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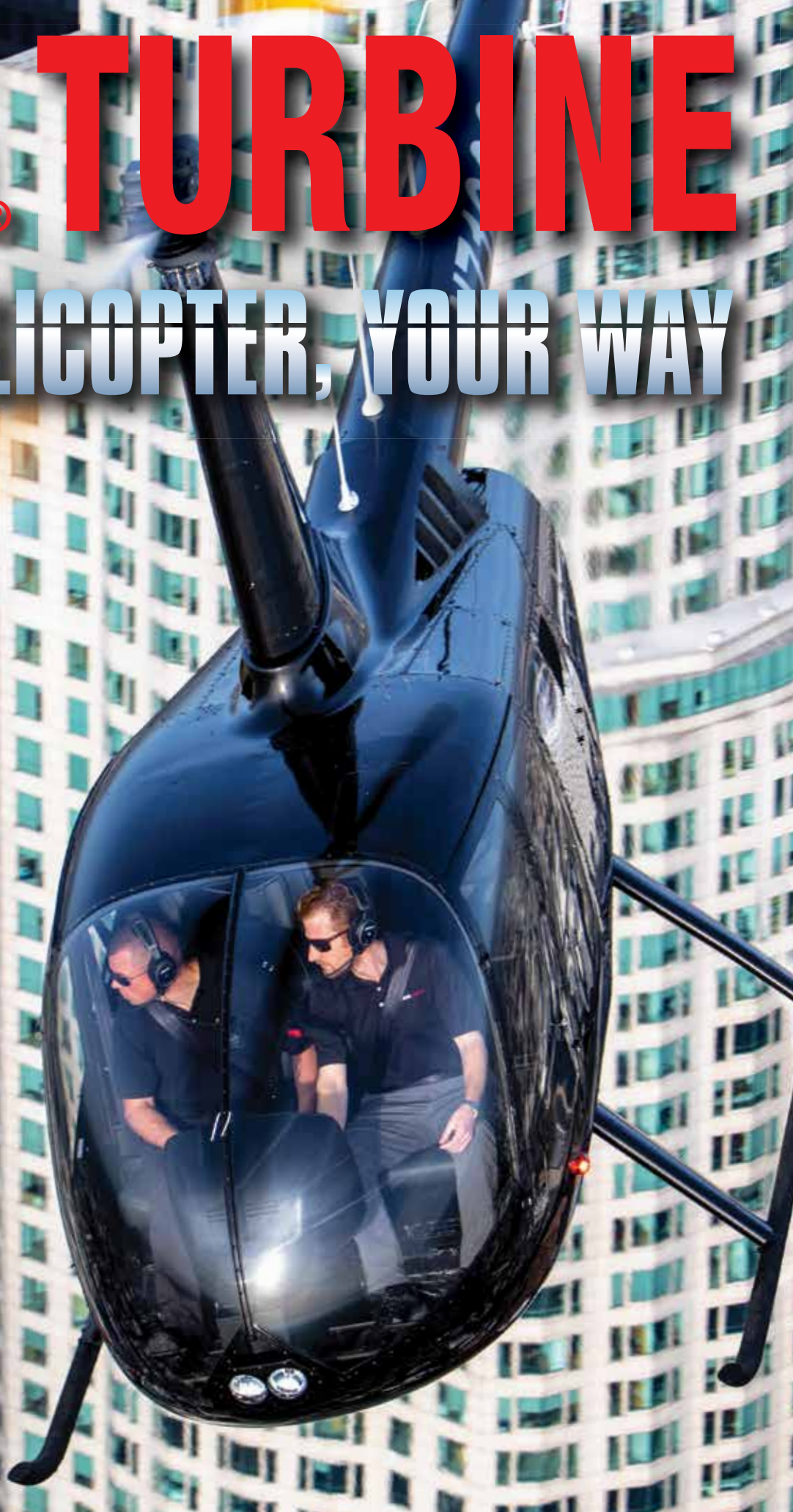
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As we move about the countryside, or indeed, from country to country plying our trade, we invariably come across items that have been lost, discarded or are awaiting repurposing. I'm not sure about those of you transiting urban airways, but those of us in more austere environments always come across various articles of flotsam that speak to our genetic predisposition to collect. Once we convince ourselves that it is no longer anyone's property, we then say to ourselves: "What can I use that for?"

I can recall lunchroom stories of abandoned military sites in the Arctic with all manner of trucks, tractors and heavy equipment just left to the elements and there for the taking. Oh, if only we had big enough helicopters in those days!

The story I have to recount here involved much lighter fare, but with a weighty safety lesson nonetheless.

If you work in a maritime environment, you will at some point be parked on a beach somewhere with time to spare. Many years ago, it came to pass that after finishing his job and having dropped off his client, a colleague of mine was left to his own devices on an expansive and beautiful beach in southern Labrador. The weather was pleasant and there was lots of daylight left. No need to kick the tires and light the fires with any undue haste.

While walking along the beach, he came upon an abandoned net buoy. Obviously it had broken loose from its mooring and Mother Nature had conveniently deposited the buoy in front of our pilot. Now, these net buoys are not your two-liter pop bottle type. They are about three feet in diameter and blaze orange in color, with a black reinforced rope loop at the bottom. They are inflated, made of industrial rubber and

are certified to survive a nuclear attack. It was quite a find, and our resourceful pilot immediately thought (you guessed it): "What can I use this for?"

It just so happened that our beachcomber pilot had a boat at home, and this net buoy would make the best mooring float ever! So he immediately liberated the buoy from its worthless presence on the beach and laid it inside the cabin on the rear floor of the helicopter. This buoy was destined for greatness.

Having started the helicopter, the pilot departed the beach en route to his base on the island of Newfoundland. If you're familiar with the geography of the area, you know that there is a rather large damp area between Labrador and Newfoundland called the Strait of Belle Isle. It is damn cold no matter what time of the year it is, and for a single-engine helicopter without floats it requires about 7,000 feet of altitude to comfortably cross it. Being a fine day, getting to 7,000 feet would not be an issue. It just takes a little time.

Our pilot continued his spiral climb and considered his current state. Good weather, serviceable aircraft, lots of fuel and the marine equipment acquisition of the century! He was very proud, and rightfully so, of his gathering skills.

Enough dithering. Let us stay focused on the matter at hand, which was crossing the strait. As our pilot approached 7,000 feet and began his turn south, he could feel something rubbing against the back of his head. It was but a minor distraction, maybe a Labrador mosquito hitching a ride south, but it was persistent and did not have that buzzing bloodsucking sound that accompanies all Labrador insects.

He turned around to the sight of a huge orange ball still expanding and quickly overwhelming the back seat. Imagine our pilot's

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If you're familiar with the geography of the area, you know that there is a rather large damp area between Labrador and Newfoundland called the Strait of Belle Isle.


It is damn cold no matter what time of the year it is, and for a single-engine helicopter without floats it requires about 7,000 feet of altitude to comfortably cross it.

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surprise. A dying star turning super nova would not have created the same visual effect. Air pressure is a wonderful thing and very helpful in the appropriate amounts. Released from its constraints of 29.92 atmospheric pressure, our buoy decided to try on the back of the helicopter for size and quickly started to encroach on the front seat as well! Our pilot thought it might be time to begin a slight descent to try to rein in our buoy's uncontrolled expansion.

While exploding balloons are very popular at parties, they tend to be frowned upon in aircraft. Particularly small aircraft. The pilot's surprise would likely have turned to horror had the orange beast blown up.

But as with most aviation anecdotes, this one has a happy ending. You will be delighted to hear that all parties — the pilot, the buoy and the helicopter — all made it back to base safely, and the buoy no doubt went on to perform heroically for the balance of its career marking the boat mooring.

But now, whenever I see anyone on an airplane with an unopened bag of chips... 

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FOCUS ON TRAINING // ANDY ROE



Airplane pilots often become incensed when they first hear that helicopters might be more difficult to learn to control and fly. Controlling a helicopter safely to the full extent of its capabilities, especially at slow speeds, requires skill and a thorough understanding and appreciation of helicopter dynamics. The basic visual flight rules (VFR) helicopter is very unstable and control forces cannot be trimmed out as with airplanes. Helicopter pilots must have their hands on the controls at all times.

Airplanes, boats and automobiles are propelled forward by a thrusting force in line with the length of the vehicle. The basic helicopter, however, has a main rotor mounted above the airframe that thrusts upward, and another rotor at the rear that thrusts sideways. The airframe moves ahead through the air when the pilot tilts the main rotor forward with the cyclic and increases main rotor blade pitch with the collective. Lateral cyclic movement controls direction.

The main rotor rotation tends to turn the airframe in a horizontal plane in the direction opposite to the rotor spin (Newton's Third Law). To counter this twisting motion and keep the helicopter flying straight ahead, the pilot moves two foot pedals that apply a variable anti-torque force from the sideways thrusting tail rotor at the back of the airframe. The amount of tail rotor thrust needed to keep the airframe in trim depends on airspeed and the main rotor collective pitch angle.

