for those extra passengers, the A380 would do away with the double staircase at the front of the plane in favour of something more compact. The narrower spiral staircase at the back would also be modified. (Tim Hopher, Reuters)

BIG DAY FOR BOEING MAX 9

Boeing marked a milestone in early March as the first 737 MAX 9 made its debut in front of thousands of Boeing employees at its Renton, Washington facility. The 737 MAX 9 is the second member of Boeing's 737 MAX family, with a maximum capacity of 220 passengers and a range of 3,515 nautical miles. The airplane now begins system checks, fueling and engine runs on the flight line. The MAX 9 will then begin

flight-testing, with entry into service scheduled for 2018.



SIKORSKY SALUTES BC'S HELIJET FOR 30 YEARS OF SAFE FLIGHT OPERATIONS

At an event in Dallas, Texas in early March, Sikorsky recognized Helijet International for 30 years of safe scheduled airline and charter operations with S-76 helicopters. The event was hosted during the 2017 Helicopter Association International Heli-Expo show. Helijet's fleet of 11 Sikorsky S-76 helicopters is used primarily for scheduled passenger transport, air medical services and corporate charter services. ■

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PROJECT: Rosey Spitfire

BY DAVE O'MALLEY

Classic aircraft are much more than just a collection of metals and materials. They embody the spirit of the times in which they were built. And thanks to dedicated volunteer AMEs working at the flying museum, Vintage Wings of Canada, a Spitfire restoration project is coming along nicely.



Above left: Last July, the mechanics at Vintech Aero pushed the Roseland Spitfire outside and ran the engine for the first time with Gerry Bettridge at the throttle. A second engine run a week later was conducted by Mike Potter, founder of Vintage Wings of Canada.

Above right: The Spitfire's cowling substructure is prepared to receive the finished cowlings. David O'Malley photo

the revival of a legend

In 1967, just 22 years after the end of the Second World War, when the producers of the epic motion picture *Battle of Britain* contracted with the legendary Group Captain Hamish Mahaddie, RAF to wrangle extant Spitfires from across the United Kingdom, there were only 14 airworthy examples in the world — from a full production run of more than 20,000 of all marks.

The film production company restored another three Spitfires to round out the roster for the film, as not all the owners of flyable Spits were keen on lending them for use in the film.

According to Peter Arnold, who, along with Gordon Riley and Graham Trant, authored the two expansive volumes of *Spitfire Survivors*, “Then and Now”, 85 Spitfires have flown since that date. That’s a 600 percent increase in flyable airframes. Today he estimates that 56 Spitfires and Seafires are flyable.

In 1960, author Bruce Robertson in “*Spitfire — Story of a Famous Fighter*” put the number of survivors (airworthy and otherwise) at just 80. When a reprint of the book came out in 1973, that number had grown to 127.



Above: In September of 2014, the fuselage of the Roseland Spitfire arrived at Vintage Wings of Canada, having been delivered from the Vintech Aero team at Comox, British Columbia's Air Force Museum. Peter Handley Photo

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Above: Last year, with the major components completed, Ken Wood began work on the wing tips. The Spitfire's wing tip structure was made from wood to save vital war materials, then covered with aluminum. Ken Wood photo

Today, Arnold, Riley and Trant have calculated that number to be 282 Spitfires (both flyable and non-flyable) and build projects under way. That extraordinary growth is the result of one thing: the belief held by certain people that a Spitfire should be free to dance the skies and tell the stories of those boys from so long ago. These people are the men and women of the warbird world and the people who fund them.

There are those who believe that an inanimate object as precious and as central to world history as a Supermarine Spitfire should be grounded, conserved, roped off and displayed to ensure its continued existence for all those who would study it. To fly it or even to take it out of doors is to diminish the lifespan of the object. To display it in anything but its original markings and condition is to alter history. To fly it is risking too much.

Then there are those who think it isn't an inanimate object at all and should not be kept in captivity, no matter how well intentioned.

Historical artifacts are often experienced only through interpretation and sight. See it, read the plaque, move on. But a Supermarine Spitfire played its role in a very real world — one with smells, sounds and textures as well as visual qualities. As such, it is better understood in its environment — the environment in which its pilots lived, fought and died in. With nearly all Second World War Spitfire pilots now dead, soon only the aircraft themselves will remain to tell the story. Inanimate objects are those without a soul or life force, like a

rock or a dinner plate, but a Spitfire has a soul, one that remains in its bones forever. That soul...that life force spread into its structure the first time a pilot plunked his ass on its seat and stroked its leather-wrapped spade-grip or toggled a switch with a finger tip. The smell of very human sweat and even blood are mixed with those of high-octane petrol, glycol leaks and sun-heated paintwork. From that first moment on, the movements of its ailerons and its tail feathers, the pace of its heartbeat, the heights to which it climbed and the vectors it followed were all expressions of a pilot's desire.

We can never look at a Spitfire and see only metal and fabric, for our perspective is altered by history, by youth, by blood and bone. Soon, another aircraft will join the growing flock of free-range Spitfires — Supermarine Spitfire Mk IX, RAF serial number TE294, which was flown by Flight Lieutenant Arnold Roseland of 442 Squadron, one of only a handful of Canadian fighter pilots who fought both the Japanese and the Germans during the World War Two. "Rosey" Roseland was killed in 1944 during an air skirmish over France. The restoration of TE294 is now ongoing and when finished the Spitfire will be dedicated to his memory.

Twenty years ago, nothing more than a pile of metal and components

TE294 had almost been subsumed by the earth from which she came—her aluminum and steel structure corroding and



It takes a village to raise a Spitfire. Some of the mechanics involved today with the Roseland Spitfire project. Dave O'Malley photo

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breaking down in a scrapyard in South Africa, her wings long gone, component parts stolen or vandalized. Only to someone who could recognize her broken, twisted and rusted bones was she still a Spitfire. In the 1990s, TE294 was rescued, the decline to dust arrested, and the long, long journey to living warbird commenced. From South Africa, her boxed bones travelled to British Columbia, Canada, where a group of passionate volunteers at the Comox Air Force Museum took on her daunting rebuild as a millennium project and as an homage to the wartime pilots of 442 Squadron, a Search and Rescue squadron of the Royal Canadian Air Force still residing on the flight line at 19 Wing, Comox. For a number of years, the Comox team made steady progress, but continued funding of the extremely expensive enterprise became problematic.



The multi-dimensional complexities of building a Spitfire in the Castle Bromwich factory during the Second World War were overcome by jigs, custom tools, forms, molds, templates and thousands of employees. Ken Wood photo

Mike Potter and the Heritage Foundation flying museum Vintage Wings of Canada located in Gatineau, Quebec were approached to offer assistance in terms of expertise, facilities and above all funding.

The transition of control to Vintage Wings was not without controversy and detractors, but the Comox Air Force Museum website explains it best:

“In 2000, the Comox Air Force Museum, with a grant from the Y2K Millennium Fund, purchased TE 294 and embarked on the Y2K Spitfire Project. The project was funded entirely by donations and grants from the general public and the restoration proceeded slowly. By 2007 only the fuselage and tail section had been completed and it was becoming obvious that a massive infusion of cash would be needed if the project were to continue.

“In 2008, the Museum presented a decision paper to the Wing Commander of 19 Wing, Comox. It concluded that unless a new owner could be found the Museum would be compelled to shut the project down and dispose of the unfinished aircraft. The Wing Commander accepted the findings, and the plane was offered to other museums and agencies that might be interested in completing the restoration. Vintage Wings of Canada was willing to take over responsibility for the project in situ and provide the then-estimated \$1.6 million required to finish it to flying status.”

