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WHAT'S ONLINE? 🔀 JUNE/JULY 2017



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Elan Head flies with legendary aerobatic pilot Chuck Aaron in an MBB Bo.105 near Camarillo, California. Aaron is now offering upset recognition and recovery training through his company FX LLC.

SKIP ROBINSON PHOTO

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TALKING POINT | MARIA LANGER



The phone call came in mid-February, while I was repositioning equipment for my late winter frost control job in the Sacramento area. It was someone new from my Flight Standards District Office (FSDO), "reminding" me that FAR 135.160 required me to install a radio altimeter on my Robinson R44 helicopter if I planned to keep flying it under Part 135 after April 24. A Letter of Deviation Authority (LODA) was available for helicopters under 2,950 pounds (1,338 kilograms), but it could take up to 60 days to get so I should make my request soon if I wanted one.

This was the first I'd heard of FAR 135.160 - I don't study the FARs in my spare time - but I wasn't worried. Getting the LODA was a no-brainer. My Raven II's max gross weight is 2,500 pounds (1,134 kilograms) and it's visual flight rules (VFR) only. I don't fly in instrument meteorological conditions (IMC): if I want to see how far I am from the ground, all I have to do is look out the window. A radio altimeter would not make my operations any safer and could possibly distract me. Surely the Federal Aviation Administration (FAA) understood this; after all, the LODA option seemed to be written specifically for aircraft like mine. Every pilot. aircraft owner, or mechanic I spoke to was certain that I'd get the LODA.

Apparently, we were all wrong. Although some FSDOs — for example, Las Vegas — did grant LODAs for Robinson R44s, my FSDO, Spokane, did not. I applied twice and was turned down twice.

Oddly, all FSDOs were working off guidance provided in FAA Notice 8900.405, which provides instructions for issuing the LODA in the form of "OpSpec A160, Letter of Deviation Authority (LODA) for Part 135 Rotorcraft Operations Without a Radio Altimeter." But not all FSDOs were interpreting it the same way. So while operators I contacted in Nevada and California were able to get the LODA, other operators I spoke to in Washington and Texas were not.

FAR PART 135.160: THE FAA'S

IRRATIONAL APPLICATION OF A RULE

This irrational application of FAR 135.160 could be financially catastrophic for small operators like me. Although the FAA had somehow estimated a maximum cost of compliance at \$9,000, early estimates put my cost as high as \$20,000 for the altimeter hardware, special mount to make it physically fit in my aircraft, and installation, which would also require my aircraft to be offline for a week or more. And although I only have one aircraft to upgrade, an operator I spoke to in Texas has three.

I'm not the kind of person who takes unreasonable policies sitting down. In the five weeks I fought the FAA on this, I involved AOPA, a lawyer, my Congressman, and my two Senators. I contacted four FAA people involved in the rulemaking process. My argument: The rule was clearly intended for larger aircraft with instrument flight rules (IFR) operations, such as air-medical transport and airtaxi in the Gulf. It addressed operations in IMC, brownout, whiteout, and flat light conditions; few (if any) R44 operators conduct Part 135 air taxi operations in those conditions. An R44 that is fully instrumented for Part 135 day and night VFR operations has a full panel: there's no room for another instrument. Compliance was an unreasonable financial burden on small operators of VFR-only aircraft. And the rule wasn't being applied consistently throughout the FAA's FSDOs.

In the end, I lost. The Spokane FSDO didn't budge — and didn't care about how unreasonable the requirement was. It was a rule handed down from Washington and it was their job to make sure Part 135 operators complied. To this day, I don't know why they wouldn't give me or other Part 135 operators flying R44s in Washington and Idaho the LODA; our helicopters certainly meet the requirements to get one.

This was bad news for me. In the first two weeks after the rule went into affect, I had

to turn down five flights. With contract work in my area coming up quickly, I couldn't find someone who could install the equipment before I'd be stuck in Wenatchee for the season. At first, I couldn't even find someone who said they were able to do it. And even if I could, I didn't have the money to pay for it.

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The FSDO did, however, offer me a temporary OpSpec A160 if I proved that I'd ordered a radio altimeter and set up an appointment for installation. They didn't seem to care when the appointment was. The shop in Arizona that had done my overhaul last winter said they could do it and gave me a quote of \$13,500. They'd do it this coming winter, when I bring my ship south for some tour work in the Phoenix area. The quote satisfied my FSDO's need for documentation. When I formally requested the temporary A160, they put it in the mail the same day. So even though I was supposedly required to have it by April 24, now I don't have to have it until December.

While it might be helpful for an IFR-capable aircraft and crew to have a radio altimeter on board, it makes no sense to require one for VFR-only operations. Unfortunately, the voices of the operators who spoke up during the rulemaking comment period weren't heard over those promising a quick fix to the problem of the air ambulance crashes that were plaguing the industry at the time.

When the FAA proposes a rule, operators *must* assume that it will affect them. It's vital to stay informed and comment during the rulemaking process. While it's uncertain that our voices will be heard, we can only blame ourselves if we don't try.

Maria Langer is a single pilot Part 135 operator. In addition to air-taxi flights and scenic tours, Maria's company, Flying M Air, LLC, also does cherry drying, frost control, aerial photo and survey flights, and the occasional multi-day helicopter excursion.



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Having now retired, it is interesting for me to reflect on an industry in which I started out as a student and hit all the rocks along the career stream en route to managing a company. By far the most exciting part of the journey was as a junior pilot. Everything was new and every job an adventure. But as my career progressed, I found one of the more challenging parts of the job was creating the same time building opportunities for junior staff that I was afforded when I started my career.

That was some time ago, and there are now several new generations of junior pilots who have come along since and are vying for their own adventures. But things are not the same as they were "back in the day." Particularly in the single pilot environment that most of us live in. Many clients and contracts now require significant experience levels before pilots are allowed to fly them, and the flexible opportunities that once existed to get those prerequisite hours are getting far fewer than they were years ago. If new to the job, proving one's self has become quite a challenge.

I don't have to look too far to think of such examples of someone looking for an opportunity to demonstrate their skill. While my father attended Dalhousie University completing an engineering degree, he and his class had an opportunity to display the creative and technical talents that lie dormant in young minds until called to action. Their home room professor was a very affable sort and all got on well with him, but one of their math professors turned out to be a bit of a cad. None of the students liked him and I am sure the sentiment worked both ways. This particular professor clearly lacked the social graces and acumen required to deal with a bunch of fuzz-faced engineering students. Game On!

While this professor did not like his students, it was very apparent he loved his new car. This vehicle obviously occupied a special place in his life, and he directed his affection towards it during the majority of his waking hours. Indeed, he may have regularly dreamt about the car. I do not know. As the professor's attention towards his car increased, so did the class's dislike of the professor.

This class of yet-to-graduate civil engineers got together and formed a plan of action. I do not have the specifics of the resulting conference, but I am sure alcohol was involved. An operation was conceived and tasks assigned. So it came to pass that one night, while the professor was away on a short sabbatical, and displaying the precision and timing worthy of U.S. Navy SEALs, the group scrounged various materials on campus. At the entrance to the University there was a pond with a small island in the middle. Under cover of darkness, they erected a portable bridge capable of carrying the weight of the professor's car across the water, and then deposited the vehicle safely on the island. Then, just as quickly, the bridge was

Like it or not, a bunch of us have retired, are retiring, or are thinking about it. Unless we help these folks at the start of their careers along the way, we are creating our own bottleneck — and will face the safety and operational issues that go along with it. taken apart and materials returned to their places of origin. The whole thing was over in a matter of hours. The U.S. Army Corps of Engineers would have been proud.

Our poor professor returned from his sabbatical to find his vehicle marooned on the island. It took a commercial construction company weeks and several thousands of dollars to retrieve that poor vehicle.

The group's home room professor first admonished the whole class for the sculduggery — not knowing exactly who was responsible, righteous indignation fell down from the chancellor's office on all who were registered with the University. But our home room professor had a hunch who the perpetrators were, and indicated that if it had been a course sanctioned project, all those involved would have received an "A." Dad was always a bit fuzzy about his personal involvement in the affair, but spoke to some of the particulars with great detail and pride.

I am not advocating that junior pilots exercise similar initiative and sling their ops managers' vehicles to some mountain top, but it would be nice to have a process acceptable to industry and its clients to help build time and experience in that all important group. Like it or not, a bunch of us have retired, are retiring, or are thinking about it. Unless we help these folks at the start of their careers along the way, we are creating our own bottleneck — and will face the safety and operational issues that go along with it.

Very prescriptive contract clauses along with a very litigious work environment makes breaking into our industry a difficult process. As a past operations manager and then a president/CEO, I won't hesitate to say to those caught in this crossfire: I feel your pain. It bothered me no end to see energetic and ambitious talent fade over time as we desperately hunted for flight opportunities for the young and the restless.

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An early exercise in the flight training program that sometimes gets glossed over by instructors is "attitudes and movements." And yet, instructors can present and explain all the motions of a helicopter in forward flight with this one exercise. Understanding pitch and bank attitudes, as well as the movements about the three airframe axes that control these attitudes, is an essential first step in learning to fly a rotary-winged vehicle.

So what are the attitudes and movements of a helicopter? First, let's describe how a helicopter maneuvers in the air. In flight, the airframe rotates about its center of gravity the center point of the helicopter's mass. This is usually at, or somewhere near, the rotor mast leading up to the blades.

The helicopter's orientation is the result of the amount of rotation along the three principal axes which pass through the center of gravity. The helicopter is able to pitch nose up and nose down about the lateral axis, and roll (turn) to the left or right about the longitudinal axis along the centerline. It can also twist or yaw back and forth horizontally about the vertical axis, which affects the trim of the aircraft. The pilot moves the pedals to control tail rotor pitch in flight to prevent yaw and keep the helicopter in trim. Helicopter yaw is inefficient, and an out of trim condition is hard on the tail boom.

The cyclic pitch lever in front of the pilot controls the helicopter's progress through the air. The cyclic is so named because of its orbital, cycling motion. Movements about the lateral axis are referred to as pitch attitudes. Nose pitch up to climb, and pitch down to increase speed. The collective pitch lever increases and decreases blade pitch and power, but oddly enough for aerodynamic reasons, has a secondary influence on attitude control also. Reducing power in flight will pitch the nose down slightly and the nose will pitch up when power is applied. The airframe will yaw about the vertical axis as well. This must be anticipated and corrected, and is one of the reasons helicopters are tricky to learn to fly.

Pilots who mostly fly in remote areas often have poor altitude control. They brush this off with the excuse that accurate height discipline in the middle of nowhere doesn't matter. However, getting from A to B is slower if your altitude wanders up and down. Also, if these pilots need to fly in busy urban areas, they must have good pitch and roll discipline because when air traffic control tells you to hold 2,500 feet on a specific heading, they mean it. Poor attitude discipline in mountainous terrain will also lead to sloppy control, and could get you into trouble. Accurate attitude control is good helicopter control no matter where you are.

The concept of moving the cyclic left and right to control direction makes sense. Nose up and down pitch attitudes are more difficult to come to grips with. A 10-year-old child would catch on to left and right turns with the cyclic, but holding a level attitude while turning would probably be a bit more confusing.

When you learned to drive the family car, the word attitude never cropped up. A car on a flat road starting to go up a hill changes pitch attitude automatically. Some cars have omni adjustable pitch and roll. Formula 1 race cars have very complex suspension system designs to control attitudes and movements. Race engineers are constantly seeking to maximize aerodynamic downforce, control, and mechanical grip by adjusting chassis attitude, rake, heave, and roll rates as the car speeds through the corners. Helicopter flight control is not quite so complex. Attitude, roll, and trim control movements are much simpler to visualize and manage in the air.

Horizontal yaw movement about the mast is not an attitude change nor is it desirable in flight. In fact a mechanical device could easily be designed to correct for yaw by altering tail rotor pitch accordingly each time the collective is raised or lowered. So why isn't this done? As long as speed is constant, the relation between tail rotor pitch and main rotor pitch is proportional, but at the hover below translation, the tail rotor pedals control direction separately from the collective, which controls height. Also, the airframe keel effect (which helps to prevent yaw) increases with speed, so the departing helicopter requires ever decreasing tail rotor pitch at a constant power setting as the airspeed builds. It's another reason helicopters can be a handful to fly.

Smooth and accurate attitude control is always the sign of a good helicopter pilot. Instructors should have a comprehensive lesson plan to present the flight exercise "attitudes and movements" to students. This early exercise is a building block to almost all of the following flight exercises in a training program, and should not be taken lightly.

Because the helicopter is an unstable platform, the best helicopter pilots have good attitude control and know that if sight with the ground is lost at any time, the result could be grave indeed. Pilots who know the importance of good attitude control have the discipline to maintain complete control in bad weather. Attitudes and the corresponding movements that bring about attitude change is a very important fundamental exercise to learn well in the early stages of helicopter training.

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If aerospace is where I make my money, boating and fishing is where I spend it. Most recently, I bought a used boat that was deemed reliable, in great shape, and dressed with enough bells and whistles to do everything but clean fish itself; in essence, the ultimate fishing machine. As is the case with most things used, I've spent some time combing over its systems and took particular interest in its wiring. Given the elements boats are exposed to — salt, moisture, and open air — it's no wonder that I discovered wiring with signs of degradation; not unlike the condition of wiring I have seen on aircraft exposed to similar environments.

Most commercial wire is comprised of bare copper strands sheathed with an insulating coating. Due to the properties of copper and its susceptibility to oxidation, in aerospace, all wire is of a tinned (metal coated) variety. Oxidation occurs when oxygen comes into contact with certain elements. In the case of metals, oxygen combines with the metal to form an oxide, and the bond of the metal itself is weakened. The process of tinning helps resist the onset of oxidation, or at a minimum, slows it down.

One interesting aspect of oxidation is that it accelerates with increased temperature. In high heat conditions, oxidation can be rampant. You can combat it by using a wire type that carries a specified high maximum service temperature rating. We employ three common wire varieties in our shop: Mil-spec M22759/34 (tin-coated), /41 (nickel-coated), and /43 (silver-coated). Of these three, tin has the lowest maximum temperature rating at 150 C (302 F), silver at 250 C (482 F) and nickel at 450 C (842 F). The selection of wire is based on its intended use, so engine harnesses should be built with either silver or nickel coated wire to withstand the higher temperature.

In most aerospace electrical and avionics systems, wire is interconnected by a variety of termination styles. It is often in the form of a crimp-style contact, where the ends of the wire are stripped back, a contact is inserted over top of the exposed strands, and a calibrated hand tool is used to crimp the contact to the wire. This ensures a secure connection. Although not as prevalent as in years past, soldered terminations still exist, and provide a more labor-intensive means of interconnecting wire, using heat and solder, which is an alloy of tin and lead.

Noble metals like silver are resistant to oxidation and corrosion and have a high solderability, as does tin. Nickel, on the other hand, is a less noble metal and requires a high amount of heat input during the soldering process. I have often heard fellow technicians comment

One interesting aspect of oxidation is that it accelerates with increased temperature. In high heat conditions, oxidation can be rampant. You can combat it by using a wire type that carries a specified high maximum service temperature rating. on how nickel wire cannot be soldered. This is not true. However, it does require a balance of high heat and the use of a chemical cleaning agent — flux — during soldering. Due to the high heat required, oxidation of the wire is immediate. In order to prevent this and ensure a solid bond of solder to the wire and its termination point, flux acts as a purifier, preventing the build-up of oxides.

I have often come across reported electrical problems where wires became disconnected from their source or destination due to heat, fatigue, or corrosion. Oddly, oxidation has been pegged as the catalyst in each of these types of wire failures. The concern, of course, is that the current-carrying capability of a wire relies on its size and conductivity. Since oxidation degrades a wire by forming a layer of oxides on its surface, it essentially acts as an insulator, causing the wire to lose some conductivity properties. This can result in an increase in wire resistance, which impedes electrical current flow and creates heat at the specific junction. Heat, in turn, can weaken the wire, which over time will fatigue to the point of premature failure.

Oftentimes, we are tasked with upgrading systems and asked to use the existing wiring where possible. This request often puzzles me. While the intent is often to minimize installation time, reducing overall short-term cost, it is negated by the long-term cost of repairing and troubleshooting systems with aged wiring.

Wiring doesn't always serve a visual function, nor is it as glamorous as a touchscreen GPS, but it is vital in the function it serves. It is the lifeline of any serviceable electrical or avionics system, and truly adds a net value to your flying asset and a margin of confidence in the reliability and safety of its systems.

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FIELD OPS PHOTOS FOR THE FIELD





Gary Morris spotted this Bell 407 at the Helicopter Museum in Weston-super-Mare, England, one of the stops on its around-the-world tour.



Takeoff in a Mil Mi-2 from a field in the region of Konakovo, Russia. during a training camp in helicopter precision flying by the Russian Federation of Helicopter Sports. **Constantin Chryssanthis Photo**





Uber unveils ambitious e-VTOL plan

Transportation tech company to launch electric VTOL aircraft in Dallas and Dubai by 2020

BY ELAN HEAD



new generation of electric air taxis could dramatically transform low-altitude urban airspace within the next decade

 although these small vertical takeoff and landing (VTOL) aircraft are unlikely to replace helicopters as we know them.

The e-VTOL revolution is being led by the ride-sharing technology company Uber, which convened the Uber Elevate Summit

in Dallas, Texas, April 25 to 27 to explore a future in which electric aircraft would radically expand urban mobility.

Why Dallas? As Uber chief product officer Jeff Holden announced at the summit, Dallas will be one of two launch cities for the Uber Elevate concept — the other being Dubai, United Arab Emirates. According to Holden, Uber aims to deploy its first air taxis in these cities by 2020.

"Dallas is the perfect place because it has

this rich history of aviation," Holden told the crowd at the Elevate Summit.

The Dallas-Fort Worth area also has supportive local governments, a real estate development partner eager to start building the necessary infrastructure, and aviation companies — including Bell Helicopter — that are fully behind Uber's vision.

That vision is at once more practical and more ambitious than the longstanding science fiction fantasy of personal flying cars. While personal VTOL aircraft have always promised exceptional mobility, large-scale deployment of individually owned aircraft would present a host of safety, training, and deconfliction concerns.

Instead, Uber imagines a near-term future in which small e-VTOL aircraft would be operated commercially from established vertiports as on-demand air taxis. Cleaner and quieter than helicopters thanks to their electric propulsion — and consequently more readily tolerated by urban residents — these e-VTOLs could be deployed in numbers that would enable high production volume manufacturing and associated economies of scale.

Indeed, Holden predicted that in the medium term, an e-VTOL air taxi's cost per passenger mile could be as low as US\$1.32, comparable to the present cost of an UberX transport. In the long term, he said, the cost per passenger mile could fall below the variable cost of a passenger car, which could encourage more people to rethink car ownership altogether.

"If we can provide ubiquity and low cost, people will actually dispense with their privately owned vehicle," Holden said.

But achieving that kind of efficiency and affordability will require a very specific design approach — one that, among other things, trades hover performance for efficiency in cruise flight.

As Uber observed in a white paper published in October 2016, helicopters are designed for military and multi-use roles that require sustained hovering for extended periods of time, and are relatively inefficient in cruise flight. By contrast, e-VTOL air taxis will spend most of their time in cruise flight and can be optimized accordingly.

On the first day of the Elevate Summit, Aurora Flight Sciences unveiled one approach to that kind of design optimization. Based on the XV-24A X-plane that Aurora is developing for the U.S. Department of Defense, the company's proposed e-VTOL air taxi uses multiple rotors low to the ground for hover capability, and wings and a rear-mounted propeller for forward flight.

According to Aurora e-VTOL program manager Diana Segel, the aircraft was designed to be extremely simple and efficient, and has already flown successfully in a subscale version.

"We really feel we have a viable concept here that can be realized near term because of its simplicity, and that we can also make available for a very attractive cost, compared to more complex designs," she said.

Aurora isn't the only company with a vision for e-VTOL air taxis. Also on Tuesday, Carter Aviation Technologies president and CEO Jay Carter announced that his company is partnering with Mooney International on an e-VTOL aircraft based on Carter's Slowed Rotor Compound (SR/C) technology.

And, the German startup Lilium presented its concept for a five-place e-VTOL jet that promises a 300-kilometer (185-mile) range and 300 km/hr cruise speed.

Major aircraft manufacturers are also jumping on the e-VTOL bandwagon. At the Elevate Summit, A³, the Silicon Valley outpost of



Airbus, discussed its previously announced e-VTOL concept, Project Vahana. According to A³ head of autonomous systems Arne Stoschek, vehicle development is underway in Silicon Valley, and the company has already completed some subscale flights.

Bell Helicopter is also actively involved in e-VTOL development. Although the company did not unveil a specific aircraft concept at the summit, director of engineering innovation Scott Drennan told attendees that Bell will have a "modular, adaptable and scalable" design. He said that Bell's concept will be "agnostic" with respect to energy storage, able to accommodate both electric and hybrid electric systems.

But developing and certifying appropriate aircraft is only half the battle. A viable network of e-VTOL air taxis will also require significant investments in infrastructure, including vertiports with charging facilities. In Dallas, Uber is partnering on initial vertiport development with the real estate developer Hillwood, whose chairman, Ross Perot Jr., is also an accomplished pilot.

Speaking at the Elevate Summit, Perot expressed optimism that the Dallas-Fort Worth metro area will erect its first vertiports within the next few years, beginning with a vertiport at Hillwood's Frisco Station development, just north of Dallas. "At the big entertainment hubs in North Texas, we can fairly quickly get these vertiports up," he said. "It's going to be wonderful to bring more and more people into this aviation community."

Uber anticipates that on-demand e-VTOL air taxi operations will begin with piloted aircraft operating within existing air traffic control (ATC) systems. However, as operations expand, new ATC systems will be needed to handle the volume of traffic, and the aircraft will likely transition to largely or fully autonomous operations — which will present additional certification hurdles.

Given the myriad challenges involved, it could be quite some time before Uber's vision is fully realized. But the company maintains that the potential benefits in terms of urban mobility and livability warrant its ambitious approach.

Of this brave new world — in which car ownership is optional, and nightmare commutes are a thing of the past — "we just want to usher it in as fast as possible because we all want to live in this world," Holden said.

AW609 crash report released

Flight control laws and project simulator flagged by investigators

BY OLIVER JOHNSON

evere latero-directional oscillations during a high-speed dive caused the fatal crash of a Leonardo AW609 during flighttesting in 2015, Italian investigators have

found.

The aircraft's excessive yaw angle forced its proprotors to hit its wings multiple times, damaging the hydraulic and fuel lines, and causing an in-flight breakup and fire. The resulting crash fatally injured test pilots Herb Moran and Pietro Venanzi.

The findings were detailed in the final report on the accident from Italy's national agency for flight safety (Agenzia Nazionale

The fatal crash of the second AW609 tiltrotor prototype last year raised new questions about this 20-year-old development program. **Leonardo Helicopters Photo**

per la Sicurezza del Volo, or ANSV), in which it also points to two other causes: the AW609's flight control system (FCS) control laws, and a project simulator (SIMRX) that "did not foresee the event in any way."

The ANSV also noted that the accident flight was the first in which such speeds had been reached in the new configuration of a streamlined fuselage in the tail and a reduced tail fin surface.

The wreckage of the aircraft, which was the second prototype, was found in three main parts near the town of Tronzano Vercellese in Italy. The ANSV said the distribution of the debris was coherent with a structural breakup in flight, which then caused an explosion and ballistic trajectory towards the point of impact on the ground.

The accident took place as the aircraft was performing the third high-speed dive of a test flight on Oct. 30, 2015. The pilots commenced the dive with a left 180-degree turn, targeting 293 knots for the maneuver (though the aircraft reached a maximum airspeed of 306 knots as the crew attempted to resolve the ensuing controllability issues). According to the report, the oscillation started on the roll axis following the exit from the turn, about four seconds into the maneuver. Shortly afterwards, another oscillation, this time in yaw, was added to the initial slight oscillation in roll.