At speed, helicopter stability is aided by airflow along the sides of the airframe (keel effect). As the helicopter slows, the keel effect lessens and the torque effect increases. This requires more tail rotor anti-torque thrust. At a slow speed, just before hovering, the helicopter loses all

forward translational lift and will pitch nose up, descending rapidly, unless the pilot adds enough power and forward cyclic to maintain the approach. Using airplane parlance, the helicopter will stall just before landing — but because it has vertical lifting capability and subtle forward speed control, the stall situation is overcome.

In slow flight, the combined airframe torque and tail rotor thrust moves the airframe sideways in the thrust direction. The pilot prevents this with lateral cyclic, causing the airframe to roll along the longitudinal axis. With the landing gear now uneven with the ground, touching down on flat ground is handled as if it were a slope. Suffice it to say, learning how to fly a helicopter can be frustrating.

Imagine watching a video of a helicopter hovering at altitude facing the camera at close range. You see the helicopter almost stationary in front of you moving ever so slightly up and down, left and right, and twisting gently about the vertical axis. One skid of the landing gear is hanging lower than the other. This hovering out of ground effect (OGE) maneuver requires high power and substantial aerodynamic thrust from both the main and tail rotors. Intense concentration at the controls is needed to remain as stable as possible. All the while, the spiraling black hole known ominously as the vortex ring lurks below the helicopter, waiting to take control away if the pilot allows the weight of the helicopter to descend too quickly, and then pulls collective to stop the descent.

Similarly, if the pilot applies excessive tail rotor thrust, the tail rotor can suddenly lose effectiveness and the airframe will start spinning out of control. In an OGE hover, the pilot works hard to keep the helicopter stable and tries to minimize power and tail rotor thrust to stay well away from the vortex ring and loss of tail rotor effectiveness.

Many dual rated pilots fly helicopters the way they fly airplanes, keeping their speed up to remain safe. Because a helicopter is capable of slow flight, the airplane pilot will be tempted at some point to slow down. If you don't have an understanding of the intricacies and hazards associated with slow flight, this is where things can go very wrong.

Sudden uncontrolled descent in the helicopter's rotor downwash is the cause of many accidents, and if the pilot survives, he or she often has no idea what has happened. Some pilots have a natural feel for slow helicopter flight, and learn from training how to avoid vortex ring descent and loss of tail rotor effectiveness. Others have great difficulty understanding these phenomena and are in potential danger each time they slow down.

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People looking up to see a helicopter in slow flight are fascinated by how graceful these aircraft appear, and many get the urge to learn how to fly as a result.

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So, let's review. The helicopter airframe with a tail rotor attached at the back is suspended below a spinning main rotor system, which drags the airframe and its contents through the air. The airframe wants to twist about its vertical axis, but sideways thrust from the tail rotor prevents this. As the helicopter moves forward, the nose will pitch upward as the aircraft translates into forward flight, unless the pilot moves the cyclic forward to prevent this. When main rotor pitch angle is increased or decreased to alter lift and supplement speed, airframe torque is similarly increased or decreased, requiring more or less tail rotor pitch to counter it. With more airspeed, airframe keel effect increases and the sideways drifting tendency decreases, requiring less lateral cyclic input.

People looking up to see a helicopter in slow flight are fascinated by how graceful these aircraft appear, and many get the urge to learn how to fly as a result. In truth, these complex machines are difficult to manage and control in flight, and much more of a challenge than they might appear to be. 🚫

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As a student and then an apprentice, I was often warned to never carry tools of any sort in my pockets. The reasons were varied, but the most obvious was the potential to do damage to an aircraft.

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By the time you read this column, Aeronav, the company I own and operate, will be celebrating 15 years in business. I have much to be grateful for, not least the people I've worked with and for. Whether it was helping with leasehold improvements or equipment purchasing and set up, it took the proverbial village to raise this company to where it stands today. I often reflect on the past, the takeaways, the people; but it's always the lessons learned that stand out the most.

One of my favorite tech school instructors gave me a simple handshake during our grad ceremony, followed by some unfiltered words: "Congratulations," he said. "You now know enough to be dangerous." Hardly words of inspiration, but there was a fundamental truth in them.

In tech school and in our day-to-day jobs as aircraft maintenance technicians/mechanics, we often don coveralls, which afford us the ability to keep our everyday clothes clean, as well as promote a company brand and image. Often these garments have large pockets, which serve at times as convenient tool-carrying compartments. As a student and then an apprentice, I was often warned to never carry tools of any sort in my pockets. The reasons were varied, but the most obvious was the potential to do damage to an aircraft or a component of an aircraft while walking past, working on, or sitting in one.

In my company's first year in business, life was scattered at best. I was hungry, motivated and eager to win over clients and new work. We managed to secure a repeat client who operated a fleet of Airbus AS350 helicopters. On one occasion, we had been onsite for several weeks carrying out various levels of avionics and electrical systems maintenance and repair. As I transitioned from one aircraft to the next with a screwdriver in my hand, I was approached by the client, who proceeded to hand me some work order related paperwork. I placed the screwdriver in my back pocket, handle down. As my eyes bounced from the pages to the aircraft I was approaching, I quickly

placed the paperwork on the skid tube step and hopped into the pilot seat. As I sat down, I felt uncomfortable and took the extra measure to readjust myself and ensure I was seated square in the seat as I scanned the cockpit and looked over the new installations we had just completed. In no short order, I felt a pop from behind me. My body slipped backwards in the seat a distance of mere microns but it may as well have been measured in inches as I knew in that split second the damage had been done.

I was semi-anchored to the seat; I could not move sideways, and had to pull myself forward in order to dislodge the screwdriver tip from within the seat's lower back rest. The seat had just been reworked with new leather and was in pristine condition. I reached behind me to pull the screwdriver from my pocket and uttered some colorful words as I turned to survey the damage. I was mortified. The damage itself was minimal, but it was the idea that I had done the exact thing I was warned not to do years earlier that made me feel sick. I knew there was no excuse for what had happened, and immediately brought it to the attention of the client. They understood it had been a mistake — albeit a negligent one — and even saw the funny side (by that evening, a band-aid had been placed across the hole I had made). However well they took it, I was acutely embarrassed. I wanted to fully own what I had done, and insisted on having the seat covered with new material. It was by no means an inexpensive repair, but I certainly learned my lesson. Tools have never graced my pockets since.

There is certainly a truth behind the statement my instructor shared with me. We are armed with knowledge and skills and trained over time to become chameleons to the environments in which we work. We adapt, we learn, we help, we succeed and at times, yes, we fail. But failure produces a lesson, and hopefully helps guide the way to future success. As another saying goes: You don't learn anything from doing everything right. 🍀



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I was talking to a pilot the other day who had just completed his long line training, and I asked him what he was going to do with his new long line skills. I was curious because his current job was not necessarily one that you'd think would require a long line pilot.

"Well, I would like to show my boss that there is a better, safer way to long line," he said. "But I really cannot say anything to him about it because he is stuck in his ways and he thinks he knows better."

Unfortunately, his reply was something that I have heard many times over: "My boss is stuck in his ways." So, what happens when a boss is stuck in his ways, especially in a time when it is hard to find good employees? Usually, it goes something along these lines: They can't retain frontline staff and the employee turnover increases, while experience and expertise decrease. Safety is jeopardized, leaving the potential for accidents. The competition then takes the business.

Oftentimes it is the companies that have been in business and successful for many years (usually decades) that can become very stuck in their ways. A culture was created early on and ingrained for generations of employees. The good news is that it doesn't matter what the culture is, or how long it has been there, change can happen at any time.

How, you ask? Those of you who have worked for companies or individuals that are very set in their ways may not believe it is possible.

Let's use the example of a company that is going through a period of higher than normal employee turnover. It is a company that requires long days and long rotations. While the workload and schedule was fine in the

past, the newer generation of pilots are not necessarily OK with it. Yes, the first instinct may be to tell them to go find another job somewhere else — but the company may not have much of a choice if they are short staffed.

The company must acknowledge the shift in culture. As the older pilots retire, the company's frontline employees — upon whom it builds its success and reputation — aren't as experienced and don't have the same "old school" culture. The frontline staff do not want to work the way the company has traditionally expected its senior management to work. The commitment and dedication to working long days for extended weeks at a time is shifting. That can mean higher turnover, less experience — and potentially safety issues. With the combination of increased competition and the decrease in experience, the company is left in a vulnerable position. It cannot rely on its past success to take it into the future, and must make a change.

“It doesn't matter what the culture is, or how long it has been there, change can happen at any time.”

What does the company do?

There are many different ways to create change, but one method is to use the ADKAR model created by change management specialists Prosci. This company defines change management as: "The process, tools and techniques to manage the people side of change to achieve a required business outcome," with the goal of

"improving an organization by altering how work is done."