Though costs have risen far above the initial estimate, the project has made steady progress for a number of years, overcome major setbacks due to the poor work of subcontractors



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The finished Spitfire will be dedicated to and carry the name of Flight Lieutenant Arnold Roseland of 442 Squadron. Roseland was one of only a handful of Canadian pilots who fought both the Japanese and the Germans during World War Two.

and passed many milestones, none of which would have been possible without the funding and support of Michael Potter, founder of Vintage Wings of Canada.

Throughout this build, Mike has steadfastly supported, encouraged and funded the Vintech teams in both Comox and in Gatineau. It is because of Potter's considerable interest in Canadian military aviation history and his substantial financial support that soon the Roseland Spitfire will become the very first true Canadian Spitfire — built from the spars up in Canada by Canadians for Canadians. Without Potter's involvement in this project, it is fairly certain that it would not be today a Canadian Spitfire, with the project going to Great Britain or the United States. Given the extraordinary connection to the Spitfire we as a nation have, the coming first flight of Y2-K will be a national event, one we hope will be shared with many millions of Canadians to come.

There are many people who have been critical to the rebuilding of this remarkable aircraft, the first of which were the original Y2-K team members from Comox. Their creative and audacious idea now seems close to reality. In addition, the Comox Vintech Aero team—Ken Hazell, Dean Sept, Kaven Tremblay, Henry Bukach and Terry Chester—built the main fuselage, cockpit and tail assembly. The quality of their work took our collective breath away when the fuselage was unveiled at a special hangar dinner in October of 2014.

Now that the end of the rebuild is in sight, I asked Ken Wood how he feels about this incredible accomplishment. "There is so much I don't know," he said, "but I have learned a lot in the years that I have spent on this project. The jump from a traditional parts changer AME to a full-on restoration of a vintage warbird of this caliber is unimaginable, requiring a whole other mindset. It's like learning a

totally new trade. You can't just order the part and install it, you literally have to make the tool before you can even make the part, and the part has to fit. Talk about measuring twice and cutting once! You have to measure 10 times because if you screw up, it could have monumental side effects both in time and money.

"Yes there have been many sleepless nights, and there will be more, but to have been given the opportunity to find out what it is I am really capable of is an honour. None of this would be remotely possible without the determination of Mike Potter, for his never failing desire to reach a goal, no matter what. The resources required, not just financial, but knowledge, sub-contracts and personnel are enormous. It is certainly a team effort and I'm glad to be a small part of it. There is still so much to learn."

The truth is, I can't push Ken Wood to put himself in the centre of this accomplishment, no matter how hard I try. Any attempts are met with a quiet shaking of the head and a sweep of the arm across the hangar floor where his fellow AMEs are labouring.

"It's a team effort" he says, "and no one person is responsible for this... except maybe Mike Potter. I've had so much help from some incredibly talented people — advice and support from British Spitfire builder Ian Ward in the beginning along with structural help from Mario Guevremont, systems support from highly experienced warbird engineers Paul Tremblay, Andrej Janik, Guy Richard, Mark Dufresne, Gerry Bettridge, André Laviolette, Pat Tenger and aircraft painter Korrey Foisy.

"It takes more than mechanics to build something like this though... it needed the support of men like Kevin Forbes, president of Vintech Aero who has listened and supported and had my back on this project all along. Instead of putting up roadblocks, Kevin has swept ahead, expediting delivery of key subcontracted components and writing some pretty substantial cheques along the way.

"Thanks to Shannon Wattie as well for sorting out all the invoices and accounting. The work itself is rewarding, there's no doubt, but working with these guys has been humbling."



Above: Paul Tremblay at right is the Director of Maintenance at Vintech Aero, the AMO responsible for the maintenance of the aircraft of the Michael U. Potter Collection. Peter Handley photo
Left: Mike Potter, standing to the left of WWII pilot Wing Commander James Edwards, has provided the financial backing that has made this Spitfire project possible. Peter Handley photo

There will be a few weeks of paperwork to prepare, bringing everything to a close with “Ts” crossed and “Is” dotted, but Wood is confident that before the end of this summer, a completed Roseland Spitfire will be rolled from the hangar and chocked in front of the ramp on a clear flying day. To some who will be present, it will be a beautiful object with a beautiful history. But to others, the ones of us who know in our hearts that she is more than aluminum, steel and fabric, this first Canadian Spitfire will have been born with a remarkable soul — one of indescribable melancholy and exuberant joy.

As every piece of her was formed and made fast to other pieces, it was with the memory of young Arnold “Rosey” Roseland in mind. His beautiful life, his sacrifice, his loneliness, his last terror-filled moments have become part of this machine’s story, spiraling in its DNA, amping through its emotional wiring, surrounding its metal like some ghostly magnetic field. As she climbs with a thundering heart into the

sky once again, I will think of Rosey and all that he never got to do. I will think of his courage, the heartbreak of his family and his beautiful memory. I will think of his sons and the father they really never knew. I will also think of all the effort that it took to get her to this point, the friends I have watched build her, and the man who was determined to make it happen. I will likely cry.

Founded by Michael Potter, Vintage Wings of Canada is a 23,000-square-foot flying museum designed to resemble a wartime military hangar. Its primary purpose is “to acquire, restore, maintain and fly classic aircraft significant to the early history of powered flight.” But another important goal is “to inspire and educate future generations about the historical significance of our aviation heritage.” This not-for-profit organization is located at the Gatineau-Ottawa Executive Airport in Quebec. To learn more visit www.vintagewings.ca ■

NOSE TO NOSE



French photographer and the son of a test pilot, Manolo Chrétien has combined his talents with his aeronautical experiences to turn famed aircrafts into a powerful photography exhibit that will provoke second looks.

The acclaimed French artist and photographer Manolo Chrétien shares his passion for aviation in an exhibition called Nose Art exhibition, which debuted at the Mechanical Art Devices Gallery in Geneva, Switzerland this February. With his work, Chrétien attempts to capture the essence of famed aircraft such as the 1960s Learjet to the supersonic Concorde jetliner and military vessels like the Dassault Rafale. His images take an unusual dead-on visual perspective, and are further accentuated by the circular cutout format, which follows the shape of the aircraft's fuselage.

"Nose Art is the natural outcome of 10 years' worth of trying to capture planes from a humanistic or animalistic angle, and it is the beginning of a new way of working," explains Chrétien, who is the son of Jean-Loup Chrétien, a test pilot and the first French astronaut. Hangars filled with prototype jet planes were his playgrounds, and in that environment he developed his passion for aviation early on in life.

"It's been in my head for years, since my father woke me up one morning from the air through the window of my second floor bedroom in a helicopter he was testing. I remember it as if it were yesterday:

the animal-like cockpit of the Alouette, my father with his Ray Bans smiling inside, motioning to say, “Time to get out of bed, kids!”

Each plane has a story to tell, whether this is expressed through corrosion or damage from war: their skin defects reveal the aircraft’s souls. Chrétien, for example, was drawn to the Etoile de Suisse (“Star of Switzerland”), one of the first TWA Constellation aircrafts converted for civilian service, during a photography trip to the Sonoran Desert near Tucson, Arizona.

A close look at this four-engine, propeller-driven airliner from 1943 revealed thousands of indentations in the aluminum from flying through a torrential hailstorm — a memorable journey for the pilot and one that left the aircraft with tremendous character and a visual chronicle of its history.