"The crew did not initially react using inputs to counteract them," the ANSV stated, noting that the oscillating phenomenon



had been noticed in previous test flights, but it was considered to be slight and not dangerous, and was believed to be selfdamping.

As the crew felt the oscillations increase in magnitude, about 23 seconds into the maneuver, Moran tried to counter them by "roll tracking" — maneuvering the aircraft on the roll axis — the standard pilot procedure for this type of condition. Noticing a pronounced yaw condition, he then attempted to counter this using his rudder pedals.

Around this time, an amber "QBALTH" message appeared on the EPDU, indicating a problem with the torque balancing ratio.

The ANSV explained that the aircraft's control laws worked against Moran's countering maneuvers. "A roll command [in the AW609] is transferred by the control laws into different commands that are sent to the control surfaces that act on the roll (for example: flaperons) and to the differential collective pitch control, that, in this aircraft, regulates yaw," the ANSV stated in the report. This coupling is to compensate for the expected aerodynamic effect of flaperon control surface motion.

So, despite Moran performing the standard compensating procedure, it served to increase the oscillations.

A few seconds later, the first proprotor came into contact with the leading edge of the right wing "and the aircraft started to become irredeemably uncontrollable."

The ANSV said the excessive flapping of the proprotors was caused primarily by the sideslip angle reached by the aircraft that exceeded, by nearly two and a half times, the maximum flight envelope value at the speed of 293 knots (10.5 degrees as opposed to the four degrees maximum allowed).

A similar phenomenon had been found during a flight test on July 17, 2014, when angle of attack, angle of bank, mach number, rate of decent and number of "g" caused an accelerated stall of the aircraft's right wing, and a significant sideslip developed due to lateral acceleration.

The situation caused excessive flapping on the right proprotor to the extent that it made light contact with the leading edge of the right wing, but in that instance, the crew was able to maintain control of the aircraft and perform an emergency landing.

Following the 2014 incident, Leonardo established new procedures and limitations in the flight envelope. A new parameter

(QBALTH) was added to be continuously monitored; between 0.7 and 1, an amber message appeared on the EPDU, with no crew action required. Above 1, and the message appeared in red, and the test would have to be interrupted and the aircraft smoothly leveled.

During its investigation, the ANSV said that it visited AgustaWestland Philadelphia Corporation to use the aircraft's flight simulator, but noted that it was "not possible" to reproduce the conditions that occurred during the accident.

"As evidenced by the tests carried out by the ANSV, the simulator demonstrated not being able to faithfully reproduce the dynamics occurred during test flight T664 [the accident flight], reasonably due to the non-representativeness of the aerodynamic set, for the unique and extreme conditions encountered, obtainable in the wind tunnel for the new updated configuration including the tapered rear fuselage and the modified tail fin," the report states.

"Therefore, the [simulator] was not really able to properly carry out the role of test bench for the control laws and risk reduction."

In its safety recommendations, the ANSV said the AW609's control laws should be reviewed in the management of the extreme flight conditions in which the aircraft could possibly fly. "That verification should be addressed to ensure the effectiveness of the flight controls inputs given by the pilot avoiding the possibility of unexpected and un-commanded coupling effects."

It also called for the mandatory requirement of flight data recorders in experimental aircraft — those on the AW609 were in place solely because Leonardo had chosen to do so, but were central to providing the information the agency needed to piece together the accident.

When reached for comment, Leonardo said it would issue a statement "following complete analysis and review of the report."

Flight testing of the AW609 was suspended following the accident, resuming in August 2016. The third prototype of the aircraft joined the flight test program earlier this year.

Leonardo is targeting certification of the aircraft by the Federal Aviation Administration in mid-2018, with the first delivery later that year.

AIRBUS ROLLS OUT 700[™] H130

BITS

irbus Helicopters celebrated a major milestone in early May with the rollout of the 700th H130, which will be operated by a private customer.

The H130 fleet has so far accumulated more than 1.8 million flight hours with 340 operators worldwide. Since entry into service of the first EC130 in 2001, the light single engine helicopter has continued to evolve, with the latest H130 variant being certified in 2012.

Since the beginning of this year, all H130s are produced with a glass cockpit for increased pilot awareness and enhanced safety.



AIRWORK RECEIVES FAA STC FOR MBB BK117 B2 KIT

irwork (NZ) Limited has obtained a Federal Aviation Administration supplemental type certificate (STC) for its MBB BK117 B2 cargo hook and mirror kit.

The BK117 cargo hook has a carrying capacity of up to 2,645 pounds (1,200 kilograms). It utilizes the Onboard Systems cargo hook with the option of either hydraulic or manual release and can be mounted to either an Airworkmanufactured or original equipment manufacturer cargo sling. The hydraulic release lever is installed on the collective.

The BK117 cargo hook mirror kit allows the pilot to view the cargo hook through the lower chin window for improved visibility when performing cargo hook operations. There are single or dual mirror options available.





Sim center to be built in Sudbury

BY KENNETH I. SWARTZ

C

anada is the home for the world's second largest fleet of civil helicopters, but for decades, most Canadian helicopter pilots seeking advanced

training in a flight simulator had to fly south to the United States.

Now, Aircrew Training Canada Limited (ATCL) plans to offer simulator training closer to home at a new multi-simulator helicopter

training center to be located in Sudbury, Ontario — a one-hour airline flight north of Toronto, near the geographic center of Canada.

ATCL is the brainchild of Dan Melanson and his partner Joe Natale, with the initial team also including Dennis Venturi and Tom Grover.

"About six years ago, I spent a lot of time looking at flight simulators and recognized that helicopter flight simulators were becoming much more sophisticated and



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affordable and that new training opportunities were emerging," ATCL founder and CEO Melanson told *Vertical*.

"Most pilots flying twin-engine IFR [instrument flight rules] helicopters in Canada were training on full-flight simulators [FFS] and seeing the safety benefits, but pilots flying single-engine VFR [visual flight rules] helicopters were almost totally ignored."

Melanson pulled a team together two years ago to establish a state-of-the-art helicopter pilot and maintenance training center in Canada.

The 20,000-square-foot ATCL facility will feature a helicopter and hangar and be equipped with four Frasca Level D FFS for the Bell 407GX, Airbus H130, Sikorsky S-76C++, and Leonardo AW139.

"Frasca produces an excellent simulator visual system and Motion Cueing System and they are a family-owned business that is very responsive and like-minded when it comes to training innovation," said Melanson.

ATCL will shortly decide which simulator will be first on order, with delivery expected in about 14 months. Subsequent simulators will follow at four- to six-month intervals. The first simulator training class will commence in late summer or early fall 2018.

"We are going to offer a full pilot ground school, aircraft maintenance system training, and flight training for four different helicopter families made by four different manufacturers," said Venturi, VP of training at ATCL.

Scenario-based training will be the key focus of the facility and ATCL plans to work very closely with its customers to provide a training program that precisely meets an operator's requirements, right down to a visual database of its helicopter base and work locations — all mapped using a Lidarequipped helicopter.

While the training center will be funded by a private investor, ATCL is also approaching the federal and provincial government for financial support, as the facility will help Sudbury and northeastern Ontario diversify their economies.

ATCL will house the latest of a growing number of helicopter simulation devices in Canada. In 2016, offshore operators, led by Cougar Helicopters, started training on a CAE Level D Sikorsky S-92 FFS in Mount Pearl, Newfoundland; and HNZ Group introduced a Frasca Level 7 Airbus AS350/H125 flight training device in Edmonton, Alberta.

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H225 Norway crash probe continues

BY THIERRY DUBOIS

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ver a year after the fatal crash of an Airbus Helicopters H225 (EC225 LP Super Puma) operated by CHC near Turøy,

Norway, investigators from the Accident Investigation Board of Norway (AIBN) are still trying to fathom why a crack initiated in the main rotor gearbox (MGB) and how it propagated.

In a preliminary report on the crash released on April 28, investigators raised questions about the certification process, as the failure mode "seems to differ from what was expected."

The AIBN also confirmed "many similarities" with the MGB failure that led to the fatal crash of an Airbus Helicopters AS332 L2 (G-REDL) off the coast of Peterhead, Scotland, in 2009.

"The AIBN will continue the investigation into how and why two similar catastrophic accidents could happen to near identical helicopters only seven years apart," the AIBN report stated. "Further assessment of the followup on the G-REDL safety recommendations and the continuing airworthiness of the gearbox after 2009 is a relevant issue."

The investigation has shown that the crash on April 29, 2016, which resulted in the deaths of all 13 people on board, was the result of a fatigue fracture in one

of the eight second-stage planet gears in the epicyclic module of the MGB. The fatigue had its origin in the upper outer race of the bearing (inside of the gear), propagating towards the gear teeth. The crack initiation appears to be a surface micro-pit. However, the AIBN does not yet understand why the micro-pit formed and how and why the crack continued to grow sub-surface, thus preventing detection. No material conformity or manufacturing issues have been revealed during the investigation.

As previously revealed, the MGB had been involved in a road accident during transport in 2015, but the AIBN said it found no connection with the crack.

As to the similarity with the 2009 accident, the AIBN notes there was one warning of possible gear fracture in that case. Unfortunately, the actions taken did not recognize the degradation of the secondstage planet gear, which subsequently failed. It said there was no advance warning before last year's crash.

The AIBN said it will continue metallurgical examinations and seek to understand the underlying driving mechanisms of the fatigue fracture. This includes studying the recently salvaged second-stage planet carrier with the inner race from the fractured planet gear. The investigators, however, say they cannot estimate a completion date for the final report.

In a statement reacting to the publica-

tion of the AIBN's preliminary report, the European Aviation Safety Agency (EASA) said it continues to provide its full support to the investigation. "EASA continues to implement robust and proven certification processes taking into account all available information," the regulator added. "EASA proactively takes all necessary actions to mitigate identified possible contributory factors, in order to guarantee the safety of flights."

Meanwhile, in a statement issued following the release of the report, Airbus Helicopters CEO Guillaume Faury said the company was not aware of any issue related to the 2009 crash at the time of the Turøy crash.

"The information available to us from the 2016 accident has allowed us to take protective measures that we could unfortunately not have put in place in 2009 based on the knowledge and evidence available at the time, and also because significant parts from the 2009 accident [aircraft] were never recovered," he said.

"In the course of the investigation into the 2016 accident, we have implemented a set of protective measures which have been requested and validated by EASA. Nothing in this preliminary report alters this."

Faury added that Airbus was "totally committed to transparency" in all matters regarding aviation safety and international helicopter regulations.





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Kitty Hawk Flyer personal VTOL takes flight

start-up engineering firm backed by Google co-founder Larry Page has released footage of its prototype electric vertical takeoff and landing (VTOL) aircraft in flight over a lake in Northern California.

The Kitty Hawk Flyer — developed by Mountain View, California-based Kitty Hawk Corp. — is powered by eight electrically-driven rotors mounted on the underside of a web-like airframe. In the center of the frame is the "pilot" seat, which looks a lot like a jet ski or motorcycle seat. The aircraft's controls are built into two handlebars at the front of the seat.

At the bottom of the frame are two large pontoons — as this first version of the aircraft is specifically designed to fly over water.

The co-lead engineers on the Kitty Hawk Flyer are Cameron Robertson and Todd Reichert — who both worked on the AeroVelo project that won the AHS International Sikorsky prize for human-powered flight with the "Atlas" aircraft.

The company said the Flyer can automatically hold an altitude of up to 15 feet, and is classified as an FAR 103 Ultralight, so it doesn't require registration or a pilot certificate. It said the aircraft is for recreational use only, and can only be flown in uncongested areas.

According to Kitty Hawk, the aircraft will be available for sale by the end of this year with a different look and feel to that shown in the video.



he first prototype of the Kitty Hawk Flyer is specifically designed to fly over water. Kitty Hawk Corp. Photo



The AW119Kx flew 101 hours at various altitudes and in different temperatures over the course of its demo tour in Nepal. Leonardo Helicopters Photo

AW119Kx completes Himalayan demo tour

BY OLIVER JOHNSON

he Leonardo AW119Kx Koala completed a test and demonstration tour in Nepal in April, during which it flew up to the Mount Everest base camp and achieved a maximum altitude of 24,180 feet.

Piloted by Ezio Oliva and famed alpinist Simone Moro, the aircraft spent three weeks in the Himalayan country, testing the performance of the aircraft at high altitudes and demonstrating its performance in a variety of missions to a range of operators.

"If a helicopter can fly in Nepal, it can fly in any region of the planet," Moro told *Vertical* at the end of the tour. "The orographic nature of Nepal is really unique. You can go from 40 C [104 F] in the south to -40 C [-40 F] on the highest mountain on the planet. The reason why I suggested Nepal to Leonardo [for the demo tour] is because it is an authentic location for authentic missions."

Moro said the flights included "any kind of real mission" performed in the country, such as passenger and cargo transportation, medical evacuations, demonstration flights to potential customers, and experimental flights.

"We [have] shown — to local operators, [Nepalese] Army, local people, journalists and business people — how the Leonardo AW119Kx performs: fast, smoothly, high, and in all conditions," said Moro. "We also did test flights to perform [to] the real limits of the machine and the results had been amazing."

The aircraft flew 101 hours at various altitudes and in different temperatures over the course of the campaign, with the highest of its 350 landings at 18,800 feet. Its highest landing with a full load of six passengers and two pilots was at 14,040 feet, while the team also noted the aircraft restarted with "no problems at all" after landing and switching the engine off at Everest Base Camp at 17,500 feet.

"[The AW119Kx] performed the same as — or even better than — all the other helicopters that are currently working in Nepal," said Moro. "All were amazed and even surprised about the Leonardo singleengine helicopter."

As compared to the H125 AStar — an aircraft Moro has flown extensively in Nepal — Moro claimed there was little between the two aircraft in terms of high altitude performance.

"There is no difference now," he said. "We have photos and videos that certify the performance . . . and our AW119Kx was a standard one and not modified for the purpose [of high altitude performance]."

Following completion of the tour in mid-April, Moro left to pursue his other passion — climbing. He travelled to the base camp of Kanchenjunga — the third highest mountain in the world — to begin his attempt on the 28,169-foot peak.





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To help make flying safer for all of us, the FAA has enacted new rules requiring radar altimeters for all Part 135 commercial helicopter operators – as well as HTAWS terrain alerting for air ambulance operators. Also, most aircraft flying in U.S. controlled airspace will need ADS-B "Out" capability by year end of 2019. For the best in compliance solutions, Garmin is your go-to source. But don't wait. Dealer installation schedules are filling up fast. To learn more, visit Garmin.com/helicopters



ROTORBEAT RB INDUSTRY NEWS



EASA to slow down rulemaking

BY THIERRY DUBOIS

he European Aviation Safety Agency (EASA) has agreed on a cooldown period for new rulemaking, coinciding with

the French helicopter operator lobbying association's (UFH's) call for a two-year "regulatory pause" due to a recent glut of new rules that it said were jeopardizing the future of small operators.

UFH said it is common for an operator to receive 1,200 pages of regulation to review at a 10-day notice, which, by increasing the workload of staff, is detrimental to flight safety and economical health.

Since 2011, an estimated 10 to 15 percent of operators have disappeared, due to "the economic context, the lack of a stable regulatory prospect and insufficient political support," UFH said.

EASA's response is an unusual stance for an authority. It admits numerous new rules have been issued in recent years that do have a major impact on operators. Taking into account the workload it causes for the industry, EASA said it had begun to lessen its rulemaking activity even before the UFH went vocal.

"EASA has already agreed on a cooldown period for the issuance of new rules," said European Helicopter Association (EHA) president Jaime Arque. He agreed with UFH that regulation is published too fast, but noted the recent load of new rules was the result of a backlog of rulemaking.

Eric Bennett, EASA's air operations regulations officer, admitted that a lot of regulatory changes have been introduced over the last few years, but said the authority was pausing "creation activity" of new regulations. "EASA now has to ensure the maintenance of existing rules," he said. The authority's stated goals are to facilitate the use of new technologies, to maintain Europe's conformity to International Civil Aviation Organization (ICAO) standards, to factor in some safety recommendations and to "improve our system by simplifying it."

The implementation of new regulations has been keenly felt in France, where a rule banning single-engine commercial passenger flights has caused many operators to switch to twins, increasing prices by 30 to 100 percent. Slower demand is not the only consequence, according to UFH. Replacing a high-performance Airbus H125 single with a Bell 212 twin, for example, lessens the ability to perform various missions, UFH said.

Most recently, a new rule on special operations (SPO), including parachute dropping, human cargo and aerial filming became effective April 21. Operators will need to do a lot of work to comply with this rule, UFH said — a point acknowl-

edged by Bennett. The effort will notably have to be made by small helicopter companies that have already adapted to other rules, he said.

An unresolved element is the status of a TV camera operator on an SPO flight, as everyone on board such a flight is supposed to have followed the operator's crew resource management course. Such a requirement may be impractical for a TV organization, UFH pointed out.

EASA said it is willing to take into account operators' concerns. A simplification for sling load and human cargo operations has just been introduced in the SPO rule, and EASA is also about to consider changes requested by operators about single-engine operations; brief flights over populated areas may be allowed, Bennett said.

But the response comes too late, UFH complained, as most operators have already invested in twins.

Arque agreed that EASA does not react quickly enough. "We are making ourselves heard, but the problem is the slow response," he said.

EASA's newly-created rotorcraft sector committee, in which operators are represented, only has a consultative role. EHA and UFH nevertheless hope it will help operator needs be factored in at an earlier stage of future rulemaking.



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Erickson exits bankruptcy



rickson Incorporated has successfully emerged from Chapter 11 bankruptcy protection. The company exited bankruptcy

under new ownership on April 28, 2017, having satisfied the conditions of its confirmed plan of reorganization, which became effective following approximately five months of negotiations and court proceedings.

The company will move forward as a private-

ly-held small business, with the new ownership comprised of a diverse shareholder group that includes former bondholders.

"We are very pleased to have completed our financial restructuring in such an efficient and timely manner," said thenpresident and CEO Jeff Roberts following the announcement. "Chapter 11 allowed us to achieve rationalization of our aircraft fleet and deliver our balance sheet by over

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\$400 million in debt. We are exiting the restructuring process with significant available liquidity to fund the company's present and future business opportunities.

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Just a week later, on May 5, Roberts resigned from the company. Andrew Mills has been appointed as Erickson's interim president and CEO.

Mills has 25 years of experience in helicopter operations and contracting, and his aerial services career has seen him conduct business in more than 20 countries. "I am optimistic about our future at Erickson," said Mills. "Our new owners and I believe we deliver a significant value to customers and given our recent restructuring, we now have a far better financial path to move forward. We appreciate the support of our many stakeholders around the world."





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Wiking Helikopter Service is the first operator to take advantage of the H145's enhanced OEI power. Christian D. Keller Photo

Airbus enhances H145 OEI power

irbus has extended the flight envelope of the H145, after enhancing the helicopter's oneengine-inoperative (OEI) power.

With the increased power, the light-twin helicopter H145 can accommodate two additional technicians or can fly longer distances during a mission that requires



human external cargo (HEC) operations.

The OEI performance is especially important for HEC missions, as it gives operators more leeway for hoisting operations, which are strictly regulated in terms of engine power and weight parameters. The enhancement will provide a further boost to the H145's position in the offshore wind energy market, where it is used to transfer technicians to offshore platforms.

The enhanced power equates to roughly nine percent increased hover performance capability in OEI mode within the two minutes power band, allowing 40 percent more useful load for the operator.

Airbus said the improvement was implemented in alignment with helicopter operators and the offshore and energy industry, and was certified by the European Aviation Safety Agency (EASA) in March 2017.

The H145's enhanced power and load capabilities will also benefit those operators flying sea/harbor pilot transfer or powerline maintenance missions. The new certification allows safe OEI-performance for 2.5 minutes, as the higher 30-second OEI-power is taken into account within an emergency situation.

Wiking Helikopter Service GmbH, which just won the Sea Pilot Contract for the German North Sea for the next three years, was the first offshore operator to perform operations with the increased engine performance after the engine upgrade by Safran.

"The additional power reserves of the H145 contribute even more to safety and efficiency of our daily operations over the North Sea in all weather conditions," said Alexander von Plato, managing director of Wiking Helikopter Service.

The H145 in offshore configuration is equipped with a hoist certified for HEC, an emergency floatation system certified for Sea State 6, a helicopter emergency egress lighting system, a weather radar and an automatic deployable emergency locator transmitter. In its offshore seating configuration, the H145 can transport up to eight passengers.

Airbus Helicopters said it expects the global demand in the wind/offshore helicopter segment in this segment to grow to more than 1,000 aircraft in the medium term.



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The Lilium Jet's sleek, futuristic design makes it seem like something out of a sci-fi cartoon. But it could soon be commonplace in cities around the world. Lilium Image



Blade aims to bring e-VTOLs to New York City

The Uber-for-helicopters company hopes to bring electric vertical takeoff and landing aircraft to the city that never sleeps.

BY BEN FORREST



t a distance and in profile, the electric vertical takeoff and landing (e-VTOL) aircraft being developed by Munich-

based Lilium looks like a car without wheels, its streamlined body set against the skyline like a coupe ready to zip down an invisible highway.

Nose-on, it looks more like a small plane, with a compact cabin fronting two thin, enamel-white wings atop a fan system that provides vertical lift similar to a helicopter's.

Not long ago that may have seemed like something out of a sci-fi cartoon, more aspirational than realistic. Now it's a tangible example of the kind of e-VTOL aircraft that could soon be headed to New York City and other major centers around the world.

Lilium is one of several manufacturers that could supply e-VTOL aircraft to a system coordinated by Blade, a smartphone appdriven aviation company frequently compared to Uber.

Blade already coordinates helicopter charters with its smartphone app, drawing on a fleet of Airbus AS350s, AS355 TwinStars and AS365 Dauphins; Bell 407s and 429s; and Leonardo aircraft that its partners supply.

The company sees e-VTOL aircraft as complementary to its rotorcraft services,

covering similar distances and following the same rules as helicopters, but with lower noise emissions and a smaller environmental footprint.

"We're a long way off from this being a replacement solution — this is not unlike where we were with electric cars five years ago," said Rob Wiesenthal, CEO of Blade.

While Uber hopes to launch air taxi services in Dallas and Dubai by 2020, Blade is distancing itself from the air taxi label.

The typical length of an e-VTOL flight with Blade will depend on how much weight the aircraft can carry on a single battery charge, but it will not be a matter of hopping in for a few blocks.
"We don't like the term air taxis — at least for now," said Wiesenthal. "We don't think they're going to be the price of a ride-sharing car at the start. However, we're viewing e-VTOL as a very attractive alternative to conventional rotorcraft, especially for the beginning."

Blade envisions a co-habitation phase in which e-VTOLs would coexist with helicopters in New York and would "likely follow the same rules, altitudes, and routes as conventional rotorcraft to start," said Wiesenthal.

He wouldn't say how much a typical e-VTOL flight would cost, or when such aircraft would begin carrying passengers, citing the need for the aircraft's approval by the Federal Aviation Administration (FAA).

"Our strategy is to wait for FAA approval and then to methodically add them into our accessible fleet as quickly as possible but using the existing infrastructure," said Wiesenthal.

"Once that is accomplished, we will be in a great position to assess the additional infrastructure needs in our key operating areas given the inherent flexibility of these aircrafts."

All Blade e-VTOL flights would be arranged through the Blade app, which currently connects customers on several short routes in Florida, California and New York.

It is perhaps best known for its New York City routes for destinations in the Hamptons, but the company also actively services the Los Angeles region, with routes to Santa Monica, Van Nuys, Montecito, Palm Springs, San Diego and Burbank.