Its ADKAR model highlights five outcomes that people need to achieve for lasting change: awareness, desire, knowledge, ability and reinforcement.

First, they need awareness of the need for change. Leaders need to ask what is (and isn't) working. The answers must then be communicated, along with why it is important to make changes.

Second, there needs to be a desire to support the change. Again, the leader must explain the benefits of making changes, and address any fears that employees may have in regard to the changes.

Then, the knowledge of how to make the change must be in place. This means setting up any new skills training required to make the change successful. This could include new technology in the office, for example. It also means getting people working and thinking in teams and setting reasonable targets.

Next, is ability. Train the basics and start small, so that there can be little wins along the way to the big win (new change). Make adjustments as needed along the way. Often you will find that when you make a change to one thing, you need to make changes to something else, too.

Lastly and most importantly for making lasting change, ensure there is reinforcement. Human nature tends to propel us back to what we know and what is comfortable, even if it is dysfunctional. Most of us don't like change, so provide ongoing coaching for those that need extra support. At the other end of the spectrum, identify those that advocate or back the change and make sure to have them help spread the message. Having good role models within the organization can be key.

The important thing to keep in mind throughout the process is that change takes time, it is definitely not easy, and you may have to make adjustments along the way. But remember, change can be a good thing — especially if it's for safety's sake! ➤



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FOCUS ON OPERATIONS // COREY TAYLOR



I started writing about the difficulties of gaining experience these days and was discussing it with colleagues. We all felt the requirements are just too stringent and are causing the pilot shortage. We started flying for pay with just a couple hundred hours, so it is hard for us to relate to pilots today, who may need 1,000 or more to do the same. As I pondered this, I reflected on something that happened to me early in my career that supported the need for experience.

The ink was still wet on my licence. I was flying a turbocharged piston that was a good performer (when it wasn't overloaded). I dropped some native trappers at a fishing camp and was told there was a backhaul. This all happened during "freeze-up," when much of Canada relies on helicopters for transportation.

My passengers showed up with their stuff, and I stood there using four-letter words as I surveyed the pile of guns, beavers, ducks, geese, moose meat and fish that I was somehow supposed to take off with. Muttering under my breath, I started loading the machine. Luckily (?), I had utility baskets on the sides of the aircraft that handled the bulky stuff, but as I loaded up, it didn't seem like the pile was diminishing. It became apparent that every time I turned my head to load the aircraft, someone threw more birds on the pile! The calm they exhibited at my vituperative onslaught when I caught them told me they'd played this game before.

I was finally loaded up and ready to go. In a move that preceded airbags in cars by several years, I had packed ducks and geese around the front seat occupants to protect them in the event of a hard landing. With all secure, I went to full throttle. This apparently was a signal for everyone in the camp to gather in front of the helicopter, grinning.

Brimming with confidence, I calculated how many "extra" RPMs I might need to clear the trees in front of me. At this point, I had such a death-grip on the stick it seemed it might melt. Inhaling deeply, I pulled pitch, rotated and "went for it."

As I climbed, I saw adults and children spinning and smiling under me, like Julie Andrews in the Sound of Music. I recall thinking it would be a soft landing if the engine quit.

As the trees approached, I started to worry a bit, as it appeared that the tips of the blades were barely going to clear — confirmed seconds later as the fuselage passed through two tallish trees like kicking a field goal.

Suddenly, the low-rotor horn sounded.

After some surreptitious investigation — and upon being informed by local police that there was no radio communication with the camp — I brilliantly deduced that I now owned an HF antenna.

"Right on schedule," I thought, as I lowered the collective slightly to recover RPM. As I milked the collective, at tree-top level, with all those people still running beneath me, I felt a bit like Wile E. Coyote, cranking that handcar as he chased the roadrunner. Finally, the trees gave way to lake and I could dive, get some airspeed and silence the horn as the RPM came back into the green. I leaned back and smiled with pleasure at another successful takeoff.

Thankfully, the remainder of the flight was uneventful. After landing to disgorge my passengers, I walked around the front of the aircraft. There I discovered (by tripping on it)

a steel wire, roughly the size and consistency of very thick guitar string, hanging off the pitot tube. It was wrapped tightly around the tube, trailed over the toe of the left skid, and thence down the left side of the aircraft for about 40 feet. Since this put the wire well past the tail rotor, which was on the same side, I felt momentary pride that I always flew in trim.

At this point my finely honed "pilot instincts" took over. I ignored the wire while there were people around, then looked about furtively and disposed of the evidence. Then I began to plot the cover-up. If you're wondering where the wire came from... so was I. After some surreptitious investigation — and upon being informed by local police that there was no radio communication with the camp — I brilliantly deduced that I now owned an HF antenna.

My luck being all bad, I had to go back to the camp (it would have been ok with me to fade from the memory of those people). As I landed, I was rehearsing the explanation and apology in my mind to make sure it all came out right. As everyone gathered around, I did my best to put on a brave face (and decided to play dumb). The local chief walked up to me.

"You make a lot of work for me!" he said.

"What do you mean?" I replied.

"You see those two trees?"

"Yes, I flew between them when I left here the other day."

"We know," he said. "Our trapline radio antenna was between those two trees."

"Oh? Did I hit it?" I asked.

He looked me straight in the eye. "Uhh... You hit it alright, and the radio was yanked from the tent and went bouncing through the camp, and we all tried to catch it but it got away. And then Hector..." he pointed his thumb at a young man with bandages all over his face and an arm in a sling, "... tackled it, and you dragged him through the camp and then over all the logs and stumps between here and the lake. It's a good thing he got wedged under a fallen tree or you would have taken him waterskiing!"

In retrospect, that take-off was even more of an accomplishment than I'd thought! 🚀



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 A Benefis Mercy Flight Airbus EC135 illuminates the night during landing zone training. **ZACH STRICKLIN PHOTO**



 Firefighting crews practice fast roping with a Mil Mi-8 MTV-1 helicopter. **DARKO MARETIĆ PHOTO**





⌚ A Boeing AH-64 Apache sits with star trails in the background during “Operation Devil Storm” with Taskforce Wolfpack at Fort Bragg, North Carolina. **JEFFREY RAMOS PHOTO**

 Pilot Megan Fink flies a Bell 407 during hover exit training with Parks Canada wildfire crews in Banff National Park, Alberta. **PETER BEETS PHOTO**



Vertical **DAILY NEWS** TOP 10

Here's a recap of our 10 most popular online stories since our last print edition was published.

- 01 **CITYAIRBUS PERFORMS TETHERED FIRST TAKEOFF**
The demonstrator performed a tethered "jump" at Airbus's Donauwörth, Germany, facilities.



02 **WHAT IS IT LIKE TO FLY A HELICOPTER WITH A TABLET?**
We test Sikorsky's Matrix autonomous technology in its SARA S-76 demonstrator.

03 **NTSB RELEASES MORE DETAILS ON S-97 RAIDER ACCIDENT**
The coaxial main rotor blades of the S-97 prototype intermeshed during flight testing in 2017.

04 **THE OFFSHORE HELICOPTER INDUSTRY: TREADING WATER**
Will 2019 provide a measure of stability for the offshore transport sector after another turbulent year?

05 **FLYING THE CH-53K HELICOPTER INTO A BROWNOUT**
A Sikorsky experimental test pilot talks about flight testing the CH-53K in degraded visual environments.

06 **SIKORSKY & BOEING REPORT PROGRESS WITH SB-1 DEFIANT**
The Sikorsky-Boeing SB-1 Defiant performed a successful second test flight on April 5.

07 **BRISTOW COMMENCES VOLUNTARY CHAPTER 11 PROCEEDINGS**
The company voluntarily filed for Chapter 11 protection in the U.S. Bankruptcy Court for the Southern District of Texas.

08 **OFFSHORE HELICOPTER INDUSTRY 'IN DIRE NEED' OF CONSOLIDATION**
Era's president and CEO said the current industry structure in the offshore helicopter business is not sustainable.

09 **PRESIDENTIAL HELICOPTER UNDER BUDGET; STILL FACES CHALLENGES**
Estimated costs for the VH-92A are lower than expected, but the program has seen some delays.

10 **HOW CURTI PUT A PARACHUTE ON ITS ZEFHIR HELICOPTER**
The Zefhir helicopter team explains how they put a ballistic parachute on the aircraft.



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june/july 2019

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Bristow files for Chapter 11

**BY OLIVER JOHNSON**

The Bristow Group has become the latest company in the struggling offshore oil-and-gas transport sector to file for Chapter 11 protection from the U.S. Bankruptcy Court, revealing debts of \$1.88 billion in its May 11 filing. In a message to the company's clients on Bristow's website, Don Miller, its president and CEO, said the filing was "the best path forward" for Bristow and its stakeholders.