The eight photographs in the Nose Art exhibition endow each aircraft with a human personality, as if the faces of the planes were happily smiling or cautiously glaring. Endless interpretations are left to the observer’s imagination.

The Process

Because Chrétien’s childhood abounded with aeronautical adventures, it’s not surprising that these influential experiences materialize in his compositions.

“My inspiration for Nose Art came suddenly while on a photo trip in the Tucson desert in 2008. I was photographing all sorts of planes when I had a flashback of my brothers and I when we were very young in the garden of our house in Orange, France — right next to the runway, where we were fascinated by the planes taking off,” Chrétien shares.

“Growing up I saw the tarmac, kerosene, and aluminum through the eyes of a small child; I was overwhelmed by the size of these huge metal birds flying over me.

I photograph from this viewpoint today, sometimes by lying on the ground to recreate a child-like sense of scale. Since my very first photographs I’ve been fascinated with the textures and colours of used metals, revealing the past and the story of these materials.”



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Above: Manolo Chrétien

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Photographic Equipment used for the Nose Art Exhibit

Chrétien generally carries two types of cameras on his photographic journeys: a Canon EOS 5Ds R and a Hasselblad H4D-60. When shooting the planes in preparation for the Nose Art exhibit, it was not an easy task to photograph their noses high up off the ground. Therefore, a trusty tripod and a forklift were essential to boost Chrétien face-to-face with the nose of the plane, creating the best possible angle to photograph these legendary flying machines.

"To face the Concorde was one of my best moments," Chrétien excitedly describes as if he were reliving the moment. "This amazing plane is a legend and when you go up to the beak of this fantastic metal bird, it's high and very impressive to realize just how fluid the design of that machine inspired in 1960 by a Northern Gannet bird is!"

Chrétien's photograph easily allows you to imagine the nose of the Concorde piercing the atmosphere at supersonic speeds. ■



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CFAMEA Reorganization Progress

The AME Association of Ontario board of directors is continuing in our efforts to establish a national AME Association. Our latest endeavour has been to construct a survey that can be used to poll AMEs across the country and gather their opinions. The survey was approved for distribution by the Canadian Federation of AME Associations (CFAMEA) Board of Directors and was sent to all region presidents by the CFAMEA President Uli Huber.

Three of the regional AME Associations — WAMEA, Central and Atlantic — are holding or have held their annual meetings and workshops in March and April. This will give them an excellent opportunity to gather their members' opinions and obtain a mandate for the establishment of the National AME Association.

At the recommendation of Mike McCartan, president of the Central AME Association, we have adopted a process called "Change Management" to facilitate the process of evolving CFAMEA into the AME Association of Canada. This change management consists of six steps:

- Establish a Motivation for Change
- Analyze the Situation
- Plan the Direction
- Implement the Change
- Review the Direction
- Adopt or Adjust

Our Ontario Association considers step one is complete; we have the motivation for change. We are now implementing steps two and three by analyzing the situation and planning the direction.

We will be using the data from the survey to evolve the revamped national organization. As Mr. Huber queried in the survey, should we have a paid CEO with 15 directors? Or perhaps we could get by with all volunteer positions with only a single office staff paid position? Over the years AMEs and aircraft maintenance personnel have found ways to get more aircraft into less hangar space, performed better maintenance with fewer staff and improve the safety record of the aircraft fleet. I expect that we can also find a way to improve our association in an economical way.

Annual AME Conference

Plans are well underway for this year's edition of our AME Conference and Symposium. The conference will run over two days, Thursday November 2nd and Friday November 3rd with exhibitor setup on Wednesday. We will have two days filled with educational sessions as well as a full house of displays from industries supporting aircraft maintenance. Again this year, airline maintenance staff will join our AME Conference to make this truly an event for all AMEs and aviation parts and services suppliers as well. Many of the industry leaders that support our profession will be on hand conducting concurrent presentations, along with question and answer periods.

— Stephen Farnworth
 Vice-President AME Association of Ontario

Western AME Association



The Western AME Association is one of five similar associations across Canada, the others being the Atlantic, Ontario, Central and Pacific associations. These associations represent regional interests as well as concerns of national importance.

This Association is run by a volunteer group of AMEs who are elected by the member AMEs to the Board of Directors. The membership is comprised of AMEs, non-licensed personnel working in the industry, students and apprentices as well as corporate members.

A separate committee, under the auspices of the association, runs an annual symposium/workshop. This workshop is a two-day event,

which features speakers on a variety of related topics, as well as an industry tradeshow with over 50 booths from various companies, suppliers, manufacturers and other organizations.

Attendance at this and our various other smaller workshops may be counted towards the recurrent training requirements required by Transport Canada.

www.wamea.com

Atlantic AME Association



Atlantic Region Aircraft Maintenance Conference

It is my pleasure to invite you to the 39th annual Atlantic Region Aircraft Maintenance Conference (ARAMC) Committee. The 2017 ARAMC will be held April 26-28, 2017, at the Delta St. John's Hotel and Conference Centre in St. John's Newfoundland. The theme of this year's conference is Safety Management—Everyone Contributes.

For rooms booked before March 24, 2017, the Delta St. John's Hotel and Conference Centre has reserved a block of 100 guest rooms at a Conference rate of \$199 per room plus HST and a Marketing Tourism Levy Tax of three percent per room. After this date, reservations will be honoured based upon space availability.

A welcoming reception will be held on Wednesday, April 26, 2017, at 7 p.m. in the Salon "A". The ARAMC registration desk will be located in the Crush lobby adjacent to the convention area. The registration desk staff will be available commencing Wednesday afternoon.

The tentative 2017 Technical Program will incorporate interesting, informative, and pertinent subject matter selected from ARAMC participants/ critique sheets comments, and suggestions. A Transport Canada panel will also be featured tentatively where regulatory and compliance issues will be addressed. The 2017 Technical Program has been approved by the Associate Director of Operations as meeting the requirements for Update Training as outlined in C.A.R. 573-06.

The ARAMC is a forum by which both consumers and distributors interact and conduct business, and as such, space has been

allocated for industry displays. A displayer sponsored luncheon will be held Thursday, April 27, 2017, for all registered delegates.

An integral part of the conference is the Awards Banquet that will be held Thursday, April 27, 2017. It is an opportunity for the Atlantic Region to honor outstanding Aircraft Maintenance Engineers (AMEs) and companies for their contributions to their industry.

The ARAMC is managed and sponsored by the A.M.E. Association (Atlantic) Inc. There are many advantages of being a member of the Association. They include, a strong voice concerning regulatory matters concerning engineers, member of the Canadian Federation of Aircraft Maintenance Engineers, receiver of many publications include Wings, Helicopters and Aircraft Maintenance Update, Helicopter Maintenance and Director of Maintenance (D.O.M.) at no charge, and the opportunity to receive quality upgrade training. Please plan to attend. You won't want to miss it!

— Melvin D. Crewe, Chairman, ARAMC 2017

Events Calendar

- ARAMC 2017: St. John's, Newfoundland from April 26-28
- ARAMC 2018: Halifax, Nova Scotia from April 18-20
- ARAMC 2019: Moncton, New Brunswick from April 24-26

www.atlanticame.ca



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

Transport Canada rules for recreational drones

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- within controlled or restricted airspace
- within nine km of a forest fire
- where it could interfere with police or first responders
- at night or in clouds
- if you can't keep it in sight at all times
- if you are not within 500 m of your drone
- if your name, address, and phone number are not marked on your drone

www.camea.ca

PAMA SoCal Chapter



SoCal PAMA Sponsorship Opportunities

As I am sure you are aware the Professional Aviation Maintenance Association (PAMA) is a national organization comprised of regional chapters of Aviation Maintenance professionals. These chapters represent the full spectrum of maintenance activities within the Aviation industry. We are proud to say that the Southern California (SoCal) Chapter is one of the most dynamic with in the PAMA organization. Our bi-monthly schedule has a goal to provide our members a Technical Forum /Dinner Meeting with a technical presentation by leading Aviation Maintenance Organizations.