The company also offers an airport transfer service called Blade Bounce that carries passengers between Manhattan and surrounding airports.

Under an exclusive partnership with Delta Air Lines, arriving passengers at John F. Kennedy International Airport (JFK) are met on the jetbridge and taken down the stairs directly to the tarmac to an awaiting highend car, avoiding the terminal altogether.

The car carries them to an already-spinning helicopter that flies to Manhattan in about five minutes. Blade also has three lounges in Manhattan where passengers can be dropped off, and passengers departing out of JFK are escorted through TSA security in an expedited manner.

The Delta experience costs about \$1,250 with a six-seat private private helicopter, but

Blade also offers rides to JFK starting at \$195 on a by-the-seat basis.

"We're excited about the Delta partnership," said Wiesenthal. "We think this is a big game changer in terms of reducing the friction that people have either traveling to or from the airport in New York. We turn what can be a twohour car drive into a five-minute flight."

"Blade is also actively exploring opportunities in Europe and is close to releasing a 'cabin class' product that would use twin-engine, executive aircraft like the Leonardo AW139 and Sikorsky S-76," said Wiesenthal.

As for the arrival of e-VTOL aircraft in the skies above New York City, it will depend on the capabilities of the technology, as well as regulatory approval.

Lilium has already had a successful first flight of its e-VTOL aircraft, and several other manufacturers are working on similar initiatives, including Airbus Helicopters and Bell Helicopter.

"I'm relying on manufacturers to get these into production and I'm relying on the FAA to approve them, two gating factors out of my control," said Wiesenthal.

"It is happening. Sooner than most people believe. And we have to prepare for it."



Blade is considering using e-VTOL aircraft from



Blade envisions a co-habitation phase where helicopters would complement e-VTOL aircraft in the skies over New York City. **Blade Photo**

The Lilium e-VTOL jet looks a bit like a flying car or small plane, but it functions much like a helicopter, using a multi-fan system to provide vertical lift. Lilium Image



ROTORBEAT (RB) INDUSTRY NEWS

NTSB releases PIREPS report



iting how important weather reports by pilots are to flight safety, the National Transportation Safety Board (NTSB) has called for changes in training and procedures for pilots, air traffic controllers and others within the aviation community

to enhance the effectiveness of the entire pilot weather reporting system.

In a special investigation report released on April 13, the NTSB said the changes would reduce pilots' inadvertent encounters with hazardous weather and prevent weather-related accidents.

Pilot weather reports, or PIREPs, are brief reports from pilots of observed in-flight weather conditions. Pilots, flight dispatchers and air traffic controllers use the information gleaned from these reports to help all pilots avoid weather hazards, including those that may not otherwise be known from weather radar and other detection systems and forecasts. Meteorologists also use PIREPs to validate or amend forecasts, enhancing the accuracy of the weather information made available to the aviation community.

"Even with the many advances that have been made in weather modeling and forecasting in recent years, there's still nothing that can replicate the value of pilots' reports of the weather conditions they encounter," said NTSB acting chairman Robert L. Sumwalt. "As a longtime general aviation and air carrier pilot, I can't overemphasize the importance of PIREPs. They provide pilots of all types of aircraft with critical real-time information that can enhance safety for everyone in the skies."

In developing the report, *Improving Pilot Weather Report (PIREP)* Submission and Dissemination to Benefit Safety in the National Airspace System (NAS), NTSB staff investigated numerous aviation accidents in which weather was a factor and held a two-day forum on PIREPs in June 2016, which all revealed deficiencies in how PIREPs were reported, collected, disseminated and used.

Investigators uncovered a number of reasons why the pilot community makes relatively few PIREPs. These include insufficient emphasis during pilot training on the importance that PIREPs — including those reporting "as forecast" or favorable conditions — can play in flight safety, a lack of standard criteria for reporting certain weather phenomenon, and even concerns by pilots that they could be targeted for enforcement action if they report adverse weather conditions they were (or are) in for which they or their aircraft are not rated or qualified.

The report details numerous factors that contribute to the challenges that air traffic controllers face in soliciting, collecting, handling and disseminating PIREPs, including inadequate and conflicting guidance, a lack of best practices for all types of air traffic control facilities, insufficient automation capabilities and a lack of scenario-based training.

Investigators also noted that air cargo operators, which do the majority of their flying overnight, could significantly aid weather forecasters by increasing the frequency and number of PIREPs submitted on a daily basis.

To address the issues in the special investigation report, the NTSB issued safety recommendations to the Federal Aviation Administration, the National Weather Service, the National Air Traffic Controllers Association, the Aircraft Owners and Pilots Association Air Safety Institute, the Aviation Accreditation Board International, the National Association of Flight Instructors, the Society of Aviation and Flight Educators, and the Cargo Airline Association.



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CHC Summit moves to Texas

he 13th annual CHC Safety and Quality Summit is to take place near CHC's global headquarters in Texas from September 27 to 29, offering delegates from around the world the opportunity to participate in more than 80 concurrent sessions spread over three days. The sessions will cover all aspects of aviation safety, including human factors, emerging technology and its benefits, training opportunities and more.

"The CHC Safety and Quality Summit allows everyone who has a stake in the safety of our profession a chance to expand their networks and connect with current and future leaders in aviation," said Duncan Trapp, CHC's vice president of safety and quality. "We see this event as a starting point for the candid and important discussions around safety all of us need to be having daily with our colleagues, customers and other partners."

This year, the event will ask its delegates to consider what steps are needed to manage and insulate their employees from risks across all aspects of their operation. While there are many systems and processes designed to promote safety, there is a need to constantly question and check these barriers to make sure they are sufficient to keep everyone safe. The event is built around the two-part question: "Can we truly manage all the risk? What if the barriers are not as robust as they seem?"

The conversations and discussions throughout the summit will be led by some of the top minds in the aviation safety, human factors and rotorcraft fields, including the likes of doctors Scott Shappell of Embry-Riddle Aeronautical University and Douglas Wiegmann, cofounders of the Human Factors Analysis and Classification System (HFACS).

In addition to specific sessions throughout the summit, all delegates are invited to attend the opening day plenary session, which will feature presentations by Stephen Carver, senior lecturer in project and program management from the Cranfield School of Management, and Dr. Nicklas Dalstrom, human factors manager from Emirates Flight Operations Training. Additional leaders will be added to the lineup throughout the lead-up to the event.

As in previous years, summit delegates will have the option to attend two post-summit courses. These are the Accident/Incident Investigation course (Sept. 30 to Oct. 2), led by Mark Brosnan, safety and compliance manager at CHC Helicopter; and the HFACS course (Sept. 30 to Oct. 1), led by Dr. Shappell.

This years' event marks the first time it will be held in Texas. The Gaylord Texan Resort and Convention Center is located close to CHC's global headquarters, the Dallas-Ft. Worth International airport, and the greater aviation community.

"Safety through collaboration has long been a philosophy championed by CHC and others in our industry," said CHC president and CEO Karl Fessenden. "I, and the rest of us at CHC, are dedicated to continuing to share information across our industry. With the challenges we all face in a difficult global market, it is more important than ever to make sure that we continue to invest the time, resources and attention to keep safety at the forefront of all we do."

Additional information on the summit, including the venue, post-summit course offerings and registration options, can be found on chcsafetyqualitysummit.com.



Sikorsky making strides with Matrix

BY OLIVER JOHNSON

ork is continuing apace at Sikorsky Innovations on its Matrix Technology to enable autonomous and optionally piloted flight, as the manufacturer pursues both commercial certification and military qualification for the system.

"We want to fundamentally reinvent how helicopters and even [fixed-wing] aircraft are flown," said Chris Van Buiten, vice president of Sikorsky Innovations, during a media briefing at Lockheed Martin's Grand Prairie, Texas, facility on May 8.

"Our goal is to make flying fundamentally safer. Three quarters of accidents in helicopters today are controlled flights into terrain. . . . We think that autonomy systems on board the helicopter collaborating with the flight crew can eliminate the bulk of those accidents."

Sikorsky announced the launch of the Matrix Technology program in 2013. While it has been maturing it on two products: the Sikorsky Autonomy Research Aircraft (SARA) – a customized S-76B, and an optionally piloted UH-60A Black Hawk, it hopes to ultimately use the technology to augment pilot operations across its product line.

With funding from the Defense Advanced Research Projects Agency's (DARPA's) Aircrew Labor In-Cockpit Automation System (ALIAS) program, Sikorsky utilized its Matrix Technology to complete a 30-mile autonomous flight with SARA in May 2016, highlighting the ability to plan and execute every phase of an autonomous mission with a tablet device.

This was then followed with a second phase of the ALIAS program that involved integrating the Matrix Technology — as part of an autonomy kit that fit under the cabin floor — in both SARA and a Cessna 208 Caravan fixed-wing aircraft.

In January, DARPA announced it had selected Sikorsky to continue with phase three of the program, which will see the manufacturer enhance the system's ability to adapt to different missions and aircraft types, and switch between modes enabling flight with two, one, or no pilot or pilots.

Van Buiten said such a system would expand operational flexibility, improve safe-



Through the DARPA ALIAS program, Sikorsky has integrated its Matrix Technology on an S-76B and a Cessna 208 Caravan. **Sikorsky Photo**

ty, and reduce costs. "[The aircraft] can fly with two crew when you need it — lots of passengers in the back, complex mission — or one crew when it's simple, or no crew when it's outrageously boring and the aircraft can just run all day," he said.

"We'll enable the helicopter to take on new missions, [and] we'll enable it to execute emergency procedures beyond human capability."

When used in a "two-crew" mode, the automation allows the pilots to perform the most complex missions — such as a night landing in an obstacle-rich environment for an EMS pilot, or a nighttime assault for a military pilot — to be performed more safely, by fundamentally reducing the pilots' workload.

For a less demanding mission, such as a visual flight rules flight during the day, the "one-crew" mode could be used to minimize crew costs, with the operator perhaps controlling the aircraft through a tablet either from the cockpit or the cabin.

Finally, the "zero-crew" mode could be employed for the very simple operations, or for use in areas where it's too dangerous for people to fly — such as flying in a radioactive environment like above the Fukushima nuclear plant.

Van Buiten said the use of a tablet to control a helicopter amounted to a "reinvention" of the cockpit, enabling a non-pilot to fly SARA with just 10 minutes of orientation.

"You put in large fundamental commands, and it sorts out all the details," he said. "The tablet is just the interface between the human and the autonomy system on board the helicopter, and it enables the helicopter to fly all the different trajectory elements and mission elements that the helicopter is capable of."

However, when pressed for a certification timeline for system, Van Buiten admitted it was likely to be several years away, due to the technical, cultural and regulatory challenges the manufacturer needs to overcome.

"It's not going to happen overnight," he said. "Certification of new flight controls in a helicopter can easily be a four-year/five-year kind of journey. So pile on some additional cultural and regulatory challenges, new rulemaking — this isn't going to happen overnight. But it's a change worth pursuing."

Van Buiten said the certification process is made particularly complex due to the system having multiple sensors going into multiple redundant computers. "It's kind of the challenge you get into when pursuing certification qualification of these systems," he said.

"For us, we're setting the bar high. Our vision for certifying a single pilot helicopter would mean if the pilot is incapacitated, and there's 12 passengers in the back, everyone lives. The helicopter executes a landing where it is, or decides if it's safer to return to base, or it might even complete the mission. That's going to be our criteria for single pilot functionality. That'll be a whole new space for aviation."

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Photo Courtesy of Valerie Andre



Those familiar with Whirly Girls, the international association of women helicopter pilots, may have noticed the name of Valerie Andre in its website's historical section. Women in the French military — and probably elsewhere in the world — owe her a lot. Andre pioneered the use of helicopters in medical evacuations and was the first woman to become a general officer in France. Now 95, she has a vivid memory of her key role in the Indochina war in the early 1950s and unfaltering convictions about the place of women in the armed forces.

Vertical: At the beginning of your book, Ici, Ventilateur! ("This is ventilator speaking!"), you arrive in Indochina, a war zone, in 1949. But you do not sound impressed by fire. It seems this is a normal workplace for you.

Valerie Andre: Well, this is true. There was no reason to be impressed.

V: How did you end up there?

V.A.: I have always wanted to fly; when a child, I was saying I would be a pilot. At the end of my medical studies, the dean of the faculty of medicine told us the military in Indochina did not have enough doctors. He suggested we should join the army under a fixed-term contract to see whether we liked it. This is what I did and I was taken with it. I was accepted — these men were very friendly.

To be a military physician, you need special motivation. When they saw I was a parachutist, they were interested. I was trained as a war surgeon, so I could be used in advanced surgical units.

V: How did you become a helicopter pilot?

VALERIE ANDRE: Doctor, Pilot, Pioneer

INTERVIEWED BY THIERRY DUBOIS

V.A.: We were taken to Saigon for a helicopter demonstration during the spring of 1950. These were two Hiller 360s [con-figured as air ambulances]. I took a flight in one of the [external] stretchers. I immediately understood this was exactly what we needed. Rather than dropping us, our equipment and a battalion to protect us, we'd better go and fly the patient back. [Another officer, Alexis Santini, is credited for having flown the first medical evacuation by helicopter in the French forces in 1950.]

The military health service had purchased these first two helicopters on its own budget.

V: So you applied for training?

V.A.: With helicopters, it was love at first sight. I besieged my superior. I insisted it would be good if I could be both a war surgeon for advanced surgical units and a helicopter pilot. I pestered him so much that he sent me back to France, where a civil company, Helicop'Air, was providing the training. [Helicop'Air was also a retailer for Hiller helicopters and among the salesmen was Alan Bristow, who later founded Bristow Helicopters.]

V: How was it to be both a physician and a pilot?

V.A.: I would fly to the assigned combat area and, there, triage casualties — selecting those soldiers who had the most serious injuries, or those I could save. Once landed, I would keep the engine running, lock the controls in some way, get off and quickly install the wounded person in the basket myself. You have to do it yourself if you want it to be done properly.

Sometimes, I would do the surgery on site. We would heal both the French and the Vietnamese. We would not distinguish the ones from the others — an injured person is sacred.

V: What about the Hiller 360?

V.A.: We had to make the most of the small 178-horsepower engine. It had to lift the aircraft, one pilot and one or two

casualties. We were happy when we had to carry skinny ones!

As for radio, we had no headset — we called it mustache mic. So when we had to use the microphone, we found a way to wedge the collective, thus freeing one of our hands. We would do the same to read a map.

V: Did you fly other helicopters in Indochina?

V.A.: There was the Sikorsky S-51 and the H-19, which could carry four to five casualties, but I almost only flew the Hiller. In total, French forces in Indochina had 42 helicopters over the course of the war, not all of them [operating] at [the same] time.

V: This was a male environment. In your book, it seems you experience day-to-day camaraderie, while the official organization tends to leave women behind. So how did you get along with men?

V.A.: They were straight people to deal with. They needed me! We always got on very well. [Andre later married Santini.]

V: Tell me about your experience during the Algerian decolonization war.

V.A.: I was the head physician of a squadron of H-19s, H-34s, Alouettes and Alouette 2s. I was also a pilot in my own right. To fly an H-34, we were a crew of three: two pilots and one mechanic. I was flying it not only for medical evacuation purposes. There were assault missions, too, with eight or nine commandos — all armed to the teeth. The Sikorsky H-34 was so nice, you could fly it with your fingertips. By the way, a small non-profit organization is rebuilding one and they asked me to be the aircraft's sponsor. I looked into my logbook and saw I not only flew the type, I also had a crash. So, I accepted.

V: You live in Issy-les-Moulineaux, less than one mile from Paris heliport. Is this by accident?

V.A.: When I came back from Indochina,



friends put me up and then helped me find an apartment. I was a captain so I was looking for something affordable. But I was quite demanding. I wanted a lot of sky, the last floor and a nice view. So here am I. But I was not working at the training area, where light aircraft were operated and which quickly became the heliport.

V: So where were you working?

V.A.: I was working at the flight test center in Bretigny [farther south]. I was a physician for the flying personnel. I was also a pilot, but not a flight-test pilot, rather for air transport.

V: What is your view on today's helicopters?

V.A.: They do not fly them like we did in the old days. There has been so much progress in computer science. Look at the [Airbus H225M] Caracal: it can be refueled in flight!

V: When you meet young helicopter pilots in the military, do you have any advice for them, or some experience to share?

V.A.: These are difficult missions but they love to perform them, it is a very rewarding job. I encourage them, I congratulate them. If a young pilot asks me for some advice, I will provide some, but in general they are doing all right. You do not hire the worst ones, you know.

V: What about the role of women in the French forces?

V.A.: There is no longer a difference [with men]. In 1981, then-defense minister Charles Hernu wrote to me. I was a general and close to the end of my career. Hernu offered me to be the chairperson of a commission created to "study the future of the military woman." I accepted, of course. There were 28 of us in the commission — members of the parliament, military etc.

Our goals were to open all disciplines to women, ensure they could participate in leadership — which had not been the case so far, as they were confined to administrative tasks — and guarantee they could get promotion, on an equal basis with boys. As you can see, we had a lot of work to do.

Those military who were participating in the commission were requested by their superiors to share the content of the meetings. The superiors were always criticizing my suggestions and demanding that their subordinates reject my requests. Sometimes, our meetings were stormy.

V: Do you consider the commission's work was fruitful?

V.A.: Yes, absolutely. We were asking many things. I wanted to open all disciplines to women — fighter planes, everything. I wanted women to be real combatants, not just airclub pilots.

But I realized mentalities were not ready to accept female fighter pilots. For ethical reasons — imbecilities of an earlier era. In the preamble of our final report, we explained that, as mentalities were not ready yet, we would make two kinds of propositions. Some would be for immediate application, some others for the longer term.

We did right. Now, everything is established. It was not easy. But, to our contentment, all the [trailblazing] girls were marvelous. They were very good. Should they have been not so good or not so motivated, we would have been heavily criticized. But all you have to consider is skills and motivation. They did their job.



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Pilot Brennan Reilly preflights the helicopter before what could be a long day of covering stories.

To be first on the scene to cover breaking news stories in Los Angeles, you need a helicopter. With vehicle traffic at near gridlock from early morning until late in the evening, it can be more than a little difficult to get to a story quickly with ground-based news crews.

Helicopters have been used to cover news in Los Angeles since the '60s, growing in popularity in the '70s and '80s. By the '90s, helicopters were operated by every station, but the method of capturing the images had remained relatively unchanged. Camera operators were still hanging out of open rear doors shouldering unstabilized cameras.

This all changed in the early 2000s when externally mounted stabilized camera systems were installed onto news helicopters. This revolutionized the electronic news gathering (ENG) industry, providing images of a previously unimaginable quality. Decades later, the next groundbreaking leap in aerial camera technology has arrived, in the shape of the Shotover F1 Live camera system operated by Helinet Aviation, for ABC7, the most-watched TV station in Southern California.

"By utilizing the Shotover F1 Live as the centerpiece of the Air 7 HD news helicopter, we are providing unparalleled viewpoints into breaking news events," said Rob Elmore, KABC Eyewitness News VP and news director.

The Shotover system is mounted on an Airbus AS350 B2 AStar, known as Air 7 HD. The news ship, owned and operated by Helinet, is available for the station 24 hours a day, seven days a week. During peak news hours (10:30 a.m. to 6:30 p.m.), the station also operates a second AStar. ABC7 operated a Bell 206 LongRanger for many years but transitioned to the AStar in the early '90s. This type of aircraft has proved a popular choice for ENG operators because of



its speed, power, and ability to carry the added weight needed for advanced news equipment. Its cabin size also allows a rear-seated operator to have the room needed to operate the installed news gathering mission equipment required for the task.

"The AS350 series helicopters have the power to work in the mountains and the reliability to fly multiple hours, day after day," Helinet chief pilot Garett Dalton told *Vertical*.

ABC7 is no stranger to breaking new ground with its coverage, as it was the first television station in Southern California to broadcast





news in high definition. It has continued this tradition with the new F1 Live camera system on Air 7 HD.

The Shotover F1 Live can accommodate the most advanced broadcast cameras on the market, including both 2K and 4K models. The system's six-axis stabilization technology provides a unique feature, the ability to look 90 degrees straight down, underneath the helicopter, giving the operator unprecedented flexibility in providing camera angles into extremely tight areas on the ground. In addition, the camera system has an open platform design, making







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it upgradeable as more advanced camera and lens become available. The F1 Live camera system is equipped with what ABC7 proudly calls "Xtreme Vision." This solution provides an industry-first, 6,500-millimeter zoom focal length, which is over eight times more powerful than those typically used in competing ENG helicopters. And most importantly, the Shotover is able to stabilize the image at that unprecedented zoom range. To further enhance the camera system's capability, ABC7 utilizes Churchill Navigation's state-of-the-art augmented reality mapping system, dubbed "SkyMap7." This allows on-air reporters and operators to immediately locate, iden-

tify, and navigate to assignments. "The system's flexibility brings a new level of accessibility to news coverage, allowing us to capture the latest breaking news like never before, said Helinet VP of Technology and Air 7 HD reporter, J.T. Alpaugh. "Using these advanced technologies, we can even track the speed of a suspect's vehicle during a pursuit, and locate streets or homes with augmented reality satellite imagery, even if they are obscured by smoke during a wildfire, or buried by a mudslide."

FLYING A TYPICAL BEAT MISSION

There are two ways in which the crew in the ABC7 helicopter find themselves covering a story, either through assignment from the station's news desk, or by observing newsworthy events while in flight. The crew also monitors the on-board radio scanners for in progress police pursuits, structure fires, or notable law enforcement operations. When found, they advise the station.

A typical weekday starts at 4 a.m. for the morning Air 7 HD crew until they are relieved at 2 p.m. by the crew that staffs until midnight. The aircraft are based at Helinet's headquarters at Van Nuys Airport

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in the San Fernando Valley, and when the call comes in from the assignment desk, the crew launches immediately. The aircraft routinely travel all over the Greater Los Angeles area, but most stories are within the L.A. Basin and east to San Bernardino. Crews can travel as far south as San Diego, east to Palm Springs, west to Santa Barbara and north to Bakersfield, and at times have even flown as far as the borders of Arizona and Mexico.

The helicopter can also be sent to the local mountains, and this can be challenging. Big Bear in the San Bernardino mountains, which have peaks of over 8,000 feet (2,440 meters), is a regular destination, so with safety paramount operating the AS350 is an advantage due to its performance at high altitude. Typical stories in the mountains are wildfires, cars off the side of the road, and motorcycle accidents, while searches for hikers, hunters. or skiers are also covered.

Once on-scene, the helicopter's camera operator works closely with the pilot and the on-air reporter. They need to understand and be able to operate the aircraft's ENG equipment almost instinctively, all while using radios, microwave transmission equipment, and maintaining constant contact with the assignment desk. It is a challenging job, suited only for those who are well trained to multi-task and stay focused for hours at a time.

With numerous class B. C. and D airports in and around the Los Angeles Basin, a temporary flight restriction (TFR) circling Disneyland, and Marine Corps Base Camp Pendleton to the south, Helinet's pilots need and have a clear understanding of airspace concerns and how to navigate through and around them. Regular TFRs routinely pop up at Dodger Stadium, the L.A. Coliseum, the Rose Bowl, and at Angel Stadium, which can add to the challenge.

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TECHNISONIC Communications

"L.A. is one of the most complex airspaces to fly in the country," said Dalton. "Transiting the airspace can be intimidating to even the most qualified pilot." Because of this, Dalton said Helinet hires ENG pilots who are already familiar and comfortable flying in the airspace.

In addition, crew safety and training are embedded in Helinet's culture. To maintain Helinet pilot proficiency, all pilots complete the company's requisite annual training curriculum, which involves both ground and extensive flight training with EuroSafety International.