"Bristow's financial condition reflects the challenging market circumstances that also affect our competitors," he said. "Chapter 11 will allow us to continue normal course operations while we reorganize our financial structure, which is a critical step towards best positioning our company financially and operationally for the long term."

The filings span Bristow's U.S. entities and two of its Cayman Islands subsidiaries (Bristow Group Inc., BHNA Holdings Inc., Bristow Alaska Inc., Bristow Helicopters Inc., Bristow U.S. Leasing LLC, Bristow U.S. LLC, BriLog Leasing Ltd. and Bristow Equipment Leasing Ltd). Its other non-U.S. businesses are not included.

Bristow said all of its businesses will continue to operate "in the ordinary course" throughout the Chapter 11 process.

"This process will allow us to strengthen our balance sheet, achieve a lower and more sustainable debt level and emerge as a stronger company," said Miller. "For clients, it is business as usual at Bristow."

Prior to the filing, Bristow entered into a restructuring support agreement with its senior secure noteholders, and secured a

\$75 million loan from some of those, with a commitment for a further \$75 million in financing. Bristow said this will allow it to fund its global operations "and make continued investments in safety and reliability" during the Chapter 11 process.

Bristow's filing followed just two months after fellow offshore transport provider PHI began its own Chapter 11 process. The first major victim of the downturn was CHC Group, which filed for Chapter 11 bankruptcy protection in May 2016. It emerged from its reorganization 10 months later much leaner, having secured additional funding and shed 137 aircraft from its fleet — largely through the rejection of over 80 leased aircraft.

It was in part because of this that Waypoint Leasing itself filed for Chapter 11 protection



At the time of Bristow's Chapter 11 filing, it had 265 aircraft in its consolidated fleet.
Bristow Photo

in November 2018. Waypoint was subsequently purchased by another leasing company, Macquarie, for \$650 million.

In Bristow's court filings, the company says it, too, plans to return leased aircraft as part of its restructuring.

"Bristow has undertaken — and continues to undertake — a comprehensive analysis of its overall fleet in an effort to right-size its fleet," the papers state. "As an ongoing component of that plan and of the Chapter 11 process, Bristow has identified cost savings to be achieved through a fleet reduction by eliminating leased helicopters that are currently idle, carry above-market lease payments, or that can be replaced with other helicopters within Bristow's fleet."

At the time of its filing, Bristow operated 264 aircraft in its consolidated fleet, 185 of

which it owned. These included 110 large, 85 medium, and 21 small helicopters, and 48 fixed-wing aircraft.

To date, Bristow has identified at least 10 leased aircraft — nine Sikorsky S-76C+ helicopters from HeliFleet and an S-76D from Macquarie — that it would like to reject. More, and larger, aircraft will almost certainly follow, with Bristow still holding an idle fleet of Airbus H225s.

Among the larger creditors named in the Chapter 11 filing is another leasing company — Milestone Aviation Group — which is owed \$20 million.

The filing has followed a tumultuous few months at the offshore giant, which has faced increasingly loud calls from an activist investor for changes at the company following its bid to acquire Columbia Helicopters in November 2018.

Bristow's \$560 million bid for Columbia was initially accepted, with a targeted completion date of Dec. 31. However, Bristow's stock price plunged after the announcement, from over \$10 per share to \$2.09 per share on Dec. 26.

On Jan. 8, Global Value Investment Corp. (GVIC) delivered an open letter to Bristow board of directors chairman Thomas Knudson objecting to the proposed financing of the acquisition, which it said would be "both expensive and highly dilutive to existing shareholders." GVIC added that it was "prepared to take all actions it deems necessary to ensure shareholders' interests are fully considered and protected."

Ultimately, Bristow and Columbia mutually agreed to terminate the acquisition, at a cost to Bristow of \$20 million.

However, GVIC has continued to openly criticize the Bristow board, publishing an open letter to Bristow's shareholders on April 24 to nominate a new board of directors. "Bristow's board has committed repeated unforced errors and failed to adequately react to evolving industry conditions," it stated in the letter.

As late as May 7, GVIC published a "An Investor's Case for Change" that called a Chapter 11 reorganization "avoidable and ill-advised," and requested alternative paths forward for Bristow.

Bristow has not publicly responded to GVIC's comments.

RotorBits

Airbus Photo



CITYAIRBUS DEMO PERFORMS

TETHERED FIRST TAKEOFF

In early May, Airbus announced the first takeoff of its electric urban air mobility demonstrator, CityAirbus.

According to an Airbus spokesperson, the event saw the CityAirbus team achieve one of the key milestones in their demonstration program: a tethered "jump" that was conducted at Airbus's facilities in Donauwörth, Germany. "This was meant to further assess the performance of the propulsion and flight control systems, as well as a few other data points," the spokesperson said.

The demonstration program was then scheduled to move to Manching, Germany, where the flight envelope opening will be carried out in a restricted airspace.

The 2.2-tonne aircraft is fully electric, operating at 800 volts with four batteries. It is designed to carry four passengers for operations in an urban environment.

BLADE EXPANDS TO ALL

NYC-AREA AIRPORTS

Just one month after launching continuous helicopter flights between Manhattan and John F. Kennedy Airport (JFK), Blade Urban Air Mobility, Inc. has expanded its service to include LaGuardia Airport and Newark Liberty International Airport.

"Since expanding our continuous flight service between Manhattan and JFK, we are seeing faster than expected adoption by people choosing to fly to the airport rather than driving," said Rob Wiesenthal, CEO of Blade.

Through its alliance with Bell, Blade's airport service utilizes Bell 206L-4 helicopters. Certain municipalities in the New York area have designated these helicopters under the "not noisy" aircraft classification. All flights strictly follow New York City noise abatement routes, altitudes, and best practices.



A Sikorsky S-92 and Leonardo AW189 operated by Era Helicopters in flight over the Gulf of Mexico. **Dan Megna Photo**

ERA CEO: OFFSHORE SECTOR 'IN DIRE NEED' OF CONSOLIDATION

BY OLIVER JOHNSON

The president and CEO of offshore transport giant Era has said the current industry structure in the offshore helicopter business is not sustainable and is "in dire need" of consolidation.

The remarks from Chris Bradshaw were made in a letter to shareholders within the company's annual report, released April 24, in which he added that Era is "well-positioned" to take part in consolidation opportunities.

His comments followed the Chapter 11 bankruptcy filings of fellow offshore specialists CHC and PHI, and leasing company Waypoint — and were made shortly before Bristow began a Chapter 11 process.

"Those who follow the offshore helicopter business understand that the current industry structure is not sustainable, with multiple helicopter operators and leasing companies having already filed for bankruptcy protection and others expected to follow suit shortly," said Bradshaw.

He said a simple restructuring of debt is unlikely to address "the fundamental issues at play" — and may in fact only lead to a repeating cycle of restructuring.

"In our view, the offshore helicopter industry is in dire need of consolidation, amongst both the operators and the lessors," said Bradshaw. "Consolidation will not only address the excess capacity in the industry, but will also facilitate better absorption of the significant fixed costs required to run an air carrier."

He said a combination of any two of the three large deepwater helicopter operators in the Gulf of Mexico (PHI, Bristow and Era), would likely result in cost savings that would create significant value for their stakeholders.

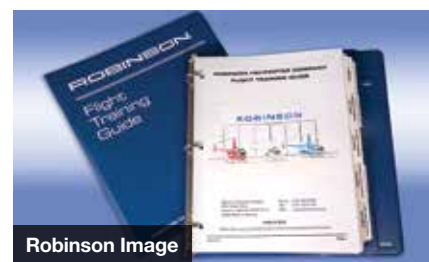
"We have positioned Era such that the company is secure in a stand-alone scenario, despite the challenging industry conditions, and also well-positioned to participate in value-accretive consolidation opportunities, should they become actionable," he said.

Era's financial results revealed a profit of \$13.5 million in 2018, compared to a loss of \$28.6 million the previous year. However, the 2018 figures included \$42 million from Airbus Helicopters as part of a settlement of a lawsuit related to Era's purchase of 11 H225 Super Pumas.

"We have experienced many rainy days over the last four-and-a-half years, but our business and balance sheet remain strong," said Bradshaw. However, he noted that Chevron's recent agreement to acquire Anadarko Petroleum Corp., a company that accounted for about 30 percent of Era's revenues in 2018, is a cause of uncertainty.

"We believe the implications for the combined company's helicopter transport needs will not be known until later in the integration process," said Bradshaw. "At this time, it is too early for us to speculate on whether a transaction will have a positive, negative or neutral impact on our business."

RotorBits



Robinson Image

ROBINSON INTRODUCES NEW FLIGHT TRAINING GUIDE

An updated flight training guide is now available from Robinson Helicopter Company. The guide addresses many levels of training, from the student pilot trying to find the "hover button," to the rated helicopter pilot transitioning into a Robinson, to the all-important flight review.