For the past 30 years SoCal PAMA has developed a close working relationship with 94th Aero Squadron Restaurant, which sets on the Van Nuys airport runway, as the location for our dinner meetings. This venue sponsored by our Technical Forum presenter, creates for an enjoyable evening for all the Aviation Maintenance Professionals in attendance and allows the sponsor to reach an audience outside of the normal marketing arena.

Once a year in December we host the Southern California Chapter of PAMA Holiday Dinner Meeting so that as professionals we can enjoy each other's professional camaraderie and holiday spirit. Many organizations and members ask how they can be involved in the festivities so this year we are opening sponsorship opportunities.

All sponsors will be noted as sponsors on the SoCal PAMA website, as well in all PAMA notification of support of the SoCal PAMA organization/holiday dinner meeting.

Sponsorship opportunities are the following:

- Diamond Sponsor: \$1,500 (15)*
- Platinum Sponsor: \$1,000 (15)*
- Gold Sponsor: \$800 (10)*
- Silver Sponsor: \$500 (50)*
- Bronze Sponsor: \$250 (2)*
- Honourable Mention: All donations will be accepted.

As usual all PAMA members are welcome with their significant other, but as a sponsor you are welcome to invite other folks from your family and or organization based upon your sponsor level. (*See number above.) Also you can always pay for an additional head count that is over your sponsorship level. Contact:

- Chris Cancelosi: (818) 997-7667; chris@rotorcraftsupport.com
- Bill Johnston: (805) 210-1873; wdjohn805@att.net

Submitted by Dan Ramos
www.socalpama.org

Central Ohio PAMA



Ask a Controller!

Our February meeting was held in the Lane Aviation Media Room at the John Glenn International facility, 4387 International Gateway, on the second floor and featured a presentation by CMH Air Traffic Control Tower on Central Ohio airspace they control.

The beginning of the meeting was filled with Awards and Presentations. Gene Sprang conducted the evening's program starting with the announcement of the 2017 COPAMA Scholarship Award recipients who are: Alexander Krigbaum, Mhamed Igoul, Cohen Fetters, Marvin Neubig Jr, Alioune Diaw, Cole Bryant, Saryn Mayfield, Ali Abaker, Ryan Goddard and Aaron Lehuta. Recipients not in attendance for the evening were: Michael Andrews, David Hallmon, Thomas Lahman and Nicholas Liberati.

Next on the schedule was FAA FAASTeam Program Manager, Inspector Mark Harden, who presented the Master Pilot's Award to Earl Redmond acknowledging his 50 years as an active pilot. Earl gave a brief history of his flying career, which included travel with his wife Carol who was in attendance for the award.

Columbus Air Traffic Controller Dave Neff presented an overview of the airspace that the Columbus Tra-Con controls from East

around Zanesville, North to just around Mansfield, West into Indiana and South to the start of Cincinnati Airspace. He gave an overview of the training that controllers go through and emphasized the attrition rate as candidates are weeded out over the many years of different levels of training. His presentation showed the many arrival and departure gates that separate traffic at the larger airports and called the skill a controller develops as "Fluid Geometry." He spoke of upcoming ADS-B and the new traffic control environment but told us that the surveillance radar would still be in use for years to come. He told us of an event where a VFR pilot was caught on top of a cloud base that went nearly to the ground and the coordination of three controllers to get him to an airport with the best visibility and talk him down to the ground before he ran out of fuel. He finished the story asking pilots to call the tower if they're ever asked to, not to be busted by ATC but to discuss what had happened to help prevent a recurrence.

We want to thank Controller Neff and Inspector Harden for the evening's presentation and hope all who attended received some benefit from this informative topic. We'd also like to extend a big Thank You to Lane Aviation for the use of their facility.

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Italdesign and Airbus have unveiled a George Jetson-like modular ground and air passenger concept vehicle system designed to relieve traffic in the super-congested megacities of the no-so-distant future. This concept system incorporates an Artificial Intelligence platform that would manage trips for passengers through a simple app. Does all this sound too incredible to be true? Probably, but who says technology must always be serious?