COVERING EMERGENCY OPERATIONS

The ENG helicopter operators within L.A. are a tight-knit group of pilots, camera operators, and reporters and it needs to be this way, as the aircraft work in close proximity to each other while covering news events. With the experience of several decades of working in such a busy environment, ENG aircrews follow established procedures while gathering news images. Communication is key, and pilots consistently advise each other of their movements and intentions anytime the aircraft are in the same general area.

Similarly, the ENG community maintains a close relationship with local law enforcement and fire aircrews, and there is a shared understanding of the procedures to be followed during pursuits, barricaded suspects, and wildfire operations. ENG helicopters maintain predetermined and prescribed separation from law enforcement and fire helicopters. They also use extreme caution not to televise live the tactical movements of law enforcement on the ground, which could compromise an operation if a barricaded suspect has the ability to watch live TV broadcasts.

The Air 7 HD aircraft also plays an important public safety role

during wildfire season, and especially now with its new ability to accurately map a fire's location, direction, and size, while providing on-air mapping overlays showing streets and homes that are directly threatened. Working news over a wildfire can be challenging, as the aircrew must make regular radio contact with fire air attack to coordinate where and at what altitude they can operate. Air attack in return is able to provide valuable information on the kind of aviation and ground assets being used to fight the fire.

All ENG helicopters operate high above the firefighting aircraft, allowing the latter to concentrate solely on containing the fire. Depending on the location of the fire, and the types of firefighting aircraft being used, the ENG helicopters might find themselves operating at well over 10,000 feet, which makes the Shotover camera system's extremely long zoom capability even more important. Aircraft performance is also a key factor at these altitudes, and is yet another reason the AS350 is the preferred choice.

"Helinet has worked with ABC7 for more than 20 years and our team has an excellent understanding of the station's needs," Helinet CEO Kathryn Purwin told *Vertical.* "KABC has always been on the cutting edge of aerial broadcast technology and Helinet works closely with them to incorporate this technology into their daily broadcasts."



Skip Robinson | Skip has covered helicopter operations through photography for 25 years and has worked with *Vertical* Magazine for over a decade. His main interests are rescue, parapublic and military operations. Skip is based in Los Angeles, California.



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Leveraging Chuck Aaron's considerable aerobatic experience in the MBB Bo.105, the FX LLC course puts pilots into some extreme unusual attitudes – but also emphasizes flying in ways to avoid them. 54

Upsettine Accepted

With their new Helicopter Upset Recognition and Recovery Training course, Chuck Aaron and Kevin Bredenbeck of FX LLC want to change how we train for inadvertent IMC.

Story by Elan Head Photos by Skip Robinson

I'm in the right seat of an MBB Bo.105, looking through the windscreen at the ground, which is coming at me fast. My internal terrain alerting system is screaming "pull up, pull up," but I don't not yet.

My instructor in the left seat, Kevin Bredenbeck, has advised me to keep the cyclic locked in a neutral position, and because hehas more experience as a test pilot than I do, I'm willing to trust him. For a while longer, anyway.

My trust is not misplaced. Our helicopter doesn't continue to plummet toward the ground; instead, like a carnival swing reversing direction, it stops its dive and begins to pitch up. Soon, our nose is pointing toward space and the windscreen is filled with nothing but sky. I'm at the ragged edge of my comfort zone, but I keep the cyclic where it is,

Just when it seems we're about to tip over backwards, the helicopter, continuing its intensifying oscillation, begins to nose over and roll right. Now Bredenbeck tells me, "Recover." A slight left input is all it takes to level the aircraft and regain control, and suddenly, our carnival ride is over.

This is Helicopter Dynamic Stability 101, an introduction to what the Bo.105, when left to its own devices, will do when it is disturbed in pitch. Later, I will repeat the exercise while flying on instruments, with my view out the windscreen blocked by a black curtain. The goal is to learn how to regain control of the aircraft with the least amount of effort and g-loading, so that if I do ever lose control while flying at night or in the clouds, I am less likely to make a bad situation worse.

It's a much more nuanced approach to unusual attitude recoveries than the rote mantra of "bank, pitch, power" I learned during my Initial helicopter instrument training. And that's the point. With their new Helicopter Upset Recognition and Recovery Training (HURRT) course, Bredenbeck and Chuck Aaron of FX LLC are aiming to redefine how helicopter pilots train for inadvertent entry into instrument meteorological conditions, or IIMC.

Conventional helicopter instrument training teaches pilots to fly their aircraft like an airplane: high, fast, and always in trim. But FX LLC's course also explores control and recovery techniques where many helicopter pilots run into trouble — low and slow, on the back side of the power curve, in configurations that instrument pilots are generally taught to avoid.

Aaron and Bredenbeck are uniquely qualified to pursue this novel approach. Aaron is a 20,000-hour helicopter pilot who is best known for wowing air show crowds in a Red Bull-branded Bo.105; during the 10 years he spent with Red Bull, he performed more than 250 helicopter aerobatic displays without a single incident or accident. He is a member of the prestigious Society of Experimental Test Pilots (SETP) and has received numerous awards over his 44-year helicopter career, including the Sikorsky Rescue Award, the Art Scholl Showmanship Award, Helicopter Association International's (HAI's) Pilot of the Year Award, and the Living Legends of Aviation Award.

Meanwhile, Bredenbeck, who began his career as a U.S. Army Black Hawk medevac pilot, spent more than two decades as an experimental test pilot with Sikorsky Aircraft before retiring from the company earlier this year. Bredenbeck was at the controls when Sikorsky's groundbreaking X2 technology demonstrator made its first flight in 2008, and again when this compound helicopter reached a blistering 263 knots in 2010. Not surprisingly, Bredenbeck is also an SETP member and has been showered with accolades over his 30-year accident-free career, including the Robert J. Collier Trophy and SETP's Iven C. Kincheloe Award for his work on the X2 program.

Both Aaron and Bredenbeck have made careers out of doing things in helicopters that other people can't — but doing them in a very methodical and disciplined way. That's a philosophy I respect, so when I had an opportunity to take their HURRT course in Camarillo, California, in March, I jumped at it.

Over three days, I performed maneuvers in the Bo.105 that I had never before attempted in any aircraft or simulator, and certainly not while in instrument flight. I also came to think about standard instrument maneuvers, such as steep turns, in an entirely new way.

Aaron and Bredenbeck believe there is a training gap when it comes to preparing helicopter pilots for IIMC, and after finding some holes in my own knowledge and skills, I'm inclined to agree with them. FX LLC's upset recovery course is not a substitute for comprehensive instrument flight rules (IFR) training or IFR-certified aircraft. But it does give helicopter pilots a powerful set of tools that could someday save their lives.

A NEW APPROACH

Chuck Aaron credits Anthony Burson, the chief pilot for United Technologies' flight department and a recent chair of the HAI board of directors, with the idea for the HURRT course. Burson knew that IIMC and weather-related controlled flight into terrain (CFIT) were deadly problems for the helicopter industry —











accounting for 248 accidents and 179 fatal accidents between 2001 and 2013, according to a white paper jointly prepared by HAI and other industry associations *(see p. 52, Vertical, Oct-Nov 2015).*

Burson thought that Aaron's aerobatic experience would give him unique insight into upset recovery training, and when Aaron reviewed the research on IIMC accidents, he realized there was a need for it. To help him develop the HURRT course, he reached out to his friend Kevin Bredenbeck, who at the time was working on the S-97 Raider experimental flight test program as Sikorsky's director of test and evaluation.

As they reviewed IIMC and CFIT accident reports, Aaron and Bredenbeck came to believe that conventional approaches to maintaining instrument flight currency — including the regulatory requirement to log six instrument approaches every six months weren't adequately preparing helicopter pilots for the demands of IIMC.

For one thing, most single-engine helicopters aren't equipped or certified for IFR flight. That means that knowing how to fly a VOR

Rather than teaching a formulaic approach to inadvertent IMC, Aaron and Bredenbeck want to give pilots tools that they can adapt to their particular situations.



For author Elan Head, the FX LLC course was about "connecting the dots" — applying aerodynamic insights to practical strategies for IIMC survival.

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At press time, FX LLC had just announced that leading aviation insurance provider STARR Aviation and its alliance including Berkley, AIG, and Swiss Re will provide a premium seven percent bonus to qualified insured customers who complete the HURRT course. It will also endorse the HURRT course in lieu of factory recurrency training on a biennial/alternate year basis. approach may not be much help to pilots of these aircraft when they wander into the soup — as they did with fatal results 133 times between 2001 and 2013. As Bredenbeck put it, "Twelve approaches a year does not make you proficient at the things that everyone is doing wrong."

Moreover, while simulators have been praised by many people in the industry for their ability to realistically simulate flight into deteriorating weather conditions, Aaron and Bredenbeck agree that there's one thing simulators can never fully replicate: the stress that comes from flying in a real aircraft, knowing that there's no "pause" button to hit when things go wrong. That's key, because Aaron and Bredenbeck believe strongly that managing acute stress is a pilot's biggest challenge when he or she suddenly loses visual references.

When it came to the "real aircraft" they would use for the course, the Bo.105 was the obvious choice. Not only did Aaron already know it inside and out from his years of flying aerobatics, the model's rigid rotor system and aerobatic capabilities provide a safety margin that is invaluable for a course that is meant to push pilots to their limits. (That said, FX LLC is actively expanding its course offerings, and at press time had just announced that it would be offering training for government customers in a Sikorsky S-70i.)

What was less obvious was how they would simulate instrument flight. After experimenting with different view-limiting devices, they engineered a system that allows a black fabric curtain to be quickly drawn across the right side of the forward windscreen. Along with a center dividing curtain, this effectively obscures the student's view out the front and left side. Meanwhile, the chin bubble windows are covered with blackout curtains that remain in place throughout the flight.

The arrangement is much more effective than the hood or

"foggles" typically used for simulated instrument flight training, while still affording adequate visibility to the instructor in the left seat. The aircraft is also equipped with a traffic alerting system for additional situational awareness.

Of course, the real challenge for Aaron and Bredenbeck was designing a curriculum that would effectively impart upset recognition and recovery skills to helicopter pilots of widely varying backgrounds. They spent months developing and refining the maneuvers they would teach, drawing on their collective operational, aerobatic, and test pilot experience.

While the resulting course does put stu-

dents into some fairly extreme unusual attitudes, that's not really the primary focus of the training. Aaron and Bredenbeck place just as much emphasis on avoiding unusual attitudes as recovering from them — and have plenty to teach students about flying helicopters benignly, as well as at their limits.

CONNECTING THE DOTS

This time, I'm riding along in the back seat while my classmate for the FX LLC course, Ed Roski, performs a slow spiraling letdown on instruments around a GPS waypoint just west of Malibu. We're descending from 3,500 feet, and at the rate Roski is going, it will take quite a while. That's fine by me — it's a beautiful day, and I've spotted three whales tracking along the coast toward



Point Mugu. Sightseeing in Southern California doesn't get much better.

Roski is keeping up a gentle flat turn using mostly pedal input, with just enough bank to help the turn along. I can't think of a single occasion during my time as a helicopter instrument flight instructor when I actually encouraged my students to fly out of trim, but the benefits in this case are obvious — even though Roski doesn't have an instrument rating, he has perfect control of the aircraft, and if he feels that it's getting away from him, all he has to do is ease up on bank.

Compared to performing a coordinated turn, it's a much more stable and comfortable way to descend through the clouds, both for the pilot flying and the passenger in the back seat. And it's a powerful technique to have in your back pocket if you suddenly



go IIMC amidst rising terrain, or somewhere where you are unable to descend using an instrument approach.

This is not to suggest that FX LLC recommends these letdowns for every situation. Rather than teaching a formulaic approach to IIMC, Aaron and Bredenbeck want to give pilots tools that they can adapt to their particular situations — and knowledge to guide their application.

Take the question of whether a pilot should attempt an IIMC exit by performing a 180-degree turn. Some pilots and flight instructors advocate always performing such a turn. Others advocate never attempting one, pointing out that a 180-degree turn is much more likely to result in spatial disorientation than committing to IMC. Of course, whether a 180-degree turn is

actually a good idea depends on what's in front of the aircraft and what's behind it — factors that are typically much more variable for helicopters operating low-level than they are for airplanes.

Aaron and Bredenbeck prepare their students for this judgment call not by giving them a rule of thumb, but by giving them practice making 180-degree turns in different configurations. During our flights with Bredenbeck, Roski and I practiced gentle 180-degree turns using only cyclic or only pedal inputs, maneuvers that are easier to perform under stress without losing aircraft control.

We also experimented with controllability in coordinated turns



in different directions and at different bank angles, finding that in the Bo.105 — with its counter-clockwise-turning main rotor system — turns to the left are much more stable to higher bank angles than are turns to the right. Bredenbeck encouraged us to repeat this exercise in the helicopters we normally fly, and then ask ourselves: given a choice in IIMC, in which direction would we rather turn?

What was most striking to me about this question was that it had never before occurred to me: not as an instrument student, not as an instrument flight instructor, and not during my occasional instrument proficiency checks. Of course, I had noticed that steep turns on instruments were always more difficult in one direction than they were in the other, depending on the direction of the helicopter's main rotor blade rotation. But my focus had always been on passing a checkride; I had not thought about how to use this observation to improve my odds of surviving an IIMC encounter.

More than anything, FX LLC's training is about connecting those dots — helping pilots understand why their helicopter flies the way it does, and how to work with it, not against it, in an emergency situation. At the end of the course, students won't necessarily be able to nail an ILS approach. But they'll almost certainly know more about themselves and their aircraft, and what to expect from both if they inadvertently fly into the clouds.



Elan Head An award-winning journalist, Elan is also an FAA Gold Seal flight instructor with helicopter and instrument helicopter ratings, and holds commercial helicopter licenses

in the U.S., Canada and Australia. She can be reached at elan@mhmpub.com.



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THE QUIET REVOLUTION Since its arrival in Afghanistan as a civilian contractor

Since its arrival in Afghanistan as a civilian contractor in July 2011, Columbia Helicopters has helped redefine the military's use of heavy-lift aircraft.

By Jen Boyer

A Columbia Vertol 107-II in operation in Afghanistan. Columbia Helicopters has been supporting military operations in the country since July 2011. Conor O'Healy Photo





hen Columbia Helicopters founder Wes Lematta developed the modern long line system, he probably never dreamed that it would reshape the use of rotary-wing aircraft in modern warfare.

Yet, revising how the military views and utilizes heavy- and super heavy-lift aircraft is exactly what Columbia is doing. Since landing in Afghanistan in July 2011 as a civilian contractor with the United States Air Mobility Command (AMC) to support U.S. and NATO forces with troop and cargo transportation, Columbia has paired the company's strong customer service culture with its unparalleled long line transport and construction experience to create new opportunities and increase support for troops in the country.

Lematta founded Columbia Helicopters in Portland, Oregon, in 1957. That same year, he responded to a call to rescue 15 sailors from a sinking dredge off the Oregon Coast. Three of those sailors he rescued by tying a long rope to the helicopter's skid and hanging out the door of the aircraft to control the line. Though he didn't realize it at the time, he had pioneered direct visual operational control (DVOC) — the process of a pilot controlling a load on the end of a long line by looking down at it.

For more than 60 years, Columbia has used and perfected this

"WE ASK THE GUN CREWS 'WHICH DIRECTION DO YOU WANT US TO POINT IT?' WE CAN BE SO PRECISE WITH OUR PLACEMENT WE CAN CUT DOWN ON THE TIME THEY NEEDED TO AIM THE CANNON."

- ANDRE HUTCHINGS, COUNTRY MANAGER FOR COLUMBIA HELICOPTERS, AFGHANISTAN. method in construction, logging, oil-and-gas, and firefighting, carrying every manner of load imaginable.

It's also said within Columbia circles that Lematta pioneered another keystone of the company that day in 1957 — the can-do attitude, ingenuity, and pride in being part of something that is bigger than any one person or group. When a bid opened in 2011 to support U.S. and NATO troops in Afghanistan, Columbia saw a perfect fit and immediately threw its hat into the ring. Once it won the contract, Columbia's crews went to work raising the bar.

"Our original contract was for four Columbia Vertol 107-II helicopters to provide troop and cargo transportation throughout the country, getting them off the roads and away from roadside bombs, rockets, and attacks," said Andre Hutchings, country manager for Columbia Helicopters, Afghanistan. "The whole push for 'white air' [contract operators] is to keep the soldiers and vehicles off the ground. We saw so much more we could do and we stepped up to help."

Before Columbia arrived, the military utilized only its own sling load system to deliver cargo. These operations saw pilots flying with no reference to the 15- to 20-foot line hanging from the aircraft; instead, they relied on the crew chief looking out the hell hole/hook well to provide reference and directions to the pilot to





deliver the load. What's more, the heavy aircraft being used typically Chinooks and Mils — can create extreme downwash, which can potentially cause brownout conditions and hazards for those on the ground. This often required loads to be delivered away from central operating areas, thus demanding further ground transport. It's also time-consuming, leaving the aircraft and troops vulnerable to an attack during delivery.

Columbia crews stepped in and offered their long line services using 150- to 200-foot lines. Highly trained in precision, quick turns to drop loads in logging and oil-and-gas support, they shared how their long line system could save time, increase safety, and make a real difference.

Upon witnessing Columbia's long line work first hand, Air Force Maj. Gen. Less Carroll coined the company's long line work as "L2P2" (long line precision placement), saying this type of system would "revolutionize the way the military would handle external loads."

Within months, projects that had taken the military days to perform were tackled in hours by Columbia. Howitzer gun relocation, for instance, formerly required troops to break down the large cannons, then helicopters would sling load them in several pieces





"The whole push for 'white air' [contract operators] is to keep the soldiers and vehicles off the ground," explained Andre Hutchings, country manager for Columbia Helicopters, Afghanistan. **Conor O'Healy Photo**



to a new location, where they needed to be assembled before being pushed into place. With the capabilities of their aircraft, Columbia crews now transport the entire assembled cannon via long line and place it directly into the gun pits.

"We ask the gun crews 'which direction do you want us to point it," Hutchings said. "We can be so precise with our placement we can cut down on the time they needed to aim the cannon."

Columbia also initiated the use of its vehicle sling system in Afghanistan. Developed for operations in Alaska, the system allows Columbia to precision deliver a truck, car, or small tractor, allowing the customer to jump in and literally drive away within minutes of delivery.

WHITE AIR OPS

Recognizing the value of the L2P2 system, the AMC recently put out a request for bids to re-compete the original contract. Columbia submitted a proposal that would increase its six Columbia Vertol 107-II aircraft in Afghanistan to nine, while also adding a Columbia 234 Chinook.

Columbia's aircraft operate from two bases in Afghanistan: Bagram Airfield and Jalalabad. Bagram is located in the high desert at the base of the Himalaya Mountains at 4,895 feet (1,490 meters) above sea level (ASL). Known for its steady high winds more than 120 days straight, extremes in weather between the seasons, and high density altitude, Bagram keeps Columbia crews on their toes. At 1,886 feet (575 meters) density altitude, Jalalabad is a favorite

From the high desert at the base of the Himalaya Mountains, Columbia flies year-round in environmental extremes to support U.S. and NATO forces in Afghanistan. **Cameron Miller Photo** for crews in the winter, while summer temperatures are some of the highest, and most miserable, in the country.

Despite the extreme field conditions, long days, and an exceptional variety of jobs, Columbia has consistently exceeded AMC's expectations for availability and reliability. Hutchings attributes this success to the dedication of the crews and the carefully planned schedule maintained by the company's operations and logistics folks.

A mission typically begins with flight planning 24 hours before takeoff. Operations crews plan the missions and file them in the aircraft flight following (AFF) system. Logistics crews ensure placement of cargo and equipment for each planned job. At the same time, parts and maintenance supplies are ordered and scheduled for delivery for overnight maintenance.

Two shifts of mechanics work from the time the aircraft lands in the evening until launch at 6:30 a.m., performing scheduled and preventative maintenance.

Pilots arrive at 5 a.m. for mission briefings and pre-flight checks. The aircraft fly close to 10 hours a day, weather permitting. In any one day, a crew could transport troops, precision place barriers to keep suicide bombers from driving up dirt roads to base fences, deliver mail and supplies to an outpost, fly in a tractor, and help construct a communications tower.

Since its first day of flying in 2011, Columbia has flown more than 55,000 hours, 400,000 passengers, 7.5 million pounds of mail and 70 million pounds of cargo in support of U.S. and NATO troops.

"We're there to do whatever they need, and we're always looking for ways we can do more," Hutchings said. "For instance, in



2012, our crews noticed Christmas mail was backing up and they wanted to help."

Understanding how much of an impact mail delivery has on morale and without request from the military or offer for compensation, Columbia crews took U.S. mail carrier courses and received certificates allowing them to deliver mail. They then began sorting and storing four-cubic-foot crates of mail, pairing them with any other delivery to be made during the day for a solid month.

"If we had space in the aircraft and were going to fly by a base, we'd add the mail and make an extra stop to make sure they got their mail," Hutchings said. "Whatever we could do to get the mail to them."

HAZARD PAY

Columbia currently employs more than 90 people to support its Afghan operations including pilots, mechanics, flight crew, logistics staff, and management. About 40 percent are veterans. Each person works a 28-day-on/28-day-off schedule with transportation from anywhere in the world, something tied to the strong family feel of the operation.

"We've found the 28/28 allows our team to operate at their highest potential," Hutchings said. "These are hard, hard conditions. The aircraft are in the air 10 hours a day in harsh conditions. Twenty-eight days is about it before you need a break."

Hutchings admitted the job isn't for everyone. "Some people go through the training and come out to [Afghanistan] only to find it's not for them," he said. "For some it's the heat and long hours. For others, it's the war zone. [But] our crews receive training on firearms, survival, medical, and local customs."

However, the attractive pay and schedule ensures Columbia has



Aircraft are configured to be able to quickly convert between troop

no shortage of qualified applicants. In fact, soldiers rotating out of service, who worked with Columbia when deployed, contact the company daily.

With an eye to the future, Columbia is hiring and training new crews to ensure the continued success of its legacy in Afghanistan.

"Our crews are our ambassadors," Hutchings said. "We're dedicated to assuring they're the best."



Jen Boyer | Long-time communications professional Jen Boyer is a commercial instrument helicopter pilot with flight instructor and instrument instructor certificates. A member of the Whirly-Girls, she runs her own aviation industry strategic communications business.






Airbus Helicopters has teamed its proprietary Helionix cockpit with the staple H135. We evaluated the package at the manufacturer's facility in Donauwörth, Germany, to see if the whole really is greater than the sum of its parts.

Story by Jon Duke Photos by Lloyd Horgan

Since its launch in the mid-1990s, Airbus Helicopters' H135 line has seen success in almost every sector of the helicopter market. Developed by the company then known as Eurocopter (and still type certificated as the EC135), it quickly became the go-to aircraft for emergency medical services (EMS) operators, a mission that now accounts for 49 percent of type ownership. Several incremental upgrades have improved performance, load capacity, and most recently with the EC135 P3/T3, its hot and high capability.

Now Airbus is integrating its proprietary Helionix avionics suite into the type, common to the larger H145, H175 and the forthcoming H160. The union brings an end to the ever-increasing alphanumeric type designations (the type is designated simply as the EC135H) and, according to Airbus, ushers in a new era of safety and intuitiveness in its "entry-level" twin.

Launched in 2014, the EC135 P3/T3 brought considerable upgrades in one engine inoperative (OEI) and hot and high performance, and was offered with Thales' Avionique Nouvelle glass cockpit and center panel display system (CPDS). Barely three years later, that system finds itself being usurped.