The guide provides students and instructors a lesson-by-lesson syllabus, which includes a written test, for each level of instruction.

Robinson's chief instructor, Tim Tucker, said: "This is the most complete and innovative training document I have seen, because it addresses all levels of pilot activity not just from a regulatory standpoint, but also from Robinson's perspective as to the safest way to train and fly its helicopters."

The syllabi include private pilot ground and flight; R22/R44 pilot qualification; R66 pilot qualification; flight review guide; R22/R44/R66 maneuver guides; and endorsement templates for all SFAR 73 and flight review instructor endorsements.

The Robinson Flight Training Guide may be downloaded from the publications section on the Robinson website or purchased with a protective binder and tabs from the company's online store.

MEEKER-AIRFILM RECEIVE

EC130 SINGLE POLE MOUNT STC

Meeker Aviation and Airfilm Camera Systems (Meeker-Airfilm) have received a Federal Aviation Administration supplemental type certificate for their EC130 B4/T2 single pole mount (AFM-130).

The AFM-130 Nose Mount is rated for payloads up to 135 pounds (60 kilograms) and can accept all the most popular cameras, sensors, searchlights, and lidar equipment.

The companies said European Aviation Safety Agency certification of the mount will be obtained in mid-2019.

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In addition to its parachute, the Zefhir boasts a turbine engine and crashworthy design features. **Curti Photo**

Curti discusses helicopter parachute tests

BY ELAN HEAD

Last year at AERO Friedrichshafen in Germany, the Aerospace division of Curti Costruzioni Meccaniche unveiled the two-seat, turbine-powered helicopter it calls the Zefhir. In April, the Italian company was back at AERO 2019 with a major milestone under its belt — the successful test of a ballistic parachute designed to bring the Zefhir and its occupants safely to the ground in the event of an emergency, a world first.

While ballistic parachutes have been certified on some fixed-wing aircraft, such as Cirrus light airplanes, installing them on helicopters is a trickier proposition due to the overhead presence of main rotor blades. Consequently, helicopters to date have relied exclusively on the ability to autorotate in the event of a power failure, using the upward flow of air through the rotor blades to maintain controllability as the aircraft “glides” to the ground.

According to Curti head of strategy Mirco Cantelli, the Zefhir’s parachute system is not intended to replace this autorotative capability, but instead provide pilots with a second option if they are unable to successfully enter or maintain autorotation.

“We know of course the primary

emergency maneuver for helicopters is, and still remains, autorotation,” said Cantelli, speaking with *Vertical* in advance of AERO 2019. “If all of the conditions are OK and you can perform it, it is for sure the best option you have to save your life and probably save the helicopter, too.

“But there is no alternative plan in case you cannot perform an autorotation . . . Either you perform an autorotation, or you fall as a stone,” he continued. “We don’t want to replace autorotation as the main emergency maneuver in case of problems, but just offer another extra possibility that now is not present on the market.”

Curti demonstrated the Zefhir’s ballistic parachute system in a remotely piloted test on June 22 last year, deploying the parachute from an altitude of 985 feet (300 meters) and a forward airspeed of 30 knots. According to Chiara Albertazzi, Zefhir project manager, the parachute was completely open after six seconds and succeeded in reducing the descent rate of the aircraft from 75 feet per second (23 meters per second) to just 25 f/s (7.5 m/s).

Although wind caused the aircraft to roll over upon touching the ground, Albertazzi pointed out that “the canopy is designed to ensure the safety of the crew, not of the helicopter.” Curti claims that the acceleration

peaks recorded during the test fall within the parameters of crash tests in both the aeronautical and automotive sectors, suggesting that “the system is likely to achieve its goal of saving lives.”

While the parachute deployment test went mostly as expected, it was more than a year in the making. The first challenge was coming up with a feasible design for the system, which Curti developed in cooperation with engine manufacturer PBS Velká Bíteš and Junkers Profly, a European market leader in the construction of rescue systems with ballistic parachutes.

According to Albertazzi, the design team first established the size of the parachute and ballistic rocket required for the 1,540-pound (700-kilogram) helicopter. Then came the problem of where to position it. The team considered the possibility of ejecting the parachute laterally and using a sliding ring for final positioning. However, because such a ring would be exposed to the elements, the team worried that it could fail when the time came to use it, “so we decided to avoid this and position the parachute on top of the main rotor,” she said.

With the positioning determined, the team designed a non-rotating containment box that attaches to the airframe through a fixed shaft inside the rotor mast. To validate the stability of the design, the box was mounted to a vehicle and driven at high speeds, with no undesirable aerodynamic effects.

“After that we performed several tests for the check of the correct opening of the box with the rocket, and the correct extraction of the bag — both statically [and] dynamically,” Albertazzi said. She noted that it is critical for the system to eject the cover in a way that avoids sharp edges, which could potentially damage the parachute.

But all of this was the easy part, she said. “A big part of the effort for the testing came from the fact that we chose not to perform it with a pilot inside, so we had to somehow create an unmanned version of our helicopter. That was quite a task!” Curti worked with the aerospace faculty at the University of Bologna to develop a remote controlled version of the Zefhir specifically for the parachute test.

The test was performed at the Oristano-Fenosu Airport on Sardinia island, Italy. “It’s an area with very little population, so it’s perfect for this kind of test,” Albertazzi said. “First we tested the stabilization

system — so we performed several tests of takeoff and landing — and then when we felt ready we performed the final test with the parachute.”

Although the test was performed from 300 meters, based on the results, Curti believes the parachute could be successfully deployed at any altitude over 500 feet (150 meters), or possibly even lower if the aircraft carries some forward speed.

The design team made the decision to stop the rotation of the main rotor blades as part of the parachute deployment sequence. This was for two reasons: first, to avoid air-flow disruptions that could slow the opening of the parachute, and also to reduce the risk of injury at touchdown.

“What we have observed in helicopter crashes is that often most of the casualties are created by the rotor blades that are out of control,” Cantelli explained. “So we think that if you cannot perform autorotation for any reasons, it is better to touch the ground without any rotating blade.”

In the remotely piloted test, this stoppage was accomplished through a deliberate series of steps. The engine was cut off, the collective was raised to decrease

main rotor RPM, and then the rotor brake was applied before the parachute was ejected. However, Curti plans to make this sequence automatic in the version of the system that is made available to customers. “We will have a very simple lever that will activate everything, but with no sensor activation, so it will always be at the choosing of the pilot,” Albertazzi said.

Curti is also working to reduce the weight of the system, which is currently 45 lb. (20 kg). The prototype containment system is made out of aluminum, but the final version will be made out of composite material, similar to the rest of the airframe. Although the company has yet to complete flight testing with the system installed, preliminary results indicate that it won’t greatly affect the aircraft’s handling characteristics, Albertazzi said. “We just have to complete the flight envelope with this box on and see that everything is fine — it’s just a matter of time.”

With the development of the Zefhir, Curti is drawing on its long experience in aerospace manufacturing as a supplier to Leonardo, among others. Curti is designing the aircraft to meet the European Aviation Safety Agency’s certification

specifications for small rotorcraft (CS-27, comparable to the Federal Aviation Administration’s part 27 certification standards). However, the company initially plans to make the aircraft available as a kit for homebuilders. Eventually, Curti hopes to certify it as an ultralight in the new 1,320-lb. (600-kg) category.

Either way, the Zefhir is likely to be flown primarily by recreational pilots — many of whom lack the comfort and proficiency with autorotations that more experienced pilots might have. For these customers, the Zefhir’s ballistic parachute system will likely be a strong selling point, along with its modern turboshaft engine, composite blades, carbon-fiber airframe, and crash-worthy seats and landing gear.

“When we speak about small helicopters, not every time the pilot is a very trained and skilled pilot with lots of hours of experience, but for him the helicopter is a hobby,” Cantelli observed. While Curti isn’t claiming to have reduced all of the risks associated with flying helicopters, when it comes to managing power failures, he said, “for sure they will feel safer because they know they will have another chance.”

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AStar fuel tanks differ in cost, but also safety features

Designing a tank that can pass the required drop tests with a cargo swing installed has proved challenging for CRFS developers. **Heath Moffatt Photo**

BY ELAN HEAD

When it comes to helicopter fuel systems, all available evidence suggests that having some crash-resistant features has a meaningful impact on reducing post-crash fires compared to having none at all. However, not all crash-resistant fuel systems (CRFS) are created equal, as is becoming apparent in the case of the Airbus AS350/H125 AStar series.

The AStar became the focus of a campaign to improve helicopter occupant protection following the fatal crash of a Flight For Life H125 in Frisco, Colorado, in July 2015. Although the model's susceptibility to post-crash fires was a known problem at that point, dramatic video footage of the Frisco crash galvanized public attention, leading to the creation by the Federal Aviation Administration (FAA) of a Rotorcraft Occupant Protection Working Group (ROPWG).