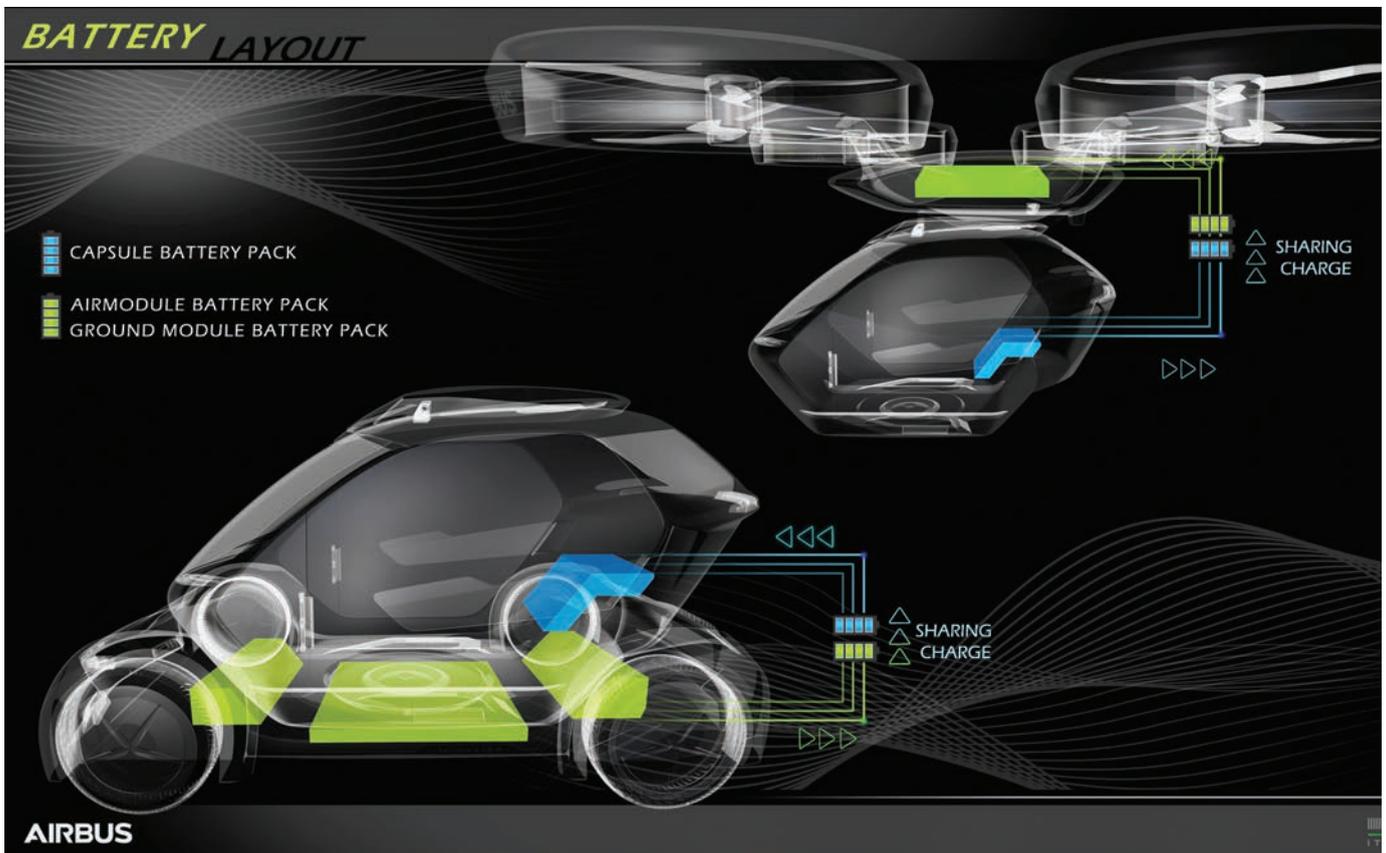
A **Pop-Up** World after all



Italdesign is an Italian-based design and engineering firm with a well-established footprint in the automotive sector and especially with the Volkswagen factory for which Italdesign has sketched key models such as the first Golf, Scirocco, Passat and the Audi 80. But it was during the 87th Geneva International Motor Show in early March that Italdesign stepped slightly outside its comfort zone to present a concept vehicle platform in collaboration with Airbus. Together the firms drew back the curtain on Pop.Up, which they call the “first modular, fully electric, zero emission concept vehicle system designed to relieve traffic congestion in crowded megacities.”

In theory, Pop.Up is a modular system for airspace and ground transportation. The concept is the result of Italdesign and Airbus’ joint reflection on how to address the mobility challenges of megacities, which has become one of the most pressing issues for commuters.

With traffic congestion projected to hugely increase by 2030, the companies decided to combine their engineering expertise to tackle how to best achieve a sustainable, modular and multimodal urban mobility system — giving rise to the Pop.Up concept, a system that consists of three layers:



Above: The battery system

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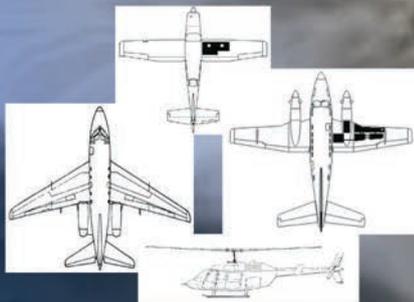
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Above: The layout of sensors

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1. An Artificial Intelligence platform that (based on its user knowledge) manages travel complexity by offering alternative usage scenarios.

2. A vehicle shaped as a passenger capsule that can couple with two different and independent electric propelled modules (the ground module and the air module). Other public means of transportation (e.g. trains or hyperloops) could theoretically also integrate the Pop.Up capsule.

3. An interface module that dialogues with users in a fully virtual environment.

The Pop.Up vehicle (if it ever comes into production) would aim to combine the flexibility of a small two-seater ground vehicle with the freedom and speed of a vertical takeoff and landing (VTOL) air vehicle, thus bridging the automotive and aerospace domains. The modus operandi is simple: passengers plan their journey and book their trip via an easy-to-use app. The system automatically suggests the best transport solution according to its knowledge of the user, timing, traffic congestion, costs, ridesharing demands. It would then join either the air or ground module or other means of transportation to the passenger capsule, following the individual passenger's preferences and needs.

At the heart of the concept is a capsule designed to accommodate passengers. This high-tech, monocoque carbon-fibre cocoon measures 2.6 metres long, 1.4 metres high, and



Above: Depiction of modular capabilities

1.5 metres wide. The capsule transforms itself into a city car by simply coupling to the ground module, which features a carbon-fibre chassis and is battery powered.

For megacity journeys with highly congested traffic, the capsule disconnects from the ground module and is carried by a 5-by-4.4 metre air module propelled by eight counter-rotating rotors. In this configuration, Pop.Up becomes an urban self-piloted air vehicle, taking advantage of the third dimension to get from A to B efficiently while avoiding traffic congestion on the ground.

Once passengers reach their destination, the air and ground modules with the capsule autonomously return to dedicated recharge stations to wait for their next customers.

Thanks to the possibility of combining the capsule with other means of public transportation, the Pop.Up offers a seamless travel experience—or so its designers say. The user can stay for the entire journey in the same capsule without worrying about switching between different travel modes and enjoy the entire

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commute time, with real time interaction between the capsule and the surrounding urban environment and communities.

Airbus says it will harness its expertise to develop a number of radical concepts that will contribute to relieving urban congestion. “Adding the third dimension to seamless multi-modal transportation networks will without a doubt improve the way we live and how we get from A to B,” said Mathias Thomsen, General Manager for Urban Air Mobility at Airbus, on the occasion of the unveil in Geneva. “Successfully designing and implementing solutions that will work both in the air and on the ground requires a joint reflection on the part of both aerospace and automotive sectors, alongside collaboration with local government bodies for infrastructure and regulatory frameworks. Italdesign, with its long track record of exceptional vehicle design was an exciting partner for Airbus for this unique concept project.”



“Italdesign is a service company, created to provide services and mobility solutions to interested parties worldwide. It is deeply rooted in our DNA to search for future state-of-the-art solutions,” said Italdesign CEO Jorg Astalosch. “Today, automobiles are part of a much wider eco-system: if you want to design the urban vehicle of the future, the traditional car cannot alone be the solution for megacities, you also have to think about sustainable and intelligent infrastructure, apps, integration, power systems, urban planning, social aspects, and so on.

“In the next years ground transportation will move to the next level and from being shared, connected and autonomous it will also go multimodal and moving into the third dimension” continued Astalosch. “We found in Airbus, the leader in aerospace, the perfect partner who shares this modern vision for the future of megacities to develop a sustainable multi-modal vision of megacity transportation.” ■