Having poured R&D euros into developing Helionix, it makes sense







The Fenestron generates considerably less noise than a conventional tail rotor, and has now been demonstrated to be effective at lateral speeds of up to 30 knots at maximum takeoff weight.

for Airbus to try to recuperate as much of that as it can by increasing its availability. According to Ralf Nicolai, sales promotion manager at Airbus Helicopters Deutschland, the integration of Helionix was driven by the need to improve safety. With ever more complex missions demanding more pilot capacity, priority had to be given to providing an intuitive interface with the aircraft and the protections necessary to allow the pilot to dedicate more concentration on the task.

Helionix also allows core customers to take advantage of new facilities such as the LPV (localizer performance with vertical guidance) approaches; and the addition of a four-axis dual-duplex autopilot opens up the light offshore role — a mission that continues to grow in Europe despite the contraction in the oil-and-gas sector, thanks to the advent of helicopter-enabled offshore wind turbine inspection.

With innovation being something of a buzzword recently, it's no surprise to see the manufacturer describing its own avionics suite as just that. But glass cockpits and autopilots are nothing new, and given the opportunity to fly a Helionix-equipped H135 in Donauwörth, Germany, I was curious about whether this integration brings anything really novel to a type that has been successfully carrying out its various missions for over three decades.

PUTTING IT TO THE TEST

Given the performance and handling of the H135 series are welldocumented, and the integration of Helionix provides no propulsion or capacity improvements, the focus of my flight was purely on the new display array and aircraft flight control system (AFCS). During the (very brief) start procedure, Airbus Helicopters experimental test pilot Alexander Neuhaus explained the display layout. One flight navigation display (FND) is positioned in front of the pilot and two multi-function displays (MFDs) are located in the





center and on the left. While the pilot's FND layout is limited by the need to retain essential flight parameters, the indications on the other displays can be varied according to the mission. The left-most MFD can double as an FND for a pilot in the left hand seat, as it did for me throughout the flight. Although the "vehicle" page on the MFD will display all the system temperatures and pressures that pilots are used to monitoring, Helionix does away with the necessity to monitor that page by instead displaying an alert in white text below the PFD that describes divergent trends if they happen, well before a limit is reached. There is a tangible capacity benefit in not constantly having to scan across the cockpit to make sure your engines and transmission are performing nominally, and once you've got used to not having your Ts and Ps there, the urge to look at them eventually wears off.

In order to demonstrate the aircraft's one engine inoperative (OEI) capability, we began with Neuhaus demonstrating a rapid OEI climb. Pressing the "train" switch under the center MFD accurately simulates a single engine failure, including transient Nr droop and slight yaw, but with full power still available if required. The first limit indicator is displayed on the power index tape, and as we entered the amber range above maximum continuous power, a small amber "pie" appeared and its slices began to fill, counting down our permitted two minutes in the range. Further collective pushed us into 30-second OEI power, with the pie becoming red. At 200 feet the point was made, and Neuhaus and simply double-clicked on the cyclic AFCS coolie hat and engaged the height hold on the collective, pinning the aircraft into a zero

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start, with Helionix monitoring conditions throughout operation.



GPS groundspeed hover, still OEI. Deselecting "train" immediately reverts to normal operation, and electing the minimum height hold possible of three feet resulted in a leisurely descent at 300 feet per minute, well outside the vortex ring threat.

After "beeping forward" on the cyclic coolie hat to select an appropriate airspeed, Neuhaus allowed the autopilot to handle the transition to forward flight, and handed control of the aircraft to me. Breaking out of the autopilot (AP) hold to avoid some traffic crossing ahead of us was effortless, and banking the aircraft resulted in a coordinated turn without any pedal input or sensation of "fighting" the autopilot heading hold. Releasing the stick, the aircraft returned to the selected heading just as smoothly.

Maneuvering towards our nominated confined area, it was striking how easy the PFD was to interpret - even by somebody with little glass cockpit time and who is used to gauges rather than tapes. A single glance was enough to build sufficient situational awareness, allowing us to concentrate on the all-important lookout during our short visual flight rules (VFR) transit.

I released the aircraft from the AP and reverted to attitude hold for the descent. Glancing inside at the power index tape, a short white line showed me the point at which it estimated my Nf and Nr may decouple. I elected to approach downwind to see how



The Fenestron generates considerably less noise than a conventional tail rotor, and has now been demonstrated to be effective at lateral speeds of up to 30 knots at maximum takeoff weight.

With each Airbus helicopter rolling off the production line in its mission fit, more than 20 kilometers of wiring in each aircraft must be tested



the AP hover-hold would cope with a tailwind, and in the final stages of the approach, Neuhaus selected the MFD to show the feed from a camera in the tail. While it was reassuring to see the tail was not among the shrubbery, I'm not sure I'd want to rely on depth perception through a camera lens to judge my clearance.

Once in the OGE hover over the confined area, double-clicking the AFCS hat switch gave us the super-stable hover again, despite the wind's subtle attempt to weather-cock us to the left. This particular mode will be well appreciated by those in parapublic roles that involve any time in a high hover over incident scenes. As for SAR or any precision work involving hoist operations, Helionix has another trick up its sleeve: one click on the AFCS hat and the aircraft moves obediently one meter in the appropriate direction.

Departing the confined area while maintaining safe single-engine was simply a matter of keeping the power index indicator below the blue OEI line. Once back at altitude, I wanted to exercise the AFCS. We went from having all four upper modes engaged down to stab-out with hardly any change in attitude. No jolts, no alarming shuddering, in fact nothing at all to indicate that the AP had left the aircraft to its own devices. Except Helionix barking "AP Disconnect, Hands On," which is a nice executive cue that might save more than your blushes one day. More impressively, engag-

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PRECISE PERFORMANCE. PROVEN EXPERIENCE. PERSONALIZED ATTENTION. ing all four axes in a 45-degree AOB turn resulted in a gentle roll out onto the datum heading. No chance of any spilled champagne down the back.

All that was left was to let the aircraft fly the LPV approach into Donauwörth, which at a shade over six degrees looks steep when you're able to see out of the window. Predictably, after Alex had selected the approach on one of the inter-seat Garmin GNS750 consoles, the aircraft flew itself dutifully around the procedure.

LIGHTENING THE LOAD

So, aside from a thoroughly enjoyable hour in the skies above Bavaria, what does Helionix bring? Well, firstly there's the obvious it makes flying ridiculously easy, to the extent that anybody who cut their teeth on "less refined" machines might feel justifiably aggrieved.

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Some might argue that in making Helionix the only option for its entry-level twin, Airbus is denying its customers choice. But I think this misses the point about this integration completely, and relies on the flawed assumption that the upgrades offered by the H135 with Helionix are primarily enhancements to its instrument flight rules (IFR) capability.

The ability to manipulate everything from the cyclic and collective is clearly aimed at pilots with a mission to achieve in fine weather or foul, but is intuitive enough that I had the measure of it within an hour. Once your muscles know where all the coolie hats are, you'll be able to fly the aircraft instinctively and accurately, whatever the conditions — seamlessly transitioning from manual flying to the AP modes as the situation demands. While this might sound like a weapon in the IFR arsenal, it doesn't really do anything in that environment that

> others don't. Where it comes into its own is in a busy VFR mission where you can work the kit with your fingers, letting it keep you safe from the ground and hazardous flight regimes while you concentrate on what's important: the mission and your lookout. The latter being immeasurably improved by the carefully considered layout of the PFD. Airbus will doubtless feel the benefit of rationalizing disparate avionics suites, and their suppliers, into one package delivered in-house. And yes, for those looking for a new light twin from Airbus it's Helionix or nothing - although it must be said that the cost is no greater than a P3/T3 with equivalent fit. Likewise, the company will certainly benefit from being able to open up the market to those wishing to operate a light twin offshore in all weather.

> Buyers that can put the IFR and LPV capability to use stand to gain the most, and among those, Airbus's EMS customers have been arguably best catered for, understandably. And operators who also have the H145 or H175 on their books will spend far less converting pilots between the types. Those buying the type for a comfortable ride between business engagements may feel less direct benefit - whether they will recoup the cost as a result of fewer champagne spillages is arguable. Perhaps the most gain will be felt by the pilots themselves - either their job is going to get easier, or they're going to be able to do much more.

Jon Duke & Lloyd Horgan |



Vortex Aeromedia provides specialist media services for the aviation, defense, and aerospace sectors. Formed in 2015 by photographer Lloyd Horgan and helicopter pilot Jonathan Duke, Vortex Aeromedia draws on their unique blend of military aviation and media experience to deliver high-

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HELOOPTER MANUFACTURERS SURVEY

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More than 1,000 members of the helicopter industry took part in our third annual industry survey. Here's what they told us about what helicopter manufacturers are doing right — and what they can do better.

• N661H

EWSOHD

Story by Elan Head | Data Analysis by PMG Intelligence

Ahmed Al Hader Photo





Results by Sector

When we launched our Helicopter Manufacturers Survey in 2015, we aimed for it to be the most comprehensive survey of the helicopter industry, by people who really know the industry. Thanks to the outstanding response we received, it quickly became just that.

Now, with the survey in its third year, we're more impressed than ever with the response from industry. More than 1,000 people took part in our 2017 Helicopter Manufacturers Survey, a new record for us. Moreover, nearly half of them (47 percent) reported having been employed in the helicopter industry for 20 years or more, suggesting the depth of experience reflected in their responses.

As we did last year, we decided to break down the overall results of this year's survey by sector for a better picture of each original equipment manufacturer's (OEM's) particular strengths. No matter how we examined the data, however, Bell Helicopter was the clear winner of our survey, coming in first place in every sector except the private sector. With a majority of respondents ranking Bell as "good or excellent" across most measures of our survey, it's clear that the company remains the industry leader for customer support.

The only OEM that received similarly high scores from our respondents was Enstrom, which last year earned top honors in the private, corporate, training, and general utility sectors. Unfortunately, we had to exclude Enstrom from our rankings this year, as the company failed to achieve the 50 evaluations we've established as our minimum for consideration.

While many OEMs appear to be holding steady in their levels of customer support, there were a few noteworthy developments in our survey this year. Airbus Helicopters continues to improve across many measures of customer satisfaction, but saw a decline in its performance in the offshore, search-and-rescue, and leasing sectors — largely attributable to its ongoing troubles with the H225. Meanwhile, Sikorsky Aircraft rebounded from a relatively poor showing in last year's survey, exhibiting significant improvement across most measures and sectors.

To conduct our 2017 survey, we once again partnered with the independent research firm PMG Intelligence, which ensured that our data collection and analysis met industry best practices. *(For more details on our survey methodology, see p.90.)* Then, after receiving the results from PMG, we asked each OEM to comment on its performance and most common customer complaints, and you can read their detailed responses on the following pages.

Here, we'd like to express our appreciation not only to everyone who took time to complete the survey, but also to the OEMs for listening to our respondents' concerns. The comments that we share with the OEMs each year are pointed, to say the least. But we truly believe that critical feedback plays a vital role in making the industry better and safer — which is why we look forward to repeating our survey in 2018.

TER	1 (3.988)	BELL HELICOPTER	1 (3.784)
ERS	2 (3.742)	ROBINSON HELICOPTER	2 (3.591)
ERS	3 (3.716)	SIKORSKY	3 (3.287)
TER	4 (3.540)	AIRBUS HELICOPTERS	4 (3.179)
	5 (3.385)	MD HELICOPTERS	5 (2.852)
SKY	6 (3.277)	LEONARDO	6 (2.505)
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RPOF	RATE	OFFSH	HORE
TER	1 (3.847)	BELL HELICOPTER	1 (3.798)
TER	2 (3.635)	SIKORSKY	2 (3.765)
ERS	3 (3.442)	AIRBUS HELICOPTERS	3 (3.439)
	4 (3.354)	LEONARDO	4 (3.207)
SKY	5 (3.292)	MD HELICOPTERS N	Α
ERS	6 (3.157)	ROBINSON HELICOPTER N	Α
=FIGF	IING	PRIV	AIE
TER	1 (3.669)	ROBINSON HELICOPTER	1 (3.903)
ERS	2 (3.597)	BELL HELICOPTER	2 (3.882)
TER	3 (3.531)	AIRBUS HELICOPTERS	3 (3.647)
SKY	4 (3.252)	LEONARDO	4 (3.499)
ERS	5 (3.157)	MD HELICOPTERS	5 (3.287)
RDO	6 (3.138)	SIKORSKY	6 (3.073)
RAL	UTILITY	SAR SEARCH 8	RESCUE
TER	1 (3.730)	BELL HELICOPTER	1 (3.836)
TER	2 (3.720)	ROBINSON HELICOPTER	2 (3.677)
ERS	3 (3.590)	SIKORSKY	3 (3.606)
SKY	4 (3.220)	AIRBUS HELICOPTERS	4 (3.585)
	5 (3.213)	MD HELICOPTERS	5 (3.439)
ERS	6 (3.177)	LEONARDO	6 (3.125)
OPT	ER EMS		NING
	1 (3.732) 2 (3.660)		
	3 (3 515)		3 (3.653)
SKY	4 (3 468)		4 (3,368)
	5 (3.340)	MD HELICOPTERS	5 (3.276)
ERS	6 (3.104)	SIKORSKY	6 (3.110)

(\$. LEASING

AIRBORNE LAW

1 (3.988)	BELL HELICOPTER	
2 (3.742)	AIRBUS HELICOPTERS	
3 (3.716)	MD HELICOPTERS	
4 (3.540)	ROBINSON HELICOPTER	
5 (3.385)	LEONARDO	
6 (3.277)	SIKORSKY	

CO

1 (3.847)	BELL HELICOPTER
2 (3.635)	ROBINSON HELICOPTER
3 (3.442)	AIRBUS HELICOPTERS
4 (3.354)	LEONARDO
5 (3.292)	SIKORSKY
6 (3.157)	MD HELICOPTERS

FIRE

1 (3.669)	BELL HELICOPTER
2 (3.597)	AIRBUS HELICOPTERS
3 (3.531)	ROBINSON HELICOPTER
4 (3.252)	SIKORSKY
5 (3.157)	MD HELICOPTERS
6 (3.138)	LEONARDO

GENE

BELL HELICOPTER	1 (3.730)
ROBINSON HELICOPTER	2 (3.720)
AIRBUS HELICOPTERS	3 (3.590)
SIKORSKY	4 (3.220)
LEONARDO	5 (3.213)
MD HELICOPTERS	6 (3.177)

HELIC

BELL HELICOPTER	1 (3.732)
AIRBUS HELICOPTERS	2 (3.669)
ROBINSON HELICOPTER	3 (3.515)
SIKORSKY	4 (3.468)
LEONARDO	5 (3.340)
MD HELICOPTERS	6 (3.104)

To qualify for ranking in a sector, a OEM needed at least 10 responses from that sector, representing at least 10 percent of all respondents for that sector.

AIRBUS HELICOPTERS



Last year was a difficult one for Airbus Helicopters and those of its customers who operate H225 and AS332 L2 models. After an H225 operated by CHC Helicopter experienced a catastrophic in-flight breakup near Turøy, Norway, in April 2016, H225 and AS332 L2 models were grounded worldwide for months — and at press time remained grounded in the U.K. and Norway *(see p.20).*

Those troubles were reflected in our survey. While Airbus continued to show statistically significant improvement from previous surveys in areas including parts availability and speed of service response time, the company had a much poorer showing in the offshore, searchand-rescue, and leasing sectors than it did in 2016. Some commenters from those sectors indicated that Airbus "has lost their trust among technicians" and needs to "restore confidence" in the H225 gearbox design.

"Investigations by Airbus Helicopters and the Norwegian Accident Investigation Board have established that a cracked gear in the main gearbox caused the H225 to fail off Norway in April last year," the company told us. "Airbus Helicopters continues to work closely with the Norwegians on the ongoing investigation. At the same time, Airbus Helicopters is putting in place a package of measures designed to protect against a recurrence. It includes: shorter timeframes for inspections of the gearbox; an improved magnetic system for collecting and monitoring any metal debris in the gearbox; replacing one type of bearing with another that imparts less pressure on the gear; and sensors that can detect any damage to the engine in transit.

"Throughout this process, Airbus Helicopters has been completely open with customers, explaining what it's doing and how it is addressing the issue. Safety is Airbus Helicopters' top priority and that remains the case with the H225."

On a more positive note, Airbus did well in other sectors, ranking second behind Bell Helicopter in the key markets of helicopter emergency medical services, airborne law enforcement, and firefighting. And most respondents appeared to appreciate the gains that Airbus has made in support; as one commenter noted, "parts availability has improved drastically" in recent years.

"Airbus Helicopters continues to improve its performance on spare parts, with network performance the best it has ever been," the company stated. "In particular, the performance in the U.S. has really improved, thanks to our previous stock investments and to very tight performance management. We now have finely optimized processes in place from order management, through to stocking and warehousing, worldwide. Our aim is to maintain this high level of performance over time, while continuing to improve elements of the parts

AIRBUS

service such as AOG support and the eOrdering functionality.

"On pricing, we have gone back to annual price lists following customer feedback, while continuing to work on ensuring that prices are fair and consistent. We have now re-priced 32,000 parts in this way," the company added.

One area in which our survey respondents would like to see significant improvements is technical publications. Tech pubs have always been a weak spot for Airbus in our surveys, but our respondents were especially vocal in their criticisms this year. French-to-English translations continue to be an issue for many of our respondents, with one commenter urging Airbus to "improve content and clarity in all technical documents." Respondents also had complaints about the functionality of Airbus's online tech pubs system.

"Airbus Helicopters is continuously analyzing market feedback and customers' expectations, especially when it comes to technical publications," the company stated. "Thus technical documentation improvements are presented during dedicated regional customer focus groups to assess and give feedback on the initiatives proposed by Airbus Helicopters but also to validate that our internal indicators correspond to a perceived reality in the field.

"On top of this, Airbus Helicopters organizes tech data webinars to both present and lead our customers to the most appropriate way of using e-Tech Pubs and ORION viewer and to how to get the most benefits from the tools. More than 20 webinars were organized worldwide in 2016."

Airbus cited a number of recently implemented improvements in this area, including increased stability, availability, and performance of web solutions; the extension of the timeout period to four hours; the ability to download ORION light (the offline version) from the KeyCopter website; new functionalities and new features in ORION including "My Inspection" to create inspections from the master servicing manual according to any criteria; and the availability of ORION on the Apple iPad (a functionality that has been available for the H125 and H130 since March 2017).

"

"TRAINING AT THEIR FACILITY IN TEXAS WAS GREAT AND THE INSTRUCTORS WERE VERY KNOWLEDGEABLE ABOUT THEIR PRODUCT."

to this customer concern" and launched corrective actions, the company told us.

"For all new and updated documentation, Airbus Helicopters teams in charge of writing this documentation are now assisted with an English guidance device to improve translation. Our experts are also accompanied by English native speakers from MRO maintenance centers to improve new work cards for the entire fleet. To harmonize TechData content, we have put together a technical terminology database, which is shared with the design office to have a unique technical referential for all aircraft in all languages (French, German, Spanish, and English)."

Editor's Note: Per the company's internal policy, Airbus Helicopters asked us not to identify the individual tech reps nominated as outstanding by survey respondents.

With respect to translation issues, "Airbus Helicopters has listened





BELL HELICOPTER



For the third year in a row, Bell Helicopter dominated our survey, ranking first among the OEMs in all sectors except the private sector, where it was a close second to Robinson Helicopter Company. Bell scored high marks across most measures of our survey, earning particularly high scores for quality of technical publications, quality of pilot and maintenance training, responsiveness of service representatives, and overall airframe/product satisfaction.

"Bell Helicopter is committed to continuing to invest to upgrade existing programs and exploring new programs that will improve the operations of our customers," said Glenn Isbell, Bell's executive vice president of Customer Support and Services. "Bell Helicopter's commitment to customer support and the way we interact with the customers has set us apart for years. Bell Helicopter provides its customers with local support in every corner of the world and has the largest support network in the industry with more than 100 authorized customer service facilities in 34 countries. We give our customers a choice of service options and provide the most reactive support available.

"Our success is also a direct reflection of our employee's dedication to our customers around the globe," he continued. "The entire customer support and service team takes a personal interest in addressing our customers' issues and ensuring they receive the support they deserve — we are not simply selling equipment, we are delivering world-class products backed by the hearts and minds of our incredible worldwide service and support team. We continue to listen to our customers and drive improvements to meet their needs." While survey respondents were generally happy with Bell's support,

we did receive numerous comments this year criticizing Bell's deci-

sion to limit part sales to authorized Bell customer service facilities. As one commenter put it, "The recent move to limit publications and parts is a HUGE MISTAKE. One of the great strengths of Bell has always been the ability to do our own overhauls or use a shop of our choice. This has allowed us to maintain high dispatch reliability and work with people we trust to do the work."

Responding to these comments, Isbell told us, "Bell Helicopter's approach is to strengthen our position in the repair and overhaul market in order to drive the most cost-effective solutions for our customers. Bell Helicopter remains committed to strengthening, developing, and enhancing our current customer support and services network with additional authorized facilities. Our customers' safety is our top priority and it is important to the integrity and quality of our aircraft that all repair and overhaul is performed by certified customer service facilities.

"We continue to work to strengthen our customer support network, which we give the most freedom to meet the customer's needs of any OEM. We are also actively working to improve our CR&O (component repair and overhaul) offerings by generating repairs through a partnership with Able Aerospace Services. This will yield more value to our customer base. We invested resources to better improve our logistics capability so that both our internal and external networks are performing better than anyone else in the world for rotorcraft parts."

Although there were few statistically significant changes in Bell's scores from 2016 to 2017, one of them was an improvement in Bell's score for "commitment to product improvement." That suggests that the industry is responding positively to new Bell CEO Mitch Snyder's explicit emphasis on innovation. However, commenters



also indicated that they're looking for practical, near-term advancements, not necessarily the futuristic technologies that were on display in Bell's FCX-001 concept demonstrator at HAI Heli-Expo 2017. Commented one respondent, "Bell needs to continue to innovate, but needs to stop coming up with solutions to problems that might not exist. Instead, ask customers what they need, and design aircraft accordingly."

"We are continually assessing our service capabilities to find innovative solutions to best meet our customers' mission requirements," Isbell stated. "Bell Helicopter has appointed a Customer Advisory Council (CAC) for future aircraft including the Bell 525 and Bell 505 in order to determine exactly what our customers need and they are actively involved throughout the entire design and development process."

Isbell also noted that the company continues to "refine and expand our support offerings to ensure Bell Helicopter can offer the most modern, innovative, and robust services to meet the long-term needs of our customers — like our Customer Advantage Plans, which we launched in 2016, a service solution that provides our customers with total aircraft coverage."

According to Isbell, since their launch in 2016, Bell's Customer Advantage Plans have "gained traction across the globe — with current customers represented in regions including North America, Latin America, Asia Pacific, and Europe. The plans have additionally been adopted by customers in mission segments ranging from emergency medical, corporate/VIP to oil-and-gas operators. Multiple large fleets have also adopted the plans, including the most recent announced customer, Heliservicio, signing its large fleet of 20 Bell 412EPs."

Isbell also reported that Bell is actively working on developing a Customer Advantage Plan solution for its legacy aircraft.

"Bell Helicopter has historically maintained a strong commitment to all models that we have ever produced," he said. "We are working with our legacy fleet owners to better understand their projected flight hours and forecasted part needs to better support them."

TECH REP SPOTLIGHT

GREG ARNOLD

"Greg is an excellent tech rep. Answers calls in a timely manner and genuinely concerned about our issues."

GREG JUDD

"Greg has gone above and beyond the requirements to make sure my new 407GXP was all — and more — it was represented to be. Questions, issues, problems: he handled them all with a smile and making me feel it was 'no big deal.""