Many of the ROPWG's recommendations were incorporated into last year's FAA Reauthorization Act, which requires CRFS for all helicopters manufactured after April 5, 2020. The law stipulates compliance

with many, but not all, of the provisions in Federal Aviation Regulations (FAR) 27/29.952, which mandates CRFS standards for civil helicopters certified after 1994. The exceptions in the new law are intended to make it easier to certify CRFS for legacy models like the AS350 — which received initial FAA type certification in 1977 — while still providing substantially increased levels of occupant protection, as validated by the ROPWG's analysis of post-crash fires in survivable accidents.

Indeed, complying fully with 27/29.952 is neither easy nor cheap. Airbus certified a retrofit kit solution for newly manufactured H125 (AS350 B3e) helicopters in 2014, but has not yet managed to certify it with the underbelly cargo swing installation used for external loads. The company declined to confirm a report that claimed the installation punctured the fuel system during drop testing, instead telling *Vertical*, "We are currently in the development phase in order to obtain 27.952 certification of the cargo swing installation and have no comments on specific tests."

Airbus announced at HAI Heli-Expo earlier this year that starting in 2020 it will be

making its CRFS standard on all newly-manufactured H125s, including those produced at its headquarters in Marignane, France (currently, the CRFS is only standard on H125s produced in the United States). Airbus also announced it will expand certification of its CRFS to AS350 B3 and EC130 B4 models in the same timeframe, and will offer the system at its own cost of \$44,000.

The company told *Vertical* that it aims to obtain 27.952 certification of the cargo swing installation by then. "If this certification was to be delayed, for whatever reason, the standard implementation of our CRFS on all new H125s will be maintained so that all customers — including those equipped with a cargo swing — can benefit from this safety enhancement," Airbus said, emphasizing that even for customers operating with a cargo swing, the CRFS offers significant safety enhancements over the legacy fuel system.

Meanwhile, there is a certified CRFS solution for AStar operators using cargo swings: the aftermarket product jointly developed by Robertson Fuel Systems and StandardAero, which was certified to the

standards of 27.952 in December 2017. The Robertson/StandardAero tank is a direct replacement for all AS350 models, including the AS350 C, D/D1, B/B1/B2/BA/B3, H125, and EC130 B4. Although there was a year-long waitlist for the product when it first hit the market, Robertson ramped up production to meet demand, and now cites wait times of around 90 days.

According to Robertson Fuel Systems director of engineering Bill York, designing a tank that could pass the required drop tests with the cargo swing installed was the most challenging aspect of certification. Robertson has a long history of designing and certifying aircraft fuel tanks to more stringent military standards, but “in our previous experience we never had quite that challenging a thing underneath an aircraft or anticipated to be a penetrator,” he explained. “So that required multiple test drops and changes to the bottom construction of both the container and [the] machined aluminum sump plate which holds a lot of the mechanics and the boost pumps at the bottom of the tank.”

Elvis Moniz, StandardAero’s VP of business development for airframes and avionics, pointed to that additional engineering as

a benefit to all customers of the tank, not just those who operate with cargo swings. The ability of the tank to resist puncturing could be extrapolated to other objects, he suggested: “So if you land on a rock, or a fire hydrant, or anything else than just a flat piece of concrete, that’s what we’re after. We’re actually trying to make this product as real-life survivable as possible.”

According to Robertson and StandardAero, while the Airbus system has a riveted aluminum container, their tank has a composite container shell strategically designed to help distribute impact loads in a crash. The Robertson/StandardAero tank also has some other premium safety features, including self-sealing breakaway valves, and a float-based rollover vent system that will close off in any abnormal orientation to prevent fuel from coming out of the vent. This is in addition to features intended to enhance the tank’s market appeal, including ease of installation, cartridge-style fuel pumps to improve serviceability, and compatibility with OEM and aftermarket fuel filters and baggage extenders, the companies said.

The catch: all of this comes at a cost. The Robertson/StandardAero tank is typically

sold for between \$100,000 and \$120,000, around two-and-a-half times the cost of the Airbus CRFS. “I think a lot of people in this market have not had to plan their operations around the investment that’s needed to be crash-resistant, or been informed of the benefits and how they impact their operation,” noted Robertson sales and marketing manager Ashley Sanchez. “So part of this is getting the market comfortable with the requirements to meet the CRFS standards.”

Robertson, StandardAero, and Airbus declined to say whether Airbus may eventually incorporate the aftermarket tank into its production line for customers who want a more robust CRFS solution. In the meantime, however, Airbus is incentivizing operators of AS350 B2 and earlier models to purchase the Robertson/StandardAero tank by offering training credits to offset part of the cost.

“Customers having already installed CRFS kits on their fleet to whom the training credit might not apply are invited to get in touch with their local contacts so that we can evaluate their training needs and make specific offers,” Airbus said.

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HELI-LYNX DELIVERS VIP H125; AIMS TO REBOOT FX PROGRAM



Ted Groesbeck (left) stands with Rob Tyler of Heli-Lynx in front of Groesbeck's new custom VIP H125 helicopter. **Oliver Johnson Photo**

BY OLIVER JOHNSON

Heli-Lynx has delivered its latest completion, a heavily customized VIP Airbus H125 to a private customer, as the company establishes a new direction under new ownership.

The completion and maintenance, repair, and overhaul specialist, based in Stoney Creek, Ontario, was purchased by Rob Tyler and Bill Kurtin on Jan. 1, 2019. The daily operations of Heli-Lynx will continue to be led by Bentley Thistlewaite and Matt Trahearn, with the company planning to expand its business around the VIP sector, offering customized completions, maintenance, and support for private and commercial operators. It is also rebooting the "FX" program, which changes the AS350/H125's electrical systems and engine for reduced maintenance and operating costs.

While the May delivery, to Ted Groesbeck, a businessman based in Texas, was the completion of an order placed before the change in ownership, Tyler said it was an example of the course the company would like to set.

"That's the direction of the custom VIP ships that we want to see, we want to produce, maintain and support; we want to promote helicopters for the private owners, and we want to expand Heli-Lynx's offering," Tyler told *Vertical*.

The customization of the H125 was a four-month project. Starting from the exterior, Heli-Lynx created a paint scheme with two

tones of grey, meeting in a dynamic arc with clean stripes along the length of the aircraft.

"I showed Ted pictures of things I thought would suit his personality," said Tyler. "Some were a bit too bold; some were a bit too plain, and just from his feedback I got a happy medium for an elegant ship that wasn't too bright or bold. We then worked with the colors to get the proper blend so that we could match the exterior look with the interior look."

Inside, the avionics were boosted with a Garmin GTN750, G500 and GTN650, a Genesys Aerosystems autopilot, a terrain awareness warning system, a radar altimeter, traffic collision avoidance system, and satellite weather and music.

The interior is fitted with luxury materials, including carbon fiber trim, leather lined doors, and tinted windows. The customized seats were made with perforated leather to keep the occupants cool when flying in hot conditions, which will be made easier with its enhanced air conditioning system. Heli-Lynx also installed sound insulation to keep noise in the cabin to a minimum.

Finally, the aircraft is outfitted with emergency floats for safety when flying over water.

"I'm totally thrilled with the helicopter," Groesbeck told *Vertical*. "Bill and Rob are helicopter guys. They know this business and they know what people expect, and they work with a lot of high net worth people who are spending a lot of money. And I could just tell from speaking with them they

were fully committed to making sure the project went right."

Groesbeck said he would be largely using the aircraft for flying himself, his wife, dog, and friends, and wanted it to look great — and feel comfortable.

"I couldn't be happier with the look that Rob was able to obtain with the paint job and the finish out and the quality and the comfort," said Groesbeck. "This is the kind of helicopter that, for people that know quality, when they get up to it, run their hand over the paint, look at the interior fit and finish — those are the guys who are going to go, 'This was done right.'"

Tyler said VIP completions are a growing area for Heli-Lynx. "We're working with Four Seasons Aviation and HelicoStore in Quebec to try to promote helicopters in general in the Greater Toronto area, and expose helicopters to people who otherwise haven't thought about how this mode of travel could enhance their life," he said.

The company believes the FX program, which installs new electronics and a Honeywell LTS 101-series engine in the AS350/H125 to create the AS350FX1/FX2, will have a part to play in growing this sector.

"The FX program basically replaces the engine . . . with an engine that has no calendar limit, resulting in longer times between required overhauls," said Tyler. "This is appealing to private owners and commercial operators who don't fly enough to get the value out of a time-limited engine, as it is significantly more cost effective to run and maintain."

HeliLynx has produced over 50 FX aircraft under the supplemental type certificate it owns for the conversion, and these are in operation around the world. The company is assembling a team to advance the program, and is already building an aircraft on spec.

Tyler said there was a lot of interest in the FX program in New Zealand, where many of the aircraft are already flying, and added that they may even expand the program to the H130.

"We're studying the viability of it and what we can expand on with the existing STCs we have now," he said.