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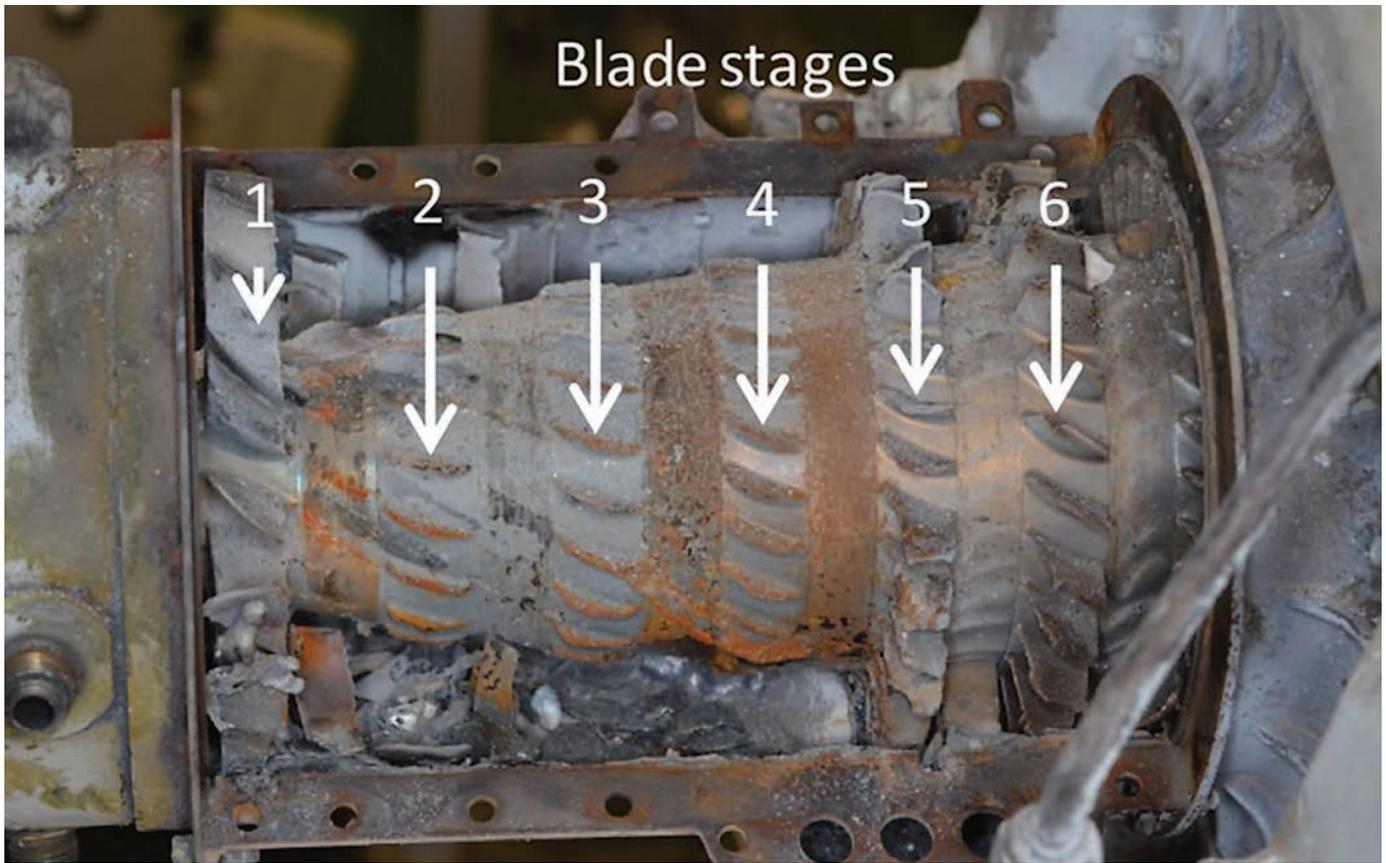


A risky job at a slow-speed hover turns deadly when component fatigue becomes a factor.

On October 22, 2015, an Oceanview Helicopters Ltd. Hughes 369D (registration C-FOHE, serial number 410942D) was conducting aerial work on power lines in the vicinity of Paynton, Saskatchewan, with the pilot and an external platform worker on board. At 1342 Central Standard Time, while installing a marker ball in a hover at approximately 325 feet above ground level, the helicopter experienced an engine failure, descended suddenly, and collided with the terrain. The pilot and external platform worker were fatally injured, and the helicopter was destroyed in a post-impact fire. The emergency locator transmitter activated on impact, but was destroyed by the post-impact fire.

History of the flight

Earlier that morning, the pilot had departed the North Battleford Airport (CYQW), Saskatchewan, and flew the Hughes 369D helicopter to a job site near Paynton. After landing, the pilot conducted the morning safety briefing with the external platform worker and ground crew and discussed the operational plan for the day. The plan was for the pilot and the external platform worker to install marker balls onto power lines that spanned the North Saskatchewan River in the vicinity of Paynton. After the briefing, the remainder of the morning was spent installing several marker balls.



Above: Axial compressor, showing blade stages 1 to 6

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Above: Marker ball installation. P&R TECH photo with TSB annotations.

The helicopter crew stopped to eat lunch and to refuel the helicopter at approximately 1200, and resumed marker ball installation at about 1330. While the first marker ball was being installed after lunch, a ground crew member took a video of the installation. The video captured the helicopter's subsequent sudden descent.

The video revealed that while the helicopter was in a hover facing northeast, a yellow flame came from the engine exhaust, followed by a puff of black smoke. The helicopter was seen backing away from the power line and descending in a left-hand rotation. The helicopter subsequently collided with the terrain on an island in the river, which was not captured on the video. The pilot and external platform worker were fatally injured, and the helicopter was destroyed in a post-impact fire.

Aircraft information

The Hughes 369D, also referred to as an MD Helicopters Inc. 369D, was a five-place, single-turbine-engine (Rolls Royce 250-C20B, serial number CAE832457) helicopter equipped with a five-bladed, fully articulated main rotor system and a two-bladed, semi-rigid type, anti-torque tail rotor. The helicopter was certified with a maximum take-off weight of 3,000 pounds and for day and night flights under visual flight rules. The helicopter had skid-type landing gear and was modified

with an external work platform under the authority of Supplemental Type Certificate (STC) C-LSH11-012/D. The STC allowed the helicopter to carry out Class D external load operations. The helicopter was also modified with an inlet barrier filter (IBF) system under the authority of STC SH04-24. The IBF system provides enhanced filtration of the inlet air to the compressor to protect it from debris and foreign object damage.

The helicopter had accumulated 14,335 flight hours, and there were no deferred or outstanding defects. Before takeoff for the occurrence flight, there were no known technical difficulties with the helicopter.

Wreckage and impact information

The accident site was located on an island in the North Saskatchewan River. The terrain was a flat wooded area, consisting of small trees, hedges, and shrubs. The helicopter struck the ground in a level attitude with a high rate of vertical descent and no forward speed. The helicopter did not leave a wreckage trail and came to rest facing northeast. A post-impact fire consumed approximately 80 percent of the helicopter structure and the surrounding vegetation.

Damage to the main and tail rotor blades indicated very low rotor torque and speed at the time of impact. An inspection of the rotor system revealed that there was continuity

from the main rotor transmission to the main rotor hub. Inspections of the engine and flight controls for continuity were inconclusive because of the extent of the fire damage. Inspections of several components, including the oil and fuel filters, were also inconclusive because of fire damage.

An inspection of the engine revealed that the accessory gearbox had been completely consumed by the post-impact fire. The rest of the engine was secured and taken to the TSB's regional wreckage examination facility for further analysis.

Single-engine helicopter hover operation

All helicopter operations include a state of hover during various transitions in flight, such as from vertical ascent to forward flight. However, time spent in a hover is relatively short. The nature of marker ball installation and various other aerial operations requires the helicopter to be in a hover for prolonged periods. If an engine failure occurs while the helicopter is in a hover, a minimum altitude is required for the helicopter to initiate a descent and gain sufficient airspeed to conduct a successful autorotation landing.

The airworthiness standards listed in the CARs require helicopters to carry a rotorcraft flight manual (RFM) on board during flight operations. The RFM contains information (such as limitations, emergency procedures, normal procedures, performance data, weight, and balance) that applies to that specific helicopter. Regulatory compliance with the RFM is confined to the Limitations section of the manual. Performance data in the Hughes 369D RFM include a height velocity diagram, in which the cross-hatched region of the diagram represents combinations of airspeed and altitude from which a successful autorotation landing is unlikely.

The Hughes 369D RFM also states: "Operation of the helicopter in the cross-hatched area is not prohibited, but should be avoided." In addition, the RFM emergency procedures state, "Flight within the cross-hatched regions represent [sic] airspeed/altitude combinations from which a successful autorotation landing may be difficult to perform. Operation within the cross-hatched area should be undertaken with caution." At the time of the engine failure, the helicopter was at 325 feet above ground level in a hover with an airspeed of zero knots, which placed the helicopter within the cross-hatched region (marked with red square) of the graph diagram on these pages.

Survivability

The accident occurred on an uninhabited island, and first responders had to swim across the river and hike through dense bush to gain access to the site. At the time of the engine failure, the helicopter was in a hover at an altitude from which a successful autorotation landing was unlikely. Although the autorotative force required for a successful autorotation landing was not generated, the helicopter had attained a significant vertical rate of descent just before impact; the investigation determined that it was approximately 2,600 feet per minute.