HONORABLE MENTIONS

Jim Agnew, Hans Arnold, Carl Barnett, Chris Brown, David Burch, Ernie Burger, Daljit Chandra, Michael Devenney, Mike Doucette, Peter Empson, Kenny Gerken, Paul Gunderson, Chad Heiman, Nelson Hetherington, Ed Horodeski, Martin Jilek, Andrew Kelley, Scott Lane, Paul Luskar, Greg Matlin, Seigo Matsubara, Erin McMahon, Ron Orndoff, Daniel Prairie, Robin Richard, Erik Sharp, Kentaro Tomita, Pierre Vachon, Dave Van Fleet, Karel Vostal, Walter Watton, Barry ZumMallen

Action Time of Manufacturer





LEONARDO HELICOPTERS



Appearing in our survey this year as Leonardo Helicopters, the company previously known as AgustaWestland continues to struggle with customer support. This year, our respondents were particularly concerned with parts availability, an area in which Leonardo ranked last among the major OEMs. One frustrated respondent commented, "There appears to be no will no solve parts delivery issues, even to the point of failing to recognize there is an issue."

"Leonardo has continued to make significant investments in inventory, processes, and the way in which we forecast parts and resources to improve parts availability around the world," said Vittorio Della Bella, Leonardo's vice president of Customer Support and Training. "While we recognize challenges in procurement of a small number of critical parts, as well as internal and external supply chain challenges, the company remains committed to improve performance, working closely with customers and their material teams to better forecast, as well as understand and meet their needs.

"For those customers in North, Central, and South America, company efforts to improve parts delivery issues has led to 95 percent availability, in Philadelphia, of parts required to serve these customers. Our current on-time delivery schedule adherence rate is over 92 percent across the Americas."

While a number of commenters praised Leonardo's customer

support team for their hard work, as one put it, "it appears that they lack the resource support they require to be more responsive." Responding to this observation, Della Bella told us, "We appreciate the recognition of our professional customer support team, and continue to make investments in our people, processes, and tools to support customers around the globe. We've grown to over 1,800 customer support personnel worldwide, just as we've more narrowly focused on how we can work closer with customers through our TeamUp initiative.

"Recent new TeamUp developments were made as we expanded online support and training portals and refined them for customer ease of use, jump-starting new efforts to further reduce direct maintenance costs and expand Leonardo Helicopters' worldwide service capabilities. As always, we encourage all customers to reach out to our customer support management team to ensure the right level of communications for their operational requirements."

Several survey respondents also raised concerns about maintenance schedules, noting that inspection intervals can be challenging and difficult to track. According to Della Bella, "Our commitment to service excellence and our TeamUp initiative includes improvement of maintenance schedule intervals. We've made progress in this area, again thanks to the feedback we receive during our Maintenance Improvement Team (MIT)



and Customer Advisory Board (CAB) meetings. This has led to improvement in certain maintenance intervals, most notably, increasing the maintenance interval on the AW139 main gearbox to 6,000 hours.

"MSG-3, a steering group style maintenance design concept, is the industry standard, and we have utilized this in the development of maintenance programs for the AW189, AW169, and it will also be used for the AW609," Della Bella continued. "The essence of MSG-3 is that it is designed with operator input. Overall, Leonardo is proud of the vast improvement of our products in the market. As the fleet expands and increases and we come upon certain maintenance challenges, we will continue to embrace MSG-3 concepts, capture these challenges as early as possible, and respond efficiently — and cost effectively — with solutions."

With many Leonardo helicopters operating in the offshore environment, corrosion remains a persistent problem for the company. Last year, the company told us that it had implemented corrosion prevention procedures both in production and aftermarket maintenance, and had worked with customers to develop new solutions that prevent corrosion. Yet a number of our respondents this year mentioned corrosion issues, so we asked Della Bella to expand on those solutions and whether they're reaching all of the customers who need them.

"Many of our customers in the Gulf of Mexico have partnered with us in finding solutions for individual corrosion issues, and their feedback continues to mature our solutions," he said. "In the environments where these customers operate, an active corrosion prevention program is central to their successful operations. We continue to work with our benchmark customers, update best practices, and improve manufacturing techniques. These practices are shared continuously through our MIT and CAB meetings, held several times per year."

TECH REP SPOTLIGHT

FABIO SCIARINI

"Brilliant, customer-oriented, lots of experience."

REY SOBRETODO

"Very committed to customer service!"

HONORABLE MENTIONS

Alessandro Caffaro (director of Customer Support & Services in Philadelphia), Roman Carreto, Marco Espejel, Pedo Ferreira, Roberto Mascheroni (manager of MRO/ Service Center Network), Paul Rosenberger, Fabrizio Tenardi, Said Torres

"

"LEONARDO REQUIRES MORE HELP IN THE AREA OF CUSTOMER SERVICE. THEIR CURRENT STAFF WORK DILIGENTLY BUT IT APPEARS THAT THEY LACK THE RESOURCE SUPPORT THEY REQUIRE TO BE MORE RESPONSIVE."

Action Time of Manufacturer





MD HELICOPTERS, INC.



Last year, MD Helicopters Inc. (MDHI) rebounded in our survey after a relatively poor showing in 2015. This year, it preserved many of those gains, with the most significant improvements in the areas of parts availability and responsiveness of service representatives.

"We have an incredibly dedicated operator base that deserves a best-in-industry service level that mirrors the best-in-class performance of our aircraft," said Nick Nenadovic, MDHI's vice president of Aftermarket and Customer Support. "MDHI's vision and our driving mantra is to provide exceptional value, aftermarket support, and customer experiences to this ever-growing global base. To achieve this, we have invested significantly in building our support organization, increasing our inventory levels, and driving innovation.

"MyMD.aero is a cornerstone of this vision. With a user base that has grown exponentially since its 2016 debut, MyMD.aero is a free, webbased tool for maintenance tracking and real-time access to parts availability information. MDHI continues to expand the capabilities of MyMD.aero. This continuous improvement, based largely on direct customer feedback, allows us to proactively support the end user by developing a greater understanding of the needs of the fleet. This holistic approach to customer support — combining product innovation, real time aircraft data, customer feedback, responsive software, and technology — has allowed MDHI to achieve fill rates over 90 percent, and kept AOG rates the lowest in industry."

Despite MDH's improvements, there was one area in which our respondents were exceptionally unhappy — the cost of parts. To be

sure, "cost of parts" is not a particular strength for any OEM, but MDHI ranked last on this measure, and it was a frequent complaint in the comments. Wrote one, "The cost of MD parts are outrageous, significantly higher than other manufacturers."

Nenadovic responded, "After a number of years of stable parts pricing, or in some cases price decreases, we did recently increase our catalog pricing on some items slightly, five percent or less. While there are many factors that drive ownership costs — and we recognize the impact individual parts pricing can have, particularly for fleet owners — we are pleased to note that even with this small increase, owners/ operators of nearly every MDHI platform will see a *reduction* in direct operating costs in 2017 up to eight percent over prior rates.

"As we move forward, we expect a couple of factors to have a positive impact on price stability: increased use of the MyMD.aero portal, integration of advanced manufacturing technologies into the production of parts, and an increase in the number of life-limited components that are designed and manufactured by MDHI," Nenadovic added.

A number of respondents expressed concern about MD's move to perform more component overhauls at the factory, with one commenting, "There is no way MD can keep up with demand . . . The reason MD lost so much market share in the past was they could not support the product." We asked MDHI to explain the reasoning behind the decision, and how the company plans to complete overhauls in a timely fashion.

"As briefed at HAI Heli-Expo 2017, over time, MDHI will be removing



several components from the CSP-COM-5 manual and expanding MRO (maintenance, repair and overhaul) operations at our Mesa Center of Excellence facility," Nenadovic stated. "The primary drivers for this decision were two-fold. First, an increasing number of FAA (Federal Aviation Administration) inquiries into components that had not been overhauled or tested properly, and second, warranty and repair data showing numerous main rotor and tail rotor gear boxes having issues before TBO (time between overhaul).

"In order to ensure overhauls are completed efficiently to minimize operator downtime, and in accordance with FAA requirements, MDHI is standing up a brand new, state-of-the-art test cell in our expanded Center of Excellence facility on our Mesa, Arizona campus. We have a qualified, fully trained MRO staff committed to providing the exceptional support that our customers demand. Overhauls of main rotor transmissions and tail rotor gearboxes will begin at this facility in the latter part of 2017. Additionally, we are in the midst of an aggressive effort to lean our process flow, build an exchange pool, and increase inventory levels to support this effort."

Finally, while MDHI operators continue to have very strong loyalty to the product, they remain concerned that the company is failing to innovate and grow its customer base. As one respondent put it, "MD Helicopters makes great helicopters, but their support continues to be weak, and product development is not happening. It's time for MD to do SOMETHING to step ahead of the other manufacturers to continue to improve their excellent products."

Nenadovic told us, "As we announced at HAI Heli-Expo 2017, MDHI is working on a number of technology and design-based product enhancements that will improve performance and expand the mission profiles of our aircraft. Chief among the improvements that will be available to operators in the coming 18 months are: glass cockpits as part of the standard configuration for all single- and twin-engine models; certification of the Rolls-Royce C47E/3 engine; tail rotor improvements that will increase the MGTOW (maximum gross takeoff weight) for the MD 530F to 3,350 pounds internal and introduction of four-axis autopilot and solid state power on the MD 902.

TECH REP SPOTLIGHT

BRAD RUSHTON

"Brad is attentive to our needs, very good communication, knowledgeable, and is always friendly."

LARRY WHITE

"Larry is always available, concerned about the customer's needs, and driven to find solutions instead of offering excuses."

HONORABLE MENTIONS

Mike Gayler, Martin Griffin, Ron Mofford, George Martinez (manager, Authorized Service Centers and Distributors), Nick Page (MDHI instructor and test pilot), Chris Pierce, Alex Rivera (MDHI maintenance instructor), Steve Shuss (aftermarket sales manager), Frank Vass

"Parallel to these efforts, we are also actively working the development of the MD 6XX concept aircraft. The MD 6XX will deliver enhanced safety, reduced pilot workload, increased flexibility, and lower cost of ownership while also expanding the performance envelope for military, EMS, and law enforcement operators.

"In order to meet our customers' best-in-class expectations, the entire MDHI organization maintains a laser focus on quality control and process improvements across all operational areas. As we move forward, operators can expect the pace of innovation and the release of new products and enhanced capabilities to increase with great rapidity."



Action Time of Manufacturer

(RANGER)

ROBINSON HELICOPTER



Robinson Helicopter Company had another strong showing in our survey this year, ranking first among the OEMs in the private sector, and a close second to Bell Helicopter in the corporate, general utility, and training sectors. The company appears to be holding steady when it comes to customer support — there were no statistically significant changes in Robinson's scores between 2016 and 2017. While some respondents saw room for improvement, in general, the company's approach to business seems to be working well. As one respondent summed up, "Robinson helicopters are extremely reliable, are offered at great prices, and have very low and predictable operating costs. Parts and service are readily available and the company's operating philosophy is consistent and sound."

According to company president Kurt Robinson, "Customer support will always be a priority at Robinson Helicopter Company. We care about our customers, our helicopters, and we are very proud to see our commitment reflected in the surveys, year after year. We always look for ways to improve our helicopters and appreciate the feedback we receive from our operators." Our survey respondents did have numerous specific suggestions for how to improve those helicopters. As in previous years, main rotor blade reliability was the most frequently mentioned complaint, with many commenters expressing a desire for composite main rotor blades. Kurt Robinson did not directly respond to our question regarding what product improvements might be on the horizon. However, he took the opportunity to highlight some recently certified improvements, including "a new inlet barrier filter for the R66, quieter muffler for the R44, and new hub and spindles for the R22 which allows for the conversion to a collective activated hourmeter. The introduction of the R44 Cadet last year was in direct response to operators and flight schools wanting more capabilities from a two-place helicopter," he added.

Once again, mast bumping problems were a concern for many of our respondents, with some calling for the Robinson main rotor system to be redesigned entirely, but many others wanting to see more proactive communication from the company on safety issues. "It is my belief that Robinson MUST do more to ensure pilots are not able to pilot a Robinson helicopter unless



they are suitably trained to do so, and actively prevent unsafe flying practices in their machines," one respondent commented. A number of commenters also asked Robinson to expand its factory safety course to other geographic locations, such as the East Coast of the U.S.

Responding to these comments, Kurt Robinson stated, "Robinson is committed to safety and training. We are a proud member of the IHST (International Helicopter Safety Team) and have a operated a factory pilot safety course since the 1980s. Although the safety course in the United States is only taught at the factory, Robinson publishes safety notices and safety alerts to notify and educate pilots and operators. All safety notices, safety alerts, pilot handbooks, and maintenance manuals are available for free on our website at www.robinsonheli.com. Also on our website is an expanding library of short instructional safety videos for pilots wanting SFAR (Special Federal Aviation Regulation) training and information on particular subjects such as night flying or flying in heavy winds and turbulence."

C "ROBINSON IS GREAT AND EASY TO DO BUSINESS WITH. THEIR TECHNICAL REPS ARE ON POINT AND PROVIDE HELP AND GUIDANCE WITH EVERYTHING THEY CAN AND IN A VERY TIMELY MANNER."

TECH REP SPOTLIGHT

PATRICK COX

"Patrick is the 'technical friend' to all Robinson helicopter owners and operators!"

DANIEL HUESCA

"Daniel is always eager to help with any technical questions we have. Great service and very knowledgeable."

HONORABLE MENTIONS

Simon Jones, Paul Mansfield, Chris Rogers, Efrain Vargas

"I WOULD LIKE TO SEE AL IMPROVEMENTS ON THE BLADE HELP DESIGN, MORE COMPOSITE THEY MATERIALS THAT ELIMINATE SR." CORROSION/DELAMINATION ISSUES."

Action Time of Manufacturer





SIKORSKY AIRCRAFT



Sikorsky Aircraft, a Lockheed Martin Company, had a relatively poor showing in our survey last year. This year it rebounded, showing statistically significant gains across nearly all measures of the survey. As one respondent summed up, "Their AOG and parts department along with communication to all orders has greatly improved from a year ago."

"We're very proud and appreciative our customers' feedback," said Dana Fiatarone, vice president, Sikorsky Commercial Systems & Services. "A couple of years ago, we recognized the decline in the quality of our customer support and have made significant investments in response to our customers' feedback.

"Since opening our Customer Care Center, we have reduced the average volume of aircraft on ground events by 72 percent and reduced the average aircraft on ground turnaround time by 66 percent. At the same time, response time for routine orders has also improved — another priority for us. We've now deployed four forward stocking locations to better support our customers globally, and have hired more than 100 field service and technical service representatives. We are dedicated to keeping our customers flying."

Despite the significant gains Sikorsky made in our survey this year, respondents still saw room for improvement, particularly in the availability of critical parts. "Would like to see Sikorsky increase parts/inventory ability and empower their account level employees to make timely customer support decisions," wrote one respondent. "Lack of critical parts and low component reliability on several components has had a significant operational impact on our operation throughout 2017."

Fiatarone responded, "We talk to our customers regularly in order to manage parts availability. For 2017, we are continuing to expand our

use of data analytics and improved forecasting to not only predict the overall part inventory, but to specifically target when and where those parts are needed. As a result, we will continue to expand the amount of material we pre-position in the appropriate forward stocking location, and service our customers with very rapid turnaround. We will also continue to leverage the vast amount of data we collect to focus our product and reliability improvement efforts. We believe that these actions will help drive down both the occurrence and impact of parts shortages."

Several commenters mentioned that they would like to see updates and improvements to Sikorsky's technical publications, including flight and maintenance manuals and documentation for optional equipment. "Sikorsky has invested heavily in this area, and many improvements have either recently been released, or are planned for 2017," said Fiatarone. "One major focus area has been the continued evolution and expansion of our digital publications offerings. We've been working closely with operators and HeliOffshore to develop and deploy Sikorsky's Flight Crew Operators Manuals (FCOMs), leveraging the foundation of our industry-leading iFly Sikorsky suite of iPad based pilot applications.

"Earlier this year, we released the NextGen S-92 and S-76 Interactive Electronic Technical Manual (IETM). The intent was to significantly improve the usability of the software and incorporate advanced features to increase the number of operators transitioning to the Interactive Electronic Technical Manual from conventional paper or PDF-based maintenance manuals.

"Simultaneously we have been working aggressively to incorporate the



maintenance data from all S-92 type certificate options into the publications. For those options that remain Supplemental Type Certificates, Sikorsky has established central libraries on www.Sikorsky360.com containing Instructions for Continued Airworthiness (ICAs), organized by individual tail number. We populated these libraries with the latest revisions of those ICAs and also established indexes with revision control to aid operators in assessing currency of the data in their possession.

"Additionally, we have recently implemented All Pilot Letters, allowing us to rapidly communicate flight pertinent (non-regulatory) information to the customer in advance of a formal FCOM or RFM Part 2 update. Sikorsky firmly believes that customers will see productivity gains and improved safety with adoption of digital publications in the form of iFly Sikorsky and NextGen IETM products. Our focus is to ensure our customers get easy and rapid access to the latest, critical information they need to operate and maintain their aircraft," Flatarone emphasized.

With a growing number of military surplus UH-60A helicopters entering the civilian market, we asked Fiatarone how the company plans to support these aircraft. He told us, "Sikorsky remains committed to serving the growing technical and logistical support needs of more than 30 commercial operators who have acquired surplus UH-60A model helicopters from the U.S. government. Sikorsky strongly recommends that new Hawk operators register their interest at the company's aftermarket support portal — www.sikorsky360.com.

"Once registered, operators can easily access a range of services, such as free Alert Service Bulletins, in addition to requesting on-site maintenance support and maintainer training from Sikorsky's field service teams. Sikorsky also can advise operators about the quality and safety of used and overhauled parts, assist with parts obsolescence issues, and be a source for factory-authorized parts and services." Finally, those S-300 operators who took part in our survey continue to despair that Sikorsky will ever give this model — acquired from Schweizer Aircraft — the support it deserves. Commented one respondent, "I love the 300. Many of us do. It's just not supported. With such a great trainer, it's heartbreaking to struggle to keep them up."

"Unfortunately transitioning this product line to our manufacturing facil-

TECH REP SPOTLIGHT

OLA HENNING DAHL

"Ola Henning is very easy to contact, he always answers either email and/or phone whenever requested. I appreciate the service he provides and that he uses his time during visits talking to us in the hangar."

ERIC MARSDEN

"Sikorsky Technical Staff remain unchallenged in the industry. Eric Marsden is representative of the level of commitment necessary to ensure safety and reliability in our currently challenging market conditions."

HONORABLE MENTIONS

Frank Ambrosino, Francisco Borbon, Steve Carracino, Glenn Chadbourne, Lance Clausen, Justin Ferris, Stephen Goodall, Peter Hansen, Austin Lee (senior service engineer), Michael Little, Don Maguire (regional sales director, Canada), Erin Marlor (customer service representative), Alicyn Mays (AOG Resolution Center CSR manager), Oliver "Kip" McCaddon (regional sales manager, Australia), Dave McConnell, Kenji Okabe, Steve Saunders, Shuxi Guan, Dan Slagle, Gary Tate, Carl Violette, Sean Whitman

ity line has had its challenges," said Fiatarone. "So our priority right now is to follow through on our commitments with aftermarket and warranty customers while we strengthen our supply chain. We continue receiving a lot of inquiries about the aircraft so we are evaluating the business case for further production. In the meantime, we remain focused on rebuilding a strong aftermarket support network for our customers."



Action Time of Manufacturer

Methodology

Our survey was conducted by PMG Intelligence, a market research and data analysis consulting company based in Waterloo, Ontario. As in previous years, PMG created a dedicated website for our survey, collected the responses, and performed all data analysis. This year, that analysis also included significance tests to determine which mean score differences between our 2015, 2016, and 2017 surveys were statistically significant.

We distributed the survey link via email to subscribers on our Vertical Daily News email list, and to customers on mailing lists provided by helicopter OEMs. We also promoted the survey through advertisements on our website and in *Vertical Daily News*; and through promotion on Facebook, Twitter, and Instagram.

The respondents were qualified through the process of initial questions directly related to the helicopter industry. If respondents did not indicate that they are currently employed in the helicopter

industry, with recent operational or maintenance experience on specific helicopter models, they were redirected out of the survey and notified that they did not qualify. If respondents disqualified on the survey, their IP addresses were marked and crossreferenced to ensure that they did not try to re-enter the survey. All responses also underwent a data cleaning process in which response patterns were validated to ensure authenticity of results prior to analysis.

We asked respondents to supply their name and email address for further validation; however, all responses were kept completely anonymous. PMG only provided us with contact information for those respondents who indicated that they were willing to be contacted to discuss their comments.

Data collection took place between April 11 and May 4, 2017. A total of 1,042 respondents participated in the survey.



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All Mean Scores

		Airbus Helicopters	Leonardo Helicopters	Bell Helicopter	MD Helicopters	Robinson Helicopters	Sikorsky Aircraft
Commitment to Product Improvement	2016	3.78	3.53	3.44	3.22	3.63	3.06
	2017	3.73	3.39	3.73	3.12	3.67	3.46
Parts Availability	2016	3.35	3.08	3.79	3.06	4.04	2.38
	2017	3.43	2.82	3.74	3.09	4.06	2.90
Cost of Parts	2016	2.68	2.77	3.13	2.69	3.49	2.34
	2017	2.68	2.67	3.08	2.55	3.30	2.58
Warranty Fulfillment	2016	3.65	3.46	3.76	3.22	3.74	3.17
	2017	3.57	3.35	3.82	3.51	3.40	3.60
Speed of	2016	3.56	3.31	3.80	3.24	3.73	2.76
Service/ Repsonse Time	2017	3.53	3.11	3.84	3.36	3.63	3.50
Responsiveness	2016	3.76	3.58	4.04	3.49	3.90	3.36
of Service Reps	2017	3.85	3.44	4.03	3.71	3.82	4.05
Satisfaction	2016	3.69	3.45	3.84	3.64	4.00	3.15
Service Centers	2017	3.60	3.48	3.99	3.98	4.05	3.72
Satisfaction with	2016	3.50	3.33	3.79	3.43	3.83	2.99
Service Centers	2017	3.51	3.10	3.87	3.45	3.63	3.51
Quality of	2016	3.58	3.71	4.11	3.75	4.03	3.40
Publications	2017	3.57	3.59	4.25	3.77	4.08	3.82
Quality of	2016	3.99	3.94	4.11	4.30	4.33	3.79
Provided	2017	3.95	3.83	4.30	4.28	4.15	4.04
Quality of Maintenance Training Provided	2016	3.93	3.87	4.15	3.98	4.05	3.68
	2017	3.95	3.81	4.31	4.11	4.08	3.92
Overall Service Satisfaction	2016	3.65	3.48	3.86	3.89	3.98	3.02
	2017	3.64	3.32	3.98	3.87	3.89	3.59
Overall Airframe/ Product Satisfaction	2016	3.92	3.64	3.98	3.42	3.97	3.65
	2017	3.87	3.57	4.10	3.49	3.96	3.94

On a scale of 1-5, where 5 means 'Excellent' and 1 means 'Poor'



Overall Mean Scores by Region





Swiss Helicopter operates 31 aircraft from 14 bases



across the Central European country of Switzerland, but it's perhaps in the foothills of the Alps that the sheer variety of its operations — and value to the communities it serves — is best demonstrated.

By Oliver Johnson Photo courtesy of Swiss Helicopter

AUDI

Standing on a steep hillside farm on the doorstep of the Swiss Alps, I found myself staring into the eyes of a 1,500-pound cow as it lifted off the ground and briefly hovered in front of me. It looked entirely disinterested in its change of state. It slowly lifted another 50 feet, rotated 90 degrees, and made a beeline towards the farmhouse down below us.

"Huh," I said to the farmer standing on my left. "You don't see that every day." His English being no better than my German, he politely smiled back. Thing is, I couldn't have been more wrong; in the foothills of the Bernese Oberland, flying cows are literally an everyday sight. In the summer, of course. Not the winter. That would just be weird.