HAI PROVIDES PILOT REPORTING TOOL

To address a growing need for reporting airborne safety hazards, helicopter pilots now have a new website, www.rotor.org/HARP, that aims to provide fast and easy reporting of near misses and other in-flight safety events.

The HAI Aviation Reporting Program (HARP) was developed by Helicopter Association International's (HAI's) operations department specifically for helicopter pilots, with customized data fields for manned and unmanned rotary-wing operations. The program is designed to be accessible from any web-enabled device.

HAI said HARP grew out of a discussion among members of its Air Medical Services Committee. They felt there wasn't an effective system for prompt reporting of unmanned aircraft systems (UAS, or drone) activities that could present a threat to the safety of helicopter air ambulance operators.

HARP users can report events in specific reporting categories: drone/UAS event; accident/serious incident; near mid-air

collision; wildlife strike/activity; laser event; and other hazards.

Clicking on one of the six categories then directs users to the proper reporting source or guides them through a menu of questions or selections related to the event, capturing date, time, location, description, and other key data.

HAI said HARP provides the convenience of several different reporting systems within one portal. If another reporting system already exists for the event, such as the National Transportation Safety Board system for accidents and incidents or the Federal Aviation Administration's system to report laser events, HARP connects pilots to that site.

"HARP is not intended to serve as a substitute for other public reporting systems or programs," said Chris Hill, director of safety at HAI. "We encourage pilots to continue using any effective, responsive system they prefer for reporting hazardous conditions. The purpose of HARP

is to provide a simple reporting portal that promptly guides users through the reporting steps and ensures that vital safety information is shared with stakeholder operators in the most expedient manner possible."

Hill added that HAI will handle all HARP submissions with "the utmost care and respect" for individual and operator privacy. "We are working directly with NASA to develop strict protocols for secure processing and transfer of HARP submissions into NASA's Aviation Safety Reporting System (ASRS)," Hill said.

HARP submissions forwarded to the ASRS will retain 14 Code of Federal Regulations 91.25 protections, which prohibit the use of ASRS reports in any disciplinary action, except for information concerning accidents and criminal offenses.

HAI said its staff is still working to improve HARP. The new program is essentially HARP 1.0, though it is far from a beta-test version of the program.

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Lilium plans to manufacture and operate the Lilium Jet as part of what it said would be a “revolutionary” on-demand air taxi service. **Lilium Photo**

LILIUM REVEALS NEW AIR TAXI AS IT CELEBRATES MAIDEN FLIGHT

Lilium, the Munich-based startup developing an on-demand air taxi service, has revealed its new five-seater air taxi prototype for the first time. The unveiling of the new Lilium Jet, on May 16, came after the all-electric aircraft completed its maiden flight in the skies over Germany earlier in the month.

The full-scale, full-weight prototype is powered by 36 all-electric jet engines that allow it to take-off and land vertically, while achieving what Lilium claims is “remarkably efficient” horizontal or cruise flight.

The aircraft has a simple design, with no tail, rudder, propellers, or gearbox and only one moving part in the engine. Lilium said this not only contributes to the safety and affordability of the aircraft, but has also allowed the design team to focus their efforts on the customer experience in the cabin, from panoramic windows to gull-wing doors.

“In less than two years, we have been able to design, build and successfully fly an aircraft that will serve as our template for mass production,” said Daniel Wiegand, co-founder and CEO. “The Lilium Jet itself is beautiful

and we were thrilled to see it take to the skies for the first time. With the perfect balance of range and speed, our aircraft has the potential to positively impact the way people choose to live and travel, all over the world.”

The Jet has a top speed of 186 miles per hour (300 kilometers per hour) and a range of 186 miles (300 kilometers). Its fixed-wing design means it will require less than 10 percent of its maximum 2,000 horsepower during cruise flight, Lilium claimed.

Such efficiency would mean the aircraft would be capable of delivering affordable high-speed connections across entire regions, the company added.

The Lilium Jet first took to the air on May 4, 2019, having completed extensive ground testing at Lilium’s headquarters in Munich. The prototype aircraft, which is controlled remotely from the ground, has since begun a rigorous flight test campaign to prove its capability and lay the foundations for certification of the aircraft. Lilium is aiming to certify at safety standards comparable to those of large commercial aircraft.

“Our flight test program will now continue with increasingly complex maneuvers as we look towards our next big goal of achieving transition flight, which is when the aircraft moves seamlessly from vertical to horizontal flight,” said Leandro Bigarella, head of flight test.

Lilium plans to manufacture and operate the Lilium Jet as part of an on-demand air taxi service, in which passengers will be able to use the Lilium app to locate their nearest landing pad and plan their journey. The company expects to be fully-operational in various cities around the world by 2025, although trial services will begin earlier in several locations.

“Getting to this point has meant tackling some of aerospace’s greatest challenges, but now we’re here we can focus on bringing our vision to life and connecting communities in ways they have never been connected before,” said Wiegand.

The latest five-seater Lilium Jet builds on the successful flight tests of a two-seater prototype in 2017.



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HELITRANS RECEIVES FIRST H125s WITH

DIGITAL LOGCARDS

Norwegian helicopter operator Helitrans has taken delivery of two Airbus H125 helicopters with digital logcards, becoming the first H125 operator able to manage the maintenance history of its aircraft components digitally. Airbus said this will result in better data quality, time savings, and simpler processes, thereby reinforcing flight safety.

The helicopters are the first two in a series of seven H125s ordered by Helitrans to be delivered with fully digital logcards. They will be used for a wide range of missions that cover powerline construction and firefighting, as well as sightseeing trips, passenger transport, photography and telecom network development.

A logcard tracks the entire maintenance history of critical helicopter parts, from manufacture all along their in-service lives. The digital logcard replaces paper logcards, prone to loss and error, with digital content stored in a secured cloud. Airbus Helicopters first unveiled its digital logcards in March 2019.

"We welcome this innovative approach to logcard management, which is fully in line with Helitrans' vision of digitising and simplifying processes within the company," said Per Erick Nesvold, director of maintenance at Helitrans.

Helitrans has been operating the H125 for almost 30 years from its bases around Norway and is one of the largest helicopter companies in the country. With these seven new H125s, Helitrans' fleet will consist of 22 Airbus H125s and H130s.

SGGAC RECEIVES FIRST H215 IN CHINA



SGGAC's new H215 is the first to arrive in China. **Airbus Photo**

China's State Grid General Aviation Company (SGGAC) has taken delivery of one heavy twin-engine Airbus H215, becoming the launch customer for the type in China.

A subsidiary of the State Grid Corporation of China (SGCC), the world's largest utility company, SGGAC performs aerial construction and maintenance work along China's network of high and very-high voltage power lines.

The H215 will join the company's existing fleet of 15 Airbus helicopters, comprised of H125s, an H120 and an H225. This addition will enable SGGAC to perform new missions such as cable repair, cable laying, cargo transportation,

and powerline pylon construction in difficult-to-reach areas.

The helicopter comes equipped with a 4.5-ton cargo sling, hoists, weather radar, and a wire-strike protection system. The configuration features 17 seats equipped with oxygen jackets for high altitude missions.

"Thanks to the H215's outstanding performance in high and hot conditions, coupled with strong support and services from Airbus Helicopters, we are confident that we will continue to develop our capabilities performing new utility missions," said Wu Jielong, chairman of SGGAC.

"It's an honor to see SGGAC becoming the first operator of the H215 in China," said Marie-Agnes Veve, general manager of Airbus Helicopters China. "This achievement reinforces the long-term and strategic cooperation we have developed with the company, which also became a certified Airbus Helicopters' maintenance, repair and overhaul center in China in 2018."

The H215 features Safran Makila 1A1 engines, the latest generation flight management system, a glass cockpit avionics system and the four-axis autopilot from Airbus Helicopters' H225.

RotorBits



Robinson Helicopter Photo

ROBINSON DELIVERS 2 MORE

CADETS TO UND

Robinson Helicopter Company has delivered two R44 Cadets to the University of North Dakota (UND). The bright green and yellow helicopters are the latest additions to the university's growing fleet of Cadets.

The new Cadets will be used for training at UND's helicopter division located at the Grand Forks, North Dakota, campus.

"By the fall of 2019, all incoming students will train in Cadets," said Wes Van Dell, UND's chief helicopter instructor. "The performance of the Cadet has been excellent in both the summer and winter months. The students particularly like the aircraft's ease of operation and advanced avionics."

The new aircraft are equipped for visual and instrument flight rules training with a fully integrated glass cockpit featuring Garmin's G500H 1060 TXi flight display, GTN 750 GPS/COM/NAV, and GTX 345 transponder with ADS-B In/Out.

BELL HELICOPTER TEXTRON

CANADA APPOINTS

NEW PRESIDENT

Steeve Lavoie has been appointed president of Bell Helicopter Textron Canada. Lavoie took over the company's reins on April 28, 2019, as former president Cynthia Garneau began the next phase of her professional career at VIA Rail Canada.