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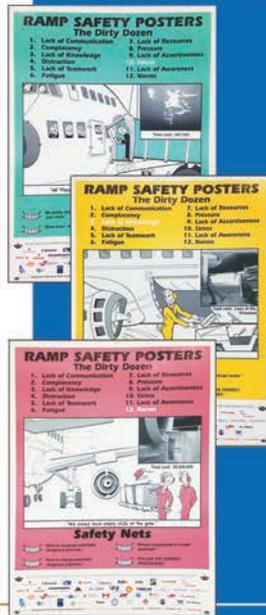
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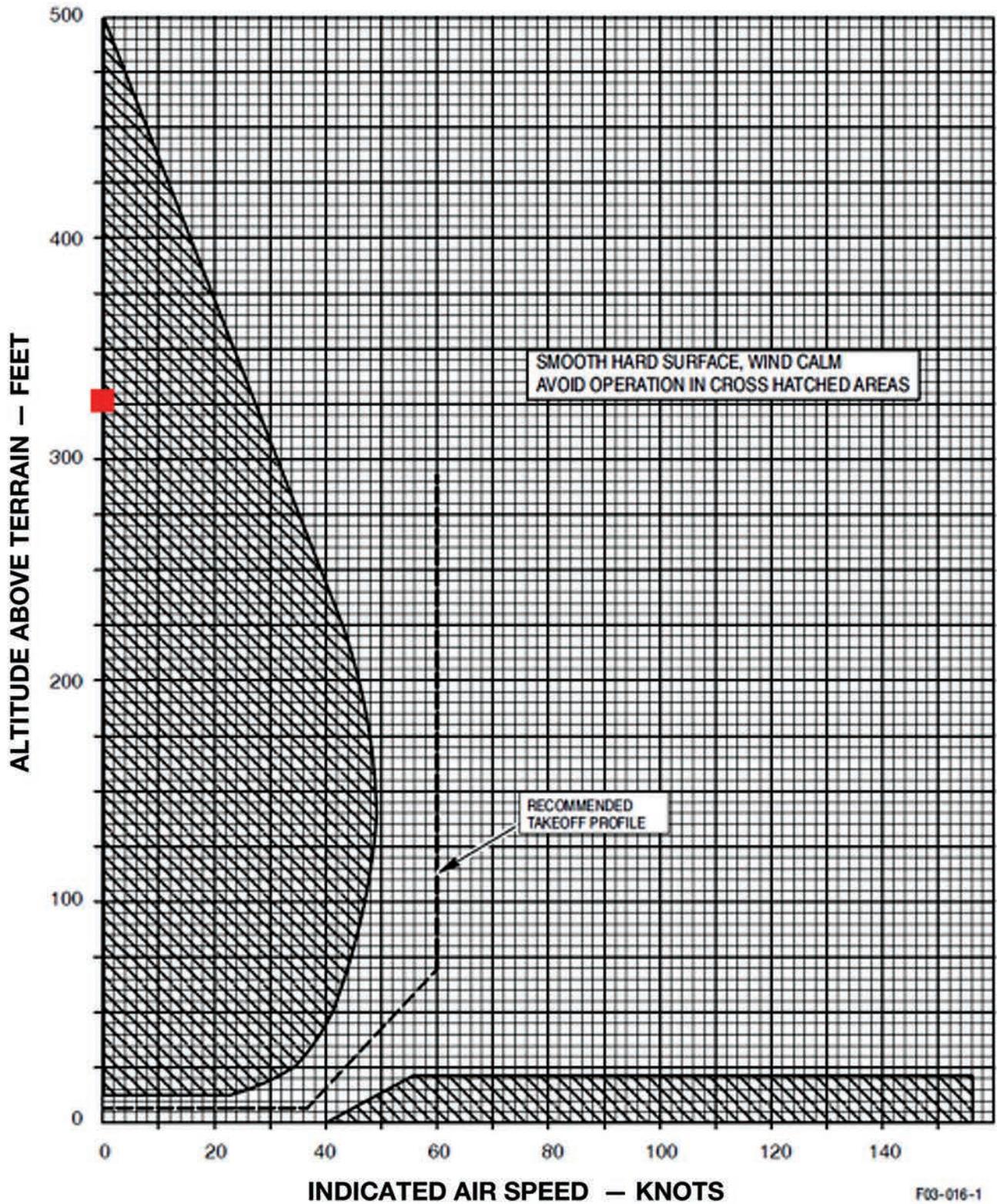


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Powerplant (engine)

The post-impact fire substantially damaged the helicopter's engine. An external inspection of the engine revealed protrusions and radial deformation to the compressor housing. The compressor section of a gas turbine engine takes in ambient air and increases air pressure for use in the combustion process. The compressor assembly consists of an axial compressor, centrifugal compressor/impeller, compressor case, and diffuser scroll.

Disassembly of the compressor assembly revealed complete failure of stages 2, 3, and 4 of the axial compressor blades. The compressor front support struts did not exhibit any pre-impact anomalies. The stage 1 compressor blades were fully intact. Examination of the compressor front support struts and stage 1 compressor blades did not show any signs of pre-existing erosion/corrosion. The stage 5 and 6 compressor blades showed progressively less damage. Examination of the compressor assembly revealed that all of the stage 2, 3, and 4 compressor blades had separated near the root.

Six of the failed compressor blade roots had partial, readable fracture surfaces. Inspection of the fracture surfaces under the scanning electron microscope revealed overstress failures. The remaining fracture surfaces of the failed compressor blade roots exhibited post-fracture rub and smear.

Examination of the compressor case assembly revealed that the stage 1, 5, and 6 stator vanes were all present but exhibited bending and distortion. All of the stage 3 and 4 stator vanes had fractured near the root. All fractures exhibited post-fracture rub and smear.

All but 3 of the stage 2 stator vanes were present. The 3 missing stage 2 stator vanes had fractured near the root. Examination of these fracture surfaces revealed post-fracture rub and smear as well as a layer of high-temperature oxidation. Fracture analysis of the recovered airfoil fragments found downstream in the engine were inconclusive because of smearing and secondary impact damage. A review of TC Civil Aviation's Service Difficulty Report da-



tabase (which, in addition to Canadian data, includes data from the U.S. Federal Aviation Administration and the Australian Civil Aviation Safety Authority) revealed that, in the past 10 years, there have been 13 Allison 250-C20, C20B, and C20J compressor failures (fracture or excessive wear) that could not clearly be attributed to foreign object damage.

Compressor assembly overhaul and maintenance

Aircraft components, such as the engine, are continuously subjected to extremely harsh operating conditions that can affect their structural integrity by inducing wear and fatigue.

Through experience and research, manufacturers have established maximum hours between overhauls; compliance with these time periods greatly reduces the likelihood that the component will fail. Rolls Royce's maintenance practices recommend that the compressor assembly be overhauled at 3,500-hour intervals.

The compressor assembly is also subject to an inspection of the compressor case, stator vanes, and compressor blades at 1,750-hour intervals. A review of the maintenance records revealed that the compressor in the occurrence helicopter had received the required 1,750-hour inspection in March 2012, and no

defects were noted. At the time of the occurrence, the subject compressor had a total of 3,453 hours of service. The helicopter had accumulated approximately 570 hours in a salt air environment within the first year following the 1,750-hour compressor inspection. Most of the 2.5 years of service before the occurrence were spent further inland.