Picking my way between the cow pies back down the hillside, I followed the Swiss Helicopter crewman who was quickly disappearing in front of me. By the time we arrived at the farmhouse, the cow had already been removed from the sling that had carried it downhill, and the Airbus Helicopters H125 to which it had been attached by a 190-foot long line had landed nearby. The animal seemed completely unaffected by its brief transcendental experience, which was the result of a suspected dislocated hip that had left it stuck on the hillside. Now back on level ground, it could be easily taken on a trailier to a vet.

Thowever, joined the two crewmembers and pilot in the awaiting helicopter. The whole process, from arrival to departure, had taken less than 15 minutes.

_Two minutes in to the 10 minute flight back to the base, a call came in over the radio. Another cow on another farm needed rescuing. It was stuck at the bottom of sheer slope.

For the pilots and crews of Swiss Helicopter's base in Gsteigwiler — a small village near the stunningly beautiful town of Interlaken in the Bernese Oberland — such calls are part and parcel of summer work. Over the season, they'll receive about 200 requests to recover cows that have become stuck, injured, or have died in the mountain meadows in which they spend their summers.



But while it might be one of the more unusual sights for the uninitiated, it's certainly not the most common work undertaken by this utility operator.

From heliskiing, skydiving, and sightseeing flights in the Alps, to aerial construction, flight school, and VIP shuttle flights in the densely populated Swiss Plateau, Swiss Helicopter's operations are as varied as the undulating countryside over which it flies.

A NATIONAL OPERATOR

Swiss Helicopter AG was formed from an amalgamation of six different operators (Air Grischa, Bohag, Eliticino, Heli Gotthard, Heliswiss and Rhein Helikopter) in 2012. But while the company as a whole is relatively new, the experience it has brought together from these operators is vast. For example, its base in Gordola (in the Ticino Canton in southern Switzerland), which had previously been part of the Eliticino company, celebrated its 50th anniversary in 2016; while the Gsteigwiler base celebrated recently its 40th anniversary.

Company-wide, Swiss Helicopter has about 150 employees during its summer peak, including about 35 full-time pilots — though they are joined by additional seasonal pilots during busy periods. With a fleet of 31 aircraft operating across 14 bases, it flies an average of 15,000 flight hours each year. Airbus H125/AS350 AStars make up about half the fleet, with the other main types being the Airbus H120 and Guimbal Cabri G2. Beyond this core, it also has access to heavy-lift specialists such as the Kamov Ka-32 and Airbus AS332 C1 Super Puma through its sister company, Heliswiss International.

At the base I visited in Gsteigwiler, the company operates an all-H125 fleet, with the number of aircraft dependent on how busy the base is. During my visit in August — when Interlaken is heaving with tourists and good weather sees the aircraft flying from about 7 a.m. to 7 p.m. — there were four AStars at the facility. These were flown by five full-time and five part-time pilots, with two maintenance technicians performing the scheduled and minor maintenance tasks required to keep the aircraft in operation.

Situated on a small plain between the turquoise waters of Lake Thun and Lake Brienz, and surrounded by white-peaked mountains — including a section of the Swiss Alps so striking in its beauty that it has been designated a UNESCO World Heritage Site — it's not hard to see why Interlaken and the surrounding area has been drawing tourists from around the world for close to 200 years. It's also not hard to see how helicopters have





One of the operator's AStars poses at the top of a mountain alongside four Swiss alphorn players.

HB-ZND

become an integral part of life here, building and maintaining infrastructure and providing supplies to remote Alpine villages, ski lodges, mountaineering huts and other buildings, and also directly catering to tourists through sightseeing, heliskiing, and skydiving flights. And, of course, saving errant livestock.

Martin Burgener, operations manager at the Gsteigwiler base, has an enormous amount of local knowledge having grown up in the area, and having worked as a mountain guide and run the highest occupied hut in Switzerland near Jungfraujoch at 11,975 feet (3,650 meters).

During a brief break in operations at the base, he showed me the schedule for the next day's work for one aircraft — a long list of various long line supply missions around the mountains, flying everything from work crews to rebar, floorboards, hay and even an excavator. However, Burgener explained that a quarter of the aircraft's ultimate workload will arrive on the day itself — work such as cow rescues, or tourists that decide on the spur of the moment they'd like a sightseeing flight up in the mountains.

"The pilots you see here all have more than 3,000 flying hours, and they need that to be able to do everything we do here," he said. "The skills to fly is one thing, the other thing is if you know the area very well. There are a lot of valleys with a lot of wires







crossing through, a lot of little gondolas leading up to those mountain barns to carry up goods and all those things. So pilots need to be familiar with the area, otherwise it's really hard — they've got to ask questions all the time, like: 'Today it's 30-kilometer wind in the forecast. Can I still fly there?' "

The general plan is to complete heavy lifting work in the morning, leaving the afternoons for things such as tourism flights, of which there are roughly five a day in the summer. Still, the various moving parts and flexibility required to complete such an ad-hoc program as efficiently as possible require some serious logistic gymnastics on the part of the flight planning department.

"I've got to send the right pilot with the right crew and the right helicopter to the right place with the right amount of fuel, with the right gear to do the work, [allocate] the right amount of time and [do it] for the right price," said Burgener.

A CHALLENGING ENVIRONMENT

During rush periods, such as when the Ski World Cup arrives in nearby Lauberhorn each January, the base can bring in additional aircraft and crews to fly competitors and those wishing to avoid the packed gondolas directly to the ski hill. However, despite the variety of winter activities on offer in the region, it's typically a period of downtime for the base.

"We get less work in the winter, because all this construction work starts in the summer and ends in October/beginning of November," said Michael Spörri, a pilot at the Gsteigwiler base. "Then we just operate two or three helicopters in Bernese Oberland, [doing] tourist flights, avalanche bombing, and we are always on standby for Rega for avalanche accidents."

Throughout the year, air medical operator Rega calls the base to assist in 10 to 20 rescues, said Burgener. The aircraft don't take



Because of the complexity of the operations and environment around Gsteigwiler, a high level of skill is required, as well as a familiarity with the local area.









medical supplies or carry injured people, but serve in a support role. "If they're going to call we need to run, we need to help them," said Burgener. "We maybe have to fly the mountain guides or fly rescue gear, or in the wintertime we have to fly the avalanche dogs....But we don't get called directly to an accident. It's not our work."

Spörri said the most challenging work for the pilots was sling load missions. "Especially here in the mountains, you have the altitude [consideration], so you go up, if you bring food up to the mountain huts, you work at 10,000 feet most of the time, or higher, up to 12,000 feet," he said. "The air up there is [thinner], and you get at the end of the power of the helicopter. This is quite challenging as well with the wind in the mountain. Sometimes you have strong winds from the south — we call it the föhn — this can be very very challenging for the hook mission or the sling missions."

He said the performance and versatility of the AStar were the reasons for its sole use on the base.

"You can take five passengers in the helicopter, but you can use it as well for a sling load, because it's got a lot of power to bring the loads up," he said. "In our mountain, it's the best helicopter for the moment."

Sporri said a heavy snowfall in 1999 demonstrated the value of Swiss Helicopter to a community like Grindelwald, a small town near Interlaken. As all the valley roads were blocked, the company created an "air bridge" to connect the town with the outside world. "We flew the people in, we brought food in, and we flew people for two/three weeks," he said. "For all the communities, it's good that they have a company like us close to their area for such emergencies."

A VARIED MISSION SET

Simon Baumann, a pilot who has been with Swiss Helicopter since 2007, serves as operations manager of the Pfaffnau base in central Switzerland, and is also the company's marketing coordinator. He said the differences between the operations in Gsteigwiler and Pfaffnau help illustrate the breadth of work the company completes.

"In Pfaffnau, we are located in the lower part of Switzerland, and we don't offer cargo mission or sling load mission," he said. "We have two H120s based in Pfaffnau, and they are used mostly for commercial air transport like scenic tours, taxi transfer from Zurich to Geneva, for example, and we also offer our flight school here."

The flight school in Pfaffnau is one of five located at different bases. The company has 14 flight instructors on its staff, with five of these also working as commercial pilots for the company. Depending on which base they attend, students have the option of learning in a Cabri G2 or an H120.

The schools are recognized by the Federal Office of Civil Aviation as approved training organizations, offering private, commercial, flight instructor, night flying, external cargo sling, mountain landing and ATPL(H) courses with instrument rating.

"The mountain rating is very special in Switzerland — if you want to land on a glacier for tourist missions and also for aerial work, you have to be a mountain pilot," said Baumann. "You have to train how to approach in high and hot regions, and how to take care of the fuel you take with you, because up in the mountains, you have less power."

He said the mountain training takes around 20 flying hours, requiring about 200 landings in one of the 40 or so designated mountain landing spots in Switzerland. "We also have pilots from Denmark or Germany, for example, that come especially for Care must be taken when flying through unfamiliar valleys in Gsteiwiler, due to the sheer number of wires often crossing them.



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The low noise level and modern design of the H120 were the major reasons for its selection in the Swiss Helicopter fleet, according to Simon Baumann, the company's marketing coordinator.


"

"HERE IN THE LOWER PART OF SWITZERLAND, WHERE ALSO MOST OF OUR INDUSTRY IS LOCATED, YOU HAVE A VERY NOISE SENSITIVE AREA, AND IF YOU REDUCE NOISE, AND YOU DO THAT ESPECIALLY DURING TRAINING FLIGHTS, YOU CAN MAKE PEOPLE HAPPY."

- SIMON BAUMANN, OPERATIONS MANAGER IN PFAFFNAU



this kind of education to take the mountain landing examination here," said Baumann.

One of the major reasons for the selection of the H120 and Cabri for the training fleet was because both aircraft are relatively quiet and modern, he said.

"That is the key factor for our management," said Baumann. "Especially here in the lower part of Switzerland, where also most of our industry is located, you have a very noise sensitive area, and if you reduce noise, and you do that especially during training flights, you can make people happy."

Swiss Helicopter will soon add a fifth Cabri to its fleet, and Baumann said the aircraft was proving popular with students.

"Students love it because it's the same philosophy as the H120," he said. "You have a right turning helicopter, because it's a French helicopter, so the turn of the rotor is the same. You also have an enclosed tail rotor, comparable to the H120, also with the instrumentation."

Having formed from six separate companies just five years ago, Swiss Helicopter has already established a strong identity as one of the leading operators in a country that provides some of the most challenging work in the world. And in meeting these challenges, it has proved itself extremely adaptable. From flying cows to training the next generation of the country's rotary-wing pilots — and everything in between — Swiss Helicopter shows the success that true versatility can bring.

The Cabri has proven to be a popular choice with flight students. Swiss Helicopter will soon add a fifth Cabri to its fleet. Robert Atwood (left) and Richard Sullivan (right) decided to start their own company while flying back after fighting a wildfire in northern British Columbia in 2014.

NEW BREED

Hummingbird Drones is breaking new ground in Canadian UAV operations as the fledgling industry takes off.

Story by Oliver Johnson | Photos courtesy of Hummingbird Drones

hen you're running a commercial drone company, you've got to get used to some pretty anti-social hours. When *Vertical* spoke to Robert Atwood, cofounder, president and CEO of Kamloops, British Columbia-based Hummingbird Drones Inc. in mid-May, he'd been working pretty much round the clock over a busy weekend of flood mapping by day, and search-and-rescue (SAR) operations at night. And the work upon which Hummingbird has been built — wildfire operations — is almost entirely done at night.

"B.C. Wildfire Management has a policy that they don't want drones and helicopters in the air at the same time," said Atwood. "So basically, our days start around at 9 o'clock at night. When grounding occurs on the fire lines, we start flying drones. It's an almost an immediate transition. But it's one of the advantages of drones, too — you can fly them all night."

The drones provide a variety of services for those fighting wildfires, from finding hotspots through the use of infrared cameras, to creating daily fireline maps to aid the management of a fire. And when the sun rises, Hummingbird needs to have not only collected the data, but sorted through the mountains of information the drones will have collected and pulled the relevant needles from the haystack.

"We're usually delivering a product by about 6 o'clock in the morning, so time is of the essence; we really have to focus on creating efficiencies," said Atwood.

But it's the sort of challenge the company relishes. Despite only being in existence for three years, it has consistently broken new ground in the use of unmanned aerial vehicles (UAVs); it was the first UAV service provider to engage in wildfire suppression operations in Canada, and is part of pilot project to evaluate the use of UAVs in SAR operations.

THE RIGHT TOOL FOR THE RIGHT TIME

Hummingbird was founded in June 2014 by Atwood and Richard Sullivan (who now serves as the company's CFO) while the two were still at university. They spent their summers working as initial attack crewmembers for B.C.'s Wildfire Management branch, and it was during a return flight home after a wildfire deployment in northern B.C. that they came up with the idea of founding a drone company.

"We started talking about the huge potential that drones had, especially in improving safety around wildfires through hotspot scanning and spatial awareness, and we just got really excited about it," Atwood told *Vertical.* "By the time we got back to Smithers [B.C.], six hours later, we shook hands and said, 'We're going to start a company.' "

The two spent their spare time that summer exploring the possibilities with different drones. At the end of the summer, they returned to their studies at Thompson Rivers University in Kamloops, but they continued to develop their plans, working with the support of the university's business incubator — known as the Generator.

"They ended up really focusing us on specializing, and doing so specifically with wildfire," said Atwood. "At the time, it was kind of on everybody's mind that there were drone applications for wildfire, but nobody was doing it. So we just really put our heads down and tried to focus on specializing and creating a product that brought the highest possible value to wildfire operations."

In a few short months, they were flying drones for the first time on fires.

"It was a pretty exhilarating sequence of events for us," said Atwood. "At the time, there were no off-the-shelf components for what we wanted to accomplish. We have a 3D printer in the office, and I think the first infrared gimbal mount that we had was a mix of this 3D printed component and K'NEX [a construction toy system] hard-mounted onto the back of one of our drones. And that's how we operated it early on. Now you look at the equipment we're using and how far we've come... it's mind-blowing."

But that first flight wasn't just a landmark for the two young entrepreneurs; it marked the first time in Canada that a UAV service provider had worked on a wildfire. And, while being a groundbreaker undoubtedly provides opportunities, it also presents its challenges — not least in the form of navigating a regulatory framework as it's being built.

In August 2014, Transport Canada released a document detailing the knowledge requirements for pilots of UAVs under 25 kilograms (55 pounds), and these form the basis for Hummingbird's pilot training program. The requirements include knowledge of items including the Canadian Aviation Regulations, general operating and flight rules, navigation and meteorology. Once in the field, Transport Canada requires at least two people to operate







a UAV - a pilot and a visual observer - and the UAV must be operated within line of sight.

The company has several Special Flight Operations Certificates from the regulator to allow its various operations, with the most notable being that which allows it to fly over a fire at night.

DRONES IN OPERATION

Today, Hummingbird has five employees, with three trained as pilots and two working on software development. Its fleet includes six drones, all produced by DJI: three Inspire 1s, two Matrice 100s, and a brand-new Matrice 200. All are quadcopters, with weights ranging from about six to almost 10 pounds. According to Atwood, they can spend about 15 to 20 minutes in the air before the battery needs to be recharged, and can self-stabilize in winds up to 19 miles per hour (30 kilometers per hour).

Typically, the company will take just one or two on any given job, with just one running at time.

"We have about 10 batteries for each one, and a generator that goes along with it," said Atwood. "As soon as a drone comes down, you flip the batteries out and put a new one in, so you're really not grounded for any period of time whatsoever — you're just able to keep flying consistently all night long."

While Hummingbird has the ability to fly the drones using waypoints, it prefers to control them manually. "Our preference is to maintain somebody's hands on the controls the entire time," said Atwood. "There's not really a huge efficiency increase from flying autonomously as opposed to just flying manually."

With the hardware Hummingbird uses — from the drones themselves to the mounts, gimbals and cameras — now available offthe-shelf, the company concentrates its development efforts on the software side of the operation. Through Atwood and Sullivan's connections at the university, they've had access to a pool of software development talent to create programs customized to their services, allowing them to quickly sort through the enormous amounts of data the drones collect during each flight.

The push to focus on software development came when they first started to find there was a disconnect between being able to capture infrared imagery with a drone, to turning that into a usable and effective product for fire operations, said Atwood.

"What we developed is this program that parses through the infrared datasets — it separates false positives and real heat, provides coordinate information or geospatial information for each one of those hotspots, and then it outputs them in a shp and kmz format," he said.

A GROWING PRESENCE

Hummingbird's work has already taken it to the four corners of British Columbia (with the exception of Vancouver Island), and the breadth of its operations continues to expand.

Since the fall, it has been part of a pilot project overseen by Emergency Management B.C. to evaluate the use of UAVs in SAR.

"Something that we found pretty early on was that there wasn't a huge difference between finding hotspots on a wildfire, and finding heat that's from a human body," said Atwood. "We've already had numerous successful searches, and it's been a really incredible tool, especially for searching at night, in the winter, when the drone can cover huge areas of ground relative to a ground searcher."

He said a drone doesn't replace the need for a helicopter; instead, it enables searchers to explore areas, such as steep canyons or gorges, that a helicopter would be unable to reach, or go out in conditions that would ground a helicopter.



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Another recent expansion has been into the realm of flood mapping, where the drone can fly over a flooded area to provide maps for incident management teams to assess and use for planning decisions, or to assess the damage caused.

"We do actively pursue wildfire operation, but with a lot of these other things, often we'll just have someone that gives us a call to ask us if something would work," said Atwood. "Sometimes the ideas are pretty crazy, but often they can boil up and become a very high value product or service. We've been incredibly fortunate in terms of the outreach and the things people's creativity have led us to."

Hummingbird received early validation of its work with a nomination for Atwood as Young Entrepreneur of the Year from Startup Canada in 2015 (he was named winner in the B.C. and the North region).

"The work that we do is having a major impact on the way that wildfire operations are being conducted, especially with the quality of data that we can provide," said Atwood. "The award was a huge honor, obviously, but it was purely a reflection of what our whole team has been working on."

Driven by enthusiastic and energetic pioneer companies like Hummingbird, the drone industry has come a long way in just a few short years. And for a young company in a young industry, it's a very exciting time.



Oliver Johnson | Editor-in-Chief of *Vertical* Magazine, Oliver has been covering the helicopter industry since joining MHM Publishing in 2012.

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Aero-Smith Heli Services treats everyone like family, from its employees to its customers. That, along with a willingness to go far above and beyond the call of duty, has driven its success.

By Ben Forrest | Photos by Heath Moffatt

hen Hugh Andrews started Aero-Smith Heli Services with his wife Wendy on Vancouver Island in 1997, he kept a hydraulic press in the back of his pickup truck and hit the road anytime a job demanded it, like a doctor making house calls.

like a doctor making house calls.

"I'd go to customers' places and tear down a transmission, anything it took to keep them flying," said Andrews, 55, a licensed mechanic and helicopter pilot who was in the process of building a full-service maintenance, repair and overhaul (MRO) company that specializes in Bell, MD and Airbus helicopters.

Aero-Smith focused initially on component repair and overhaul, but it quickly grew into a nimble, multifaceted operation offering parts supply, structural repairs, field and line maintenance, 12-year inspections, complete aircraft rebuilds, component overhauls, a paint shop and Jet A sales, among other services. The company's diversification was not a deliberate strategy it happened organically, as Aero-Smith responded to the needs of its customers. But it helped the company establish itself as a one-stop helicopter shop with a reputation for going above and beyond to get the job done.

"It's 24/7," said Andrews. "They could call me night, day, wouldn't matter: 'I need a part.' I'd personally drive it to the airport or jump on a plane and go wherever the client was to get them back in the air."

Aero-Smith is located on the same 10-acre parcel of land as the Andrews family home in the small community of Coombs, British Columbia, about 30 miles (45 kilometers) northwest of Nanaimo.

The company has eight full-time employees who work in an 8,000-square-foot (743-square-meter) hangar that has been expanded three times over the years as business grew. Many



Aero-Smith Heli owner Hugh Andrews conducts a conditional inspection on a blade pitch horn.



Structures technician Dean Sept repairs an Airbus cowling.



Technician Chris Samus installs a tail rotor drive shaft.



of those employees have been with Aero-Smith since its early days, and Andrews gives them much of the credit for the company's success.

"Your reputation's everything, but at the end of the day, I wouldn't be here if it wasn't for them," he said. The crew has worked together so long, he thinks of them as family.

"I spend more hours a day with most of these people than I do with my own family, especially in the in the busy summer season, where maintenance support is critical to the operators," said Andrews. "So at the end of the day, yeah, they're definitely family. If they were sick or in any kind of bind, we would do whatever is required to help them."

Aero-Smith is a Transport Canada-approved component shop capable of overhauling or repairing major dynamic components for all Bell 206 series and MD 500 series helicopters, with both rentals and exchanges available.

The company aims to meet its customers' everyday parts needs from its large, in-house inventory, with the ability to quickly source parts that aren't in stock. All parts are fully certified and ready to install.

"We have recently started expanding our sales and marketing outside of North America, but the big bulk of our business is Western Canada and the Yukon," said Andrews. "And we have clients in the U.S. as well we prep, pack and ship helicopters globally — Philippines, Great Britain, China and Mexico.

"We're endeavoring to broaden our market base," he added. "Over the last couple of years, with industry downturn, Aero-Smith is looking outside the box and trying to develop new initiatives to generate additional business and grow our revenues." With the oil-and-gas, logging and mining sectors all struggling, Aero-Smith is learning to adapt to challenging economic times, using the company's in-depth knowledge of its customers in those industries.

"We have to adapt with them," said Sean Sinclair, who recently joined the company as general manager. "As they change their business profiles, whether they venture into tourism or Shop foreman Ben Bruner completes an engine inspection.





Parts manager Lani Parr-Pearson helps ensure Aero-Smith meets all its customers' needs, drawing from a large in-house inventory.

EMS [emergency medical services], as examples, we have to be ready to meet their requirements as their needs change. I believe as a smaller company we have the fluidity to accomplish that and help support those changes. We can be a lot more flexible and go down whatever road our customers require from us to keep them flying, to keep them doing what they do."

Sinclair will oversee daily operations at Aero-Smith on Vancouver Island. This will allow Hugh and Wendy flexibility to explore and expand the business profile to maintain a positive growth pattern for the company. Apart from that, nothing will change. Aero-Smith will continue to serve the needs of its customers as it always has, with Andrews as always being the key component.

"We still need to take care of our customers," said Sinclair. "We can't let that slip."

As Aero-Smith moves forward, it aims to continue being the company it has always been, providing outstanding, customerfocused service while it tries to broaden its base and evolve with an ever-changing industry.

"As OEMs [original equipment manufacturers] start changing the rules of the game, we have to learn to work with those Component shop engineer Jeff Veerman inspects an MD 500 input gear.



"MANY OF MY CUSTOMERS AS WELL AS THE STAFF ARE KIND OF LIKE MY FAMILY. I KNOW THOSE CLIENTS ARE HERE BECAUSE WE KEEP THEM IN THE AIR. WHEN THEY'RE BROKE DOWN AND THEY NEED US, WE'LL BE THERE FOR THEM."

- HUGH ANDREWS, OWNER OF AERO-SMITH HELI SERVICES

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rules," said Sinclair. "I think our partnerships with OEMs is really what's going to help keep us going in the direction we're going."

As part of its growing diversity, Aero-Smith Heli Services owns four Bell JetRangers and one Bell LongRanger L-3, which at this time are part of the company's lease fleet and currently serving the Canadian helicopter industry.

In another exciting development, Hugh and Wendy's eldest daughter, Holly, recently successfully completed her commercial



Holly Andrews stands with her father.

rotary wing course, and is now ready to participate in the evolution of the company, wherever that may lead.

Andrews actively tries to ensure Aero-Smith is a fun place to work, perhaps because he is the kind of person who jokes often and laughs easily, a larger-than-life personality who feeds off human interaction.

He is the kind of man who will tell you — perhaps jokingly, perhaps not — the company's name is a nod to blacksmiths and goldsmiths, as well as nearby Mount Arrowsmith, and the rock group that penned "Dude (Looks Like a Lady)."

"They're a good band," he said with a laugh. "When we first started, we had a person call and say, 'Yeah, are there tickets available for next week's show?' "

But there is a serious idea here, peeking out from under Andrews' relaxed demeanor. What it comes down to is, everyone who deals with Aero-Smith Heli Services is considered family or something close to that, from long-time employees to the clients Andrews has always gone above and beyond to serve.

"Many of my customers as well as the staff are kind of like my family. I know those clients are here because we keep them in the air. When they're broke down and they need us, we'll be there for them."



Ben Forrest Ben is assistant editor of *Skies* magazine. Before joining MHM Publishing in 2015, he spent the better part of 10 years in the newspaper industry, where he worked as an editor, sports editor and general assignment reporter.

Aero-Smith owns four Bell JetRangers, one of which is pictured here; and one Bell LongRanger L3.



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Having started from humble roots, Helicentre Aviation is now one of the leading helicopter flying training providers in the U.K., and was among the first there to operate the Guimbal Cabri G2. It is now among the first to offer EASAcertified training on the type in the U.S., and its appetite for growth is far from satisfied. Story by Jon Duke | Photos by Lloyd Horgan

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Two Helicentre Aviation Guimbal Cabri G2s take to the air over the English countryside near Leicester Airport.





The operations room features a wall of screens displaying various aeronautical information. The company is able to track its aircraft in real-time through Private-Radar.

elicentre Aviation was established by Chris and Katie Line in the British town of Coventry in 2001. Located right in the center of the U.K., its airport offered an ideal base for the fledgling charter, utility,

and aerial survey operation. It offered instruction for a private pilot license from the outset, and soon added commercial and flight instructor training to the list of services it provided.

After the somewhat acrimonious temporary closure of Coventry Airport in 2009, Helicentre moved approximately 20 miles northeast to Leicester Airport. While the airfield was much smaller, it meant the company could be much more competitive with its training costs, in turn allowing it to concentrate on finding new ways to help students meet the costs of their training.

A key figure in helping the Lines deliver these innovations has been Sarah Bowen, Helicentre's managing director and head of training. Previously the owner of a recording studio, she caught the helicopter flying bug after a trial lesson and joined the company in 2008 as a flight instructor. She is passionate about making the progression into professional helicopter flying as achievable as possible.

Helicentre pioneered a scholarship scheme that gave its private pilot license graduates the opportunity to apply to have their progression towards commercial licenses or instructor ratings paid for in full — including the cost of hour-building and the necessary courses. In the four years it has been running, nine qualifications have been awarded, and most importantly, a successful award also comes with the offer of a freelance job upon gaining qualification. Morgan Whiting was the first to benefit from the scheme in 2013, and is now an instructor and utility pilot with Helicentre, flying its Robinson R44s and Guimbal Cabri G2s to conduct pipeline surveys.

Helicentre has made further innovations in the delivery of training by forging links with Middlesex University, with whom Helicentre delivers the BSc(Hons) Professional Aviation Pilot Practice. Launched in 2015, it has yet to deliver its first graduates, but in granting access to the preferential loan rates



Sarah Bowen, Helicentre's managing director and head of training, joined the company as a flight instructor in 2008 after catching the flying bug during a trial lesson.

The Cabri features a Lycoming O-360 engine, which is derated to 145 horsepower. The engine is the only life-limited component.



available for student finance agreements, it is an attractive way for potential future pilots to reduce the cost of their training while gaining a widely recognized academically credible qualification. This carries the additional benefit of doing away with the difficult decision between pursuing a university placement or committing to flying training. While U.S. universities, such as Embry-Riddle, have been offering similar courses for some time, this is a novelty in Europe, and Helicentre believes it is the first fully-integrated helicopter-specific honors degree program in the world.

AN EARLY ADOPTER

At the same time as it was bringing new funding and educational opportunities to its students, Helicentre also brought them a new aircraft to fly. Designed by Bruno Guimbal — formerly of Eurocopter — the Cabri G2 became the first two-seat piston helicopter to be certified for nearly 30 years when the European Aviation Safety Administration awarded type certification in 2007. The aircraft brings several advances to the class.

While the composite fuselage provides crash resistance and keeps the weight down (the tail boom weighs in at just 11 pounds) it also keeps the price up, as does the – albeit small – glass cockpit that comes as standard and includes a multi-limit indicator that would be familiar on much more complex aircraft. The Lycoming O-360 powerplant is derated to 145 horsepower, and drives the main gearbox via a belt drive incorporating an automatic tensioner that is operated by engine oil pressure; if the oil pressure drops, the motor is automatically isolated from the drive. The engine is the only life-limited component, with everything else operating on condition — which means no 2,000-hour rebuilds, with a noticeable impact on cost.

I flew the Cabri back in 2013, and found it to be spritely, but not as twitchy as its diminutive size might suggest. While an electric coolie-hat trim atop the duplicated cyclic controls helps to reduce the control forces in cruise, the unpowered cyclic in particular is somewhat heavy, and it requires considerable finesse to manually dampen the control lag that this generates. The three-bladed main rotor system is articulated on elastomeric bearings, which means it's not susceptible to mast bumping at low G and grants outstanding main rotor stability in autorotation.

Helicentre staff stand outside the company's hangar at Leicester Airport. The hangar has six helipads directly outside.





WHILE THERE'S A LONG TRADITION OF FIXED-WING PILOTS CROSSING THE ATLANTIC TO TAKE ADVANTAGE OF THE BETTER WEATHER, FUEL PRICES, AND FRANKLY THE BETTER ATTITUDE TO GENERAL AVIATION THAT COMES WITH BEING IN THE U.S., THE SAME ISN'T TYPICAL FOR HELICOPTER PILOTS."

The Helicentre hangar has the latest LED lighting, and, in a first of its kind in the U.K., is heated by burning waste aircraft oil from the airport.

4

The very wide acceptable range of 450 to 610 rotor rpm power off means that in most circumstances you can maneuver as you wish with the lever on the floor, without fear of venturing anywhere close to the limits.

Helicentre was an early adopter of the Cabri, buying its first in 2012, and within a year had four operating. It now boasts six, and has passed 10,000 hours on the type, which represents about 10 percent of the global Cabri fleet hours. It is also one of the few operators of the type in the utility role — for pipeline inspections.

The success of Helicentre's flight training program is one aspect fueling this growth, with the other being the 2013 award of an eight-year contract by National Grid – a British multinational utility firm – to provide pipeline surveillance. Initially fulfilling the contract using Bell 206 aircraft, Helicentre has now moved to Robinson R44 Raven IIs, specially modified with five-point harnesses, Lynx NGT-9000+ traffic avoidance systems, and specialist Apple iPad mapping software that provides the required mapping and monitoring functionality. Worth £20 million (about US\$26 million), the contract fulfils the U.K.'s largest onshore surveillance operation and provided the potential for a huge amount of investment in Helicentre's own facilities, which by 2013 were in need of refurbishment.

Never afraid to shy away from ambitious projects, Helicentre decided to build a new operations complex, including VIP transfer facilities. The offer of VIP handling meant allowing for VIP-class aircraft, so the new site was designed to cater for up to Sikorsky S-76-sized machines on specially prepared helipads with concrete hardstanding available all the way to the car park. To many, particularly in the U.S., this might seem obviously routine. But in the U.K., where the scale and material state of

K

general aviation has been in gradual decline for decades, having something hard to walk on between your car and your aircraft is a big deal. And Helicentre didn't stop there.

An entirely new hangar was constructed with enough room to house the ever-expanding fleet, and six helipads directly outside from which to fly them. The hangar also reflects the company's seemingly insatiable appetite for modernization and innovation, equipped with the latest LED lighting, and is even heated by burning waste aircraft oil from the airport — the first system of its kind in the U.K. Attached to the hangar is the new office, briefing, and operations building, which is a huge advance from its previous quarters.

CONTINUOUS IMPROVEMENTS

With the new building complete in early 2014, the team at Helicentre still wasn't done modernizing. The new operations room looks like how you might imagine Jack Bauer's living room, with a wall full of monitors displaying every conceivable piece of aeronautical information, even equipped with Private-Radar, a commercial aircraft tracking tool that allows real-time monitoring of the fleet's position. The flying program is managed using the increasingly popular FlightLogger software, which allows all aspects of the administration and operation of both the flying training and utility activities to be managed, including scheduling, crewing and even syllabus management.

For two years, the company took a well-deserved breather from what seemed like inexorable growth. It obviously found it too hard to stay off the gas though, as it wasn't long before plans were afoot for yet another expansion, and this time Helicentre had its eyes fixed "across the pond." It doesn't take long for newly-qualified British pilots to tire of the predictably morose English weather — even the most beautiful countryside in the world doesn't look that pretty from inside a stubborn layer of frontal stratus. While there's a long tradition of fixedwing pilots crossing the Atlantic to take advantage of the better weather, fuel prices, and frankly the better attitude to general aviation that comes with being in the U.S., the same isn't typical for helicopter pilots.

Helicentre saw the opportunity, and once the Cabri received

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its Federal Aviation Administration (FAA) certification in 2015, all the necessary pieces were in place for another expansion this time to Winterhaven, Florida. In summer 2016, a brand new Cabri was crated from the factory in Marseille to U.S. importers Precision Helicopters of Oregon for assembly and onward ferry.

Now fully operational in Winterhaven, the aircraft provides the opportunity for pilots looking to train or build hours to do so much more cheaply than in the U.K., and with a near-guarantee of flyable weather for most of the year. Two of Helicentre's scholarship winners have now completed their hour-building there. The Florida base also offers pilots of all experience levels the opportunity to obtain an FAA certificate and expand their skillset. The joke might be that the U.S. and Britain are separated by a common language, but the two are definitely separated by their interpretation of ICAO (International Civil Aviation Organization), and flying in the States is a must for anybody serious about properly developing their airmanship and general flying knowledge.

As of *Vertical's* visit to Helicentre's Leicester facility early in 2017 though, the company still refuses to rest on its laurels. It now has approval for European Aviation Safety Agency (EASA) courses in Winterhaven, including ab-initio flight training and type ratings, and can expand its Approved Training Organisation approval there to offer all the courses available at its Leicester facility, including the commercial pilot license and flight instructor courses.

Maybe after that it will take a break.





130 > Vertical Magazine

When the U.S. Navy was looking for an ultra-light, foldable helicopter for the Marine Corps in the early 1950s, engineers at Hiller Helicopters offered the remarkable-looking XROE-1 Rotorcycle. **By Bob Petite**

In 1954, the U.S. Navy was exploring the need for a small ultra-light, compact, easily portable and foldable one-person helicopter to be used by the Marine Corps for observation, reconnaissance, liaison missions, courier work, and as a rescue platform for downed pilots. In all, there were about 30 responses to the competition, but the U.S. Navy Bureau of Aeronautics selected Hiller Helicopters out of Palo Alto, California, along with the Gyrodyne Company of America in Long Island, New York, to build prototypes of the ultra-light helicopter for the Marines. The new helicopter needed to be stable and simpler to fly than larger rotary-wing aircraft, and it had to be capable of being para-dropped from an aircraft into potentially hostile environments.

After intense studies, Hiller's engineers came up with the XROE-1 Rotorcycle — a design that was striking in both its simplicity and efficiency. The main body consisted of a semi-monocoque type pylon and engine, tapered three-piece aluminum alloy spring tube landing gear, and a tubular tail boom. The helicopter could be folded without the use of tools, using just the quick release pins found in the main rotors, tail boom, and on the tripod landing gear.

The rotorcycle's 18-foot (5.5-meter) diameter main rotor consisted of two all-metal blades, and the aircraft had a conventional 36-inch (91-centimeter) diameter metal tail rotor. Mounted above the Rotorcycle's main rotor blades were the classic Hiller Rotormatic control system and airfoil paddles, as used on Hiller's production UH-12 and H-23 helicopters.

The pilot sat on a small fiberglass seat with the engine situated behind his back. A conventional pedal and cable system allowed the single pilot to change the tail rotor pitch for directional control. The instrument panel was small, incorporating just the air speed indicator, rotor tachometer, voltmeter and the engine cylinder head temperature gauge. All told, the aircraft weighed just 300 pounds.

There was little cyclic feedback to the pilot's overhead cyclic control stick. The control rotor system increased the inherent stability, and its servo action resulted in almost complete elimination of the cyclic control forces. The collective stick used a twist grip throttle control.

The Rotorcycle was powered by a Nelson Aircraft Corporation H-59 engine — the same as was used in powered sailplanes. It was a horizontally opposed, four-



ONE-MAN HELICOPTER XROE-1 ROTORCYCLE

Hiller Helicopters Palo Alto, California



VERTICAL REWIND VR THE XROE-1 ROTORCYCLE



cylinder, two-cycle, air-cooled 40-horsepower engine, and it ran on 80/87 aircraft fuel mixed with oil. The engine weighed only 42 pounds, had a 2.5-U.S. gallon tank, and was started with a lawnmower-type pull cord. Later, a slightly more powerful Nelson H-63 45-horsepower engine replaced it, and this had a batterypowered starter.

GETTING AIR UNDER THE TIRES

The prototype Rotorcycle first hovered in November 1956, with Hiller chief pilot Richard Peck at the controls. The first successful flight followed in January 1957. Of two prototype XROE-1 Rotorcycles, both were retained at Hiller Helicopters in Palo Alto for further ground tests and flight testing by Peck. Flight testing with the second pre-production prototype was completed by July 1957.

The potential of the Rotorcycle as a production aircraft was quite evident. Hiller claimed that a non-pilot would only need about eight to 10 hours of training on the Rotorcycle in order to qualify to fly it, and a single person could assemble the folded aircraft from the container package and have it ready to fly in less than 10 minutes. Among Hiller personnel, the record for assembling the folded helicopter stood at one minute and 50 seconds.

The overall length of the compact helicopter was just 18.42 feet (5.6 meters) from rotor tip to tail, with a height of 7.6 feet (2.3 meters). It had an empty weight of 300 pounds (136 kilograms) and a maximum gross weight of 546 lb. (247 kg), giving it a useful load of around 246 lb. (112 kg). The Rotorcycle cruised at about 52 m.p.h., and had a

maximum speed at sea level of 70 m.p.h. Its range varied from 30 to 40 miles (48 to 64 kilometers). Demonstrations showed the helicopter capable of climbing at a rate of 1,160 feet (354 meters) per minute to a ceiling of 13,200 feet (4,023 meters).

The Rotorcycle was demonstrated to both the U.S. Navy and Army, and the Marines put in an order for five XROE-1 (to be known as YROE-1) helicopters for further evaluation and testing. More demonstrations of the Rotorcycle, piloted by Peck, took place overseas in England, Germany, Switzerland, Italy, and Holland. Peck even flew the Rotorcycle through the French Alps during one demo tour.

By 1958, the Rotorcycle prototype had over 60 hours of flying time, and had even completed one flight during gale force winds in England with little problem. The aircraft obtained an experimental certificate of airworthiness on Jan. 24, 1958.

Canadair Ltd. in Montreal, Quebec, was an agent for Hiller Helicopters in the mid-1950s, and made arrangements for the Rotorcycle to be demonstrated to the Canadian military, and other civilian government departments during the summer of 1958 at RCAF Station Rockcliffe in Ottawa, Ontario.

With Hiller extremely busy manufacturing H-23D Raven helicopters for the U.S. Army and testing the X-18 tiltwing vertical takeoff and landing research aircraft for the U.S. Air Force, Stan Hiller decided to license the Saunders-Roe Aircraft Company in England to manufacture five YROE-1 Rotorcycle helicopters for the U.S. Marines, as well as another five (ROE-1s) for potential foreign sales.



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Helicop-Air in Paris, France — Hiller's affiliate in Europe — would administer the November 1958 contract.

THE START OF MASS PRODUCTION?

Saunders-Roe manufactured the first YROE-1 Rotorcycle and had the helicopter officially flying by Oct. 19, 1959, with all five completed by the spring of 1960. Overall, 12 Rotorcycles were manufactured: the two prototypes in the U.S. and the 10 built in England. The estimated cost of a new production Rotorcycle was about US\$10,000.

The five British-built ROE-1 Rotorcycles, serial numbers 8 to 12, were completed by December 1961, and remained in England. At least one was given a civil registration with the hope of private sales. One Saunders-Roe Rotorcycle (serial number 8) crashed on May 8, 1960, at Eastleigh. Another turned over, fatally injuring one person. The remaining aircraft did not find any sales and were eventually withdrawn from use. There was no interest in the light portable helicopter from either the British military or other European armed forces. Civil interest was also almost nonexistent.

The five USMC YROE-1s were shipped to the U.S., with two going to VTOL Branch Flight Test at U.S. Naval Air Station Patuxent River, Maryland, under the direction of Navy pilot Donald R. Segner (who later went on to pilot the Lockheed Cheyenne). About 200 test flights were conducted with the Rotorcycle at Patuxent River, and at least two other Navy pilots were trained on the type.

The other three USMC Rotorcycles were turned over to the NASA Ames Research Center in Moffett Field, Sunnyvale, California, in 1961 for further evaluation. These helicopters went to private owners when the Navy disposed of them.

One YROE-1 (serial number 5) was returned to Hiller Helicopters in 1960. It was flown by Peck, who accumulated just over three hours on the airframe.



It was said that Peck commented that he did not like flying the X/YROE-1 that much, as it was quite sensitive on the controls. However, he found each flight very exciting.

By the early 1960s, the U.S. military said that there was no longer an operational need for a one-person helicopter. Additional procurement of the YROE-1 helicopters was not a priority, and none ever entered military service.

Eventually, the YROE-1s were grounded after exacting testing and evaluation by the Naval Air Test Center (NATC) and NASA because of very sensitive directional control power in the flight controls and pedals, inadequate rudder control during simulated power failure entries, and because the tail rotor could be only used for 10 hours before requiring replacement. Full on autorotations in the Rotorcycle required a great deal of intense flying skill during entry and flaring. There was also the lack of an adequate horizon reference when flying the helicopter out of ground effect.

Overall, the Rotorcycle was satisfactory to fly when everything was working well, but it appeared the engine was not that trustworthy. One also had to keep a close watch on the tail rotor and tail boom during flights.

While the program was ultimately cancelled, numerous Rotorcycles appear to have survived. One is in the U.S. Army Museum in Fort Rucker, Alabama. Others can be found in the Steven F. Udvar-Hazy Center, National Air and Space Museum, in Chantilly, Virginia; in the Evergreen Aviation & Space Museum in McMinnville, Oregon; and in the Hiller Aviation Museum at San Carlos, California. There is also one Rotorcycle owned by a private individual near San Diego, California.

With its slow speed and short range, no one will ever know how the Hiller Rotorcycle would have performed in a real rescue and evacuation during an actual crash situation. But its unusual design and ambitious concept provide an interesting chapter in the history of military rotary-wing aviation.



Bob Petite | Bob is a member of the Twirly Birds, AHS International, the Canadian Aviation Historical Society, the American Aviation Historical Society and the Bell 47 Helicopter

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IN THERE I WAS... | PAMELA JACOBSON DIRECTIONS IN THE DARK

"Chalk 4, Chalk 4, are you alright? You're descending."

From the cabin of the UH-60 Black Hawk, I could see only black velvet darkness outside, blending together sky and ocean, but a quick instrument scan told me we were in a rapid descent.

"Take the controls," blurted the pilot in command (PIC) to his fellow pilot. "I've got vertigo." Captain H, a young maintenance officer with little experience in formation flight, air assaults and, certainly, night formation flight over water without night vision goggles (NVGs), reluctantly took the controls and managed to level the aircraft, some 50 feet above the ocean surface. As the captain slowly climbed the helo back to 500 feet, the worried radio calls persisted. "Chalk 4, are you okay? Chalk 4, what's going on?" With one pilot incapacitated and the other in over his head, I assumed radio duties from the crew chief station in the back, and assured the rest of the eight-ship flight that Chalk 4 was a little disoriented, but better now, and attempting to rejoin the lead aircraft.

Hearing a female voice over the radio when there were no female pilots on the mission brief probably did little to allay their fears, but it couldn't be helped.

I was originally scheduled to fly the mission, but a bout of drug-resistant malaria from Honduras had medically grounded me for the third time that year. As D Company's instructor pilot, however, I had volunteered to ride along and monitor the training.

It was the summer of 1994, and the 82nd Airborne Division was preparing to invade Haiti. The operation would require the use of every available UH-60 in the division. The plan was to rotate crews and keep the aircraft flying 24 hours a day for the first few days of the invasion. That meant scraping up every non-proficient, day visual flight rules (VFR)-only desk jockey we had, and getting them up to speed in a hurry. It would be a night attack, and unfortunately, many of these guys had only received a modicum of training in NVGs. There wasn't time to get these guys trained to spec, and many were too busy planning the invasion to get out to the airfield. So, while three flights of eight crews did overwater flight training wearing NVGs down at Fort Stewart, one flight was sent out unaided.

Ahead of the training, I talked to my guys about flying unaided night formation. The PIC was a lieutenant who was proficient in NVGs, so his instinct was to hold a tight formation. Unfortunately, at night and without goggles, that approach doesn't work. The aircraft were blacked out, a vision of glowing green "slime" lights on shapeless black forms. You need to fly a looser formation, I explained, and scan your instruments regularly, using your artificial



horizon to orient yourself, or you'll get vertigo. Our PIC was not the first casualty. Chalk 2, flying at a 45-degree angle to the right rear of the lead aircraft, became disoriented and missed a course correction to the left. Chalk 3 made the turn, and stayed in trail behind the lead, and Chalk 4 followed 2 straight ahead. Realizing what had happened, my lieutenant quickly tried to rejoin Chalks 1 and 3.

But reforming a broken formation is one of the most dangerous maneuvers you can attempt — even under the most forgiving circumstances.

"Chalk 4, Chalk 4, are you alright? You're descending." The radio call was enough to alert our PIC that he had lost control of the aircraft. He did what he was trained. He handed over the controls.

The problem was, Captain H was a career maintenance test pilot, day VFR. This was not his thing, at all. Still, he somehow managed to get the helo under control and regain the lost altitude. Now the task at hand was to rejoin the aircraft ahead.

The lead aircraft turned on his position lights and headed back towards land, as this training mission was rapidly devolving into a fiasco, and a dangerous one at that. Captain H cautiously added power, and aimed for the lights of the aircraft ahead. From the back, I spoke to him as calmly as I could manage, reassuring him that he was doing great, all the while keeping my eyes glued to his instrument panel. Slowly, but surely, we managed to catch up with the lead two aircraft. Periodically, Captain H would panic at his rate of closure and yank the cyclic to the rear. This caused the aircraft to pitch nose up and slow, giving aircraft behind us a sudden and terrifying view of our rotor system. Noting the attitude indicator, I would gently admonish him, "forward cyclic."

We call that a "whoa-boy" — an abrupt maneuver which tends to cause the rest of the flight to suddenly pitch up in turn. Despite my best efforts, I'm afraid the flight did a lot of whoa-boys that night.

Somehow, we made it back to our launching point without losing anyone. By some sort of unspoken agreement, we all went straight to bed. In my 10 years in the Army, every training mission has always had an intense post-flight debrief. All but one. To my knowledge, that mission was never debriefed. Not one word.

In the coming weeks, previously reluctant staff pilots made time for NVG training. By September, when we self-deployed our Black Hawks from Fort Bragg to the island of Great Inagua, just a 45-minute flight from Haiti, all of our pilots were NVG qualified. There were no more unaided flights. Of course, the trip to Great Inagua was not exactly uneventful, but that's another story.



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