Operation in a salt air environment is considered by Rolls-Royce to be corrosive. It is recommended that operators conduct inspections after a reduced interval of 300 hours and daily fresh-water rinses. The investigation determined that Oceanview had not conducted the reduced-interval inspections and fresh-water rinses, as outlined in CSLs 1172 and 1135 and as required by the company's TC-approved MSA, while the helicopter was operated in a salt air environment.

Analysis

Records indicate that the pilot was certified and qualified for the flight in accordance with existing regulations. The investigation concluded that pilot fatigue did not play a role in the accident. As well, the weather conditions at the time were not considered to be a factor in this accident.

Before takeoff for the occurrence flight, there were no known technical

difficulties with the helicopter. It was also determined that the helicopter's airframe and flight control systems did not contribute to the occurrence.

The analysis will focus on the helicopter's powerplant, engine failure during a hover, the accident scenario, and survivability.

Powerplant (engine)

The yellow flame and puff of black smoke seen in the video are indicative of an engine failure. However, a definitive cause for the failure of the compressor assembly could not be determined because of secondary damage (post-fracture smear and rub).

Secondary damage of the compressor assembly and airfoil fragments found further downstream of the compressor section suggest that the engine was still running a short time after the initial compressor failure.

Lack of damage to the front support struts or to the stage 1 compressor blades suggests that the engine did not ingest any foreign objects. Compressor damage began with the stage 2 compressor blades. When considering the flow of air during compressor operation, the damage would progress downstream from the initial failure location.

The progression of damage suggests that the initial failure was located either in the stage 2 compressor blade or the stage 2 stator vanes. Because the stage 2 compressor blades were completely destroyed and there was no damage upstream, it is considered likely that the lead event was the failure of a stage 2 compressor blade, resulting in a loss of engine power.

A second, and less likely, scenario involves the failure of a stage 2 stator vane, which would have been deflected forward into the path of the stage 2 compressor blades, resulting in the fracture of the compressor blades and in damage cascading downstream.

Compressor assembly overhaul and maintenance

The compressor failed before its prescribed overhaul period had elapsed. The compressor had accumulated a total of 3,453 hours and, at the time of the occurrence, had 47 hours left before its next recommended overhaul.

The occurrence aircraft's compressor was subject to routine visual inspections during scheduled maintenance, with no anomalies noted. In addition, the aircraft was equipped with an inlet barrier filter system to prevent foreign objects from being ingested by the engine.

The compressor inlet, the front support struts, and the stage 1 blades did not exhibit any erosion/corrosion or any foreign object damage, suggesting that erosion/corrosion likely did not affect the other compressor assembly components. The inlet barrier filter system significantly reduced the possibility of blade erosion/corrosion and eliminated any foreign object damage to the compressor blade. Therefore, it is highly unlikely that erosion/corrosion or damage caused by foreign object ingestion contributed to the compressor failure.

It was determined that the lead event was likely the failure

of a stage 2 compressor blade; therefore, it is likely that the failed compressor blade was subject to fatigue and eventual overload failure before the prescribed overhaul period had elapsed; research suggests that this sort of failure is rare.

The investigation also concluded that, while not contributory in this occurrence, the reduced-interval erosion/corrosion inspection and daily fresh-water rinses of the compressor were not completed as recommended by the engine manufacturer. If operators do not follow manufacturer-recommended procedures when operating in an erosive/corrosive environment, there is an increased risk of an undetected and premature failure of the compressor.

Accident scenario

For the Hughes 369D helicopter to achieve a successful autorotation from a state of hover with no airspeed, required conditions include having a minimum altitude of 500 feet above ground level and then immediately transitioning into forward flight to maintain the rotor energy required to slow down the helicopter's rate of descent.

During the marker ball installation, the helicopter was hovering at an approximate altitude of 325 feet with very little wind. While the helicopter was in the hover, the engine lost power and the pilot then backed up the helicopter to avoid contact with the shield wire and cables below.

Without engine power, the helicopter's continued flight depended on the energy remaining in the rotor disc and on transitioning to forward flight. In this occurrence, the pilot had to avoid power lines and could not immediately transition into forward flight. A significant amount of rotor energy was expended while pulling back, and the helicopter began to descend. There was insufficient altitude to conduct a successful autorotation, and the helicopter collided with the terrain.

Survivability

The accident occurred on an uninhabited island, which resulted in a delayed response to the accident. By the time first responders arrived at the site, the helicopter and surrounding vegetation were engulfed by flames.

The rate of descent, calculated by analysis of the video, would have resulted in a G-force of 139 to 208 on impact. Possible attempts by the pilot to arrest the rate of descent before impact may have reduced impact forces; however, they remained above the threshold for survivability.

The G-forces sustained on impact were also well outside the structural limitations of the helicopter and resulted in the rupture of the fuel cell and a post-impact fire. It was determined that the accident was not survivable. Oceanview Helicopters Ltd. voluntarily suspended, and has not yet resumed, external platform worker operations.

(This report concludes the Transportation Safety Board's investigation into this occurrence. The Board authorized the release of this report on January 4, 2017. It was officially released on February 2, 2017.) ■

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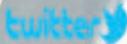
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Currently not hiring?

Much has been said about the aging demographic in Canada's AME community and how the dearth of young men and women entering the trade is a major source of concern for the industry. One mother in Ontario wrote us wondering why her recently graduated son cannot land a job.

By Jane Brown

I thought I would go out on a limb and request a story from you concerning the unemployment of unlicensed AMEs. My son graduated from Mohawk College in Ontario last June. He remains unable to secure any employment in his field of study: Aviation Maintenance Technician. He has sent resumes to AMOs and airlines across Canada, coast to coast without the success of finding work. He has also applied to every advertised Apprentice AME-Maintenance job across Canada and even the far north. He has applied for Ramp positions to no avail.

We are extremely disappointed that he has not secured employment in aviation. His teachers had advised that there were plenty of jobs and that obtaining work shouldn't be a problem. Wow, were they wrong!

There has been very little in the way of Apprentice positions. Everyone seems to want a licensed AME. Considering how long it takes for an Apprentice to become licensed I am shocked that there are not more positions available.

We thought that there would be some concern in the industry about the lack of aviation maintenance technicians when all of the Boomers start to retire. There appears to be very little concern in the aviation maintenance field judging by the lack of Apprentice positions. I don't know what the helicopter companies plan to do. I have yet to see any Apprentice AME jobs with them. Perhaps they have the ability to just cherry pick licensed AMEs. So here are my questions:

1. Are there enough AMEs in Canada, to the point of not requiring any Apprentice AME Technicians? Is the Ontario market saturated with AMEs? Are there too many graduates in this position in Ontario and elsewhere? What is the point of having colleges put out AME Apprentices if no one will hire them?

2. Why is there a reluctance to hire Apprentices for the future? Why is the industry not planning and taking into consideration the years it takes to put an Apprentice through their system to become a licensed AME?

3. What is the plan when the retirements increase and there are not enough licensed AMEs?



4. Is there going to be a sudden crunch in the industry when they all start to realize that they are not getting the licensed AME that they were holding out for?

5. Who can ring the alarm bell loud enough to motivate the industry into action?

6. Why are the helicopter companies not hiring Apprentices? I wonder if my son should just give up and go back to school to study something else.

(Jane Brown is a pseudonym we've given for the usual reasons, but her story is real and the questions she poses are thought provoking. If there are industry voices who would like to comment on any of the above, or if there are others with similar or even dissenting stories to share, please contact us for the opportunity of editorial space on this page. Ed.) ■

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