Lavoie joined Bell last year as quality site leader. He has more than 20 years of experience in international operations management, program management, aerospace product development, strategic project planning and execution, and process re-engineering. He held various positions at Bombardier from 1996 to 2018, taking on positions of increasing responsibility, including the most recent: vice president of industrialization.

CHINESE H135 FAL STARTS OPERATIONS

Airbus Helicopters has expanded its industrial footprint and partnership with China with the opening of an H135 final assembly line (FAL) in Qingdao, China. Airbus said the factory is the first helicopter FAL built by a foreign manufacturer in China, as well as the first H135 FAL outside of Europe.

The opening of the FAL follows a cooperation agreement signed between Airbus Helicopters and China in 2016 for the purchase of 100 H135s for the Chinese market. Ninety-five of these 100 helicopters will be assembled on the newly-operational FAL from 2019 onwards.

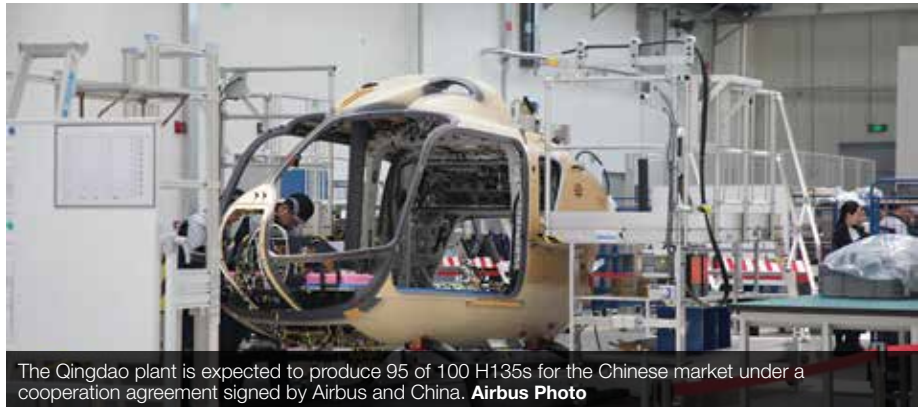
Main components including the main fuselage, main gearbox kits and rear fuselage will be shipped to Qingdao from Donauwörth, Germany, and Albacete, Spain, respectively.

The 70,000-square-foot (6,500-square-meter) Qingdao plant is comprised of four working stations, a paint booth, ground and flight test areas, and a delivery center. Airbus said the site will employ around 40 people, 23 of whom received on-the-job training in Donauwörth.

The first aircraft roll-out from Qingdao is expected to take place in the second half of 2019. Operations will start with an annual capacity of 18 helicopters, which could be doubled to accommodate future growth.

"Beginning to manufacture H135s in Qingdao marks the start of a new chapter of Sino-European collaboration, as we become the first foreign helicopter manufacturer to open a manufacturing facility in China," said Marie-Agnes Veve, general manager of Airbus Helicopters China. "This achievement is a testament to our continued commitment to the Chinese helicopter industry and the strong spirit of cooperation that exists between us and our Chinese partners."

Airbus said it has 300 helicopters already flying in China, serving 83 customers. Given the rapid development of the HEMS, public services and offshore wind industries in China, the company anticipates potential demand for 600 light twin-engine helicopters over the next two decades.



The Qingdao plant is expected to produce 95 of 100 H135s for the Chinese market under a cooperation agreement signed by Airbus and China. **Airbus Photo**

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FLIGHTSAFETY EXPANDS SIKORSKY S-70 TRAINING PROGRAM

FlightSafety International has announced a significant expansion of the training programs it offers for the Sikorsky S-70, offering Federal Aviation Administration (FAA)-approved instrument flight rules training in a Sikorsky S-70 Level D qualified simulator. This includes unrestricted S-70 type rating and ATP courses as well as a 61.58 pilot in command proficiency check. A new FAA-approved S-70A visual flight rules variant course is also offered.

The S70 and S-70i training programs and simulators are designed to increase pilot proficiency and enhance safety in both routine and unexpected operating conditions. The simulators are capable of replicating a wide variety of scenarios that enable pilots to experience situations that would be too dangerous, too impractical or impossible to practice in an aircraft. This includes major systems failures, heavy icing and power loss under hot and high conditions.

The simulators are also configured for firefighting scenarios. This new capability includes simulated belly tank/snorkel operations as well as those with Bambi Bucket external loads with emergency jettison. FlightSafety said the VITAL 1100 visual system

installed in the S-70i simulator presents visual scenes that accurately depict firefighting scenarios that can be tailored to the specific area of operations.

The simulators are equipped for night vision goggle (NVG) training, with goggles and helmets provided by FlightSafety.

Veterans with Sikorsky UH-60 Black Hawk experience can earn an S-70 FAA type rating and ATP through an abbreviated course. Funding for these courses may be available

through the Veterans Education Assistance Program offered by the U.S. Department of Veterans Affairs, FlightSafety said.

FlightSafety has served as a factory-authorized training provider for Sikorsky for nearly a 25 years. Highly qualified and experienced instructors provide Sikorsky S-70 pilot, maintenance manager and maintenance technician training using full-flight simulators, production aircraft maintenance trainers and the MATRIX integrated training system.



FlightSafety now offers instrument flight rules training in a Sikorsky S-70 Level D simulator. **FlightSafety Photo**

OCEANIA AVIATION PREPARES ASTAR CARGO POD



Airborne Systems is working to gain regulatory approval to allow H125/AS350 operators to use the cargo pod on the left or right side of their aircraft. **Oceania Aviation Photo**

Oceania Aviation's manufacturing division, Airborne Systems, has been approved as an Airbus supplier, and is in the final stages of achieving a supplemental type certificate (STC) amendment for its cargo pod to allow its use on the right side of H125/AS350 helicopters.

Airborne Systems has been supplying

H125/AS350 operators with cargo pods following its first New Zealand Civil Aviation Authority (NZCAA) certification in 2011. It has since achieved STC approval from Transport Canada and the Federal Aviation Administration (FAA).

"We have complete confidence in our cargo pod and the commercial value it brings to

an operation," said Russell Goulden, general manager of Airborne Systems, Oceania Aviation. "Since our FAA STC, Airbus USA and NZ have purchased several of our cargo pods over the last year, resulting in our approval as an official supplier."

He said the next step was to make the cargo pod available for both sides of the H125. "We are actively working on this with flight tests set for the end of [May]," said Goulden. "Our experience with cargo pods goes as far back as the 1990s for the AS350, AS355 and BK117, making us confident in the outcome."

The cargo pod has been designed to provide optimum user experience, the company said. Produced from lightweight material, Airborne Systems said the pod is "pilot-removable," reduces drag due to its aerodynamic design and protects its contents from the elements.

A single cargo pod offers 265 pounds (120 kilograms) extra capacity and the new STC amendment will allow operators to choose between three configurations: left-hand only, right-hand only, or both sides.

Airborne Systems said there are future plans to certify the pod for the EC130 B4, Bell 205, Bell 212, and Bell 412.



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DART RECEIVES MORE EC/H130 EFS STCs

Dart Aerospace has received supplemental type certificate (STC) approvals from both the Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) on its new EC/H130 Emergency Float System (EFS).

Transport Canada certification was granted in late 2018 for this kit, which is applicable to both legacy EC130 B4 models and the latest H130 from Airbus. The system can now be used in operations across multiples regions covering the Americas, Europe, the Middle East and any others accepting Transport Canada/FAA/EASA STCs without validation.

According to Dart, two new major improvements over the previous kit have been brought to the system: compatibility with OEM fixed provisions; and the addition of quick release fittings, which the company said allow for the removal of 70 percent of the kit's weight in less than five minutes without any tools.

"This project provided a unique opportunity to revisit our previous design and really examine how we could incorporate the latest technology in float systems to add value for our H130 customers," said Pablo Bravo, director of engineering at Dart's San Diego, California, facility. "We looked at ways to simplify the design to make it easier for

customers to install and remove the system, which was critical feedback from existing operators who prefer to reconfigure their aircraft for different missions quickly and efficiently. Specifically, we included quick release hoses that facilitate removal of the floats within just a few minutes — for excellent mission flexibility."

In addition, the new EFS is approved for the latest gross weight of the H130 and features a squib-free electro-mechanical valve made of corrosion-resistant steel. The system can be purchased with or without DART's patented integrated six-passenger liferaft (nine passenger overload).

"We used engineering resources from our San Diego and Calgary groups, an AMC partner to facilitate flight testing, and our certification team to leverage our collaborative relationship with Transport Canada to ensure that the project continued to move forward to completion," said David Marcus, program manager at the San Diego facility. "We truly feel that having an external liferaft option available for the H130 puts operators in a win-win situation in which safety and operational flexibility is increased, and weight is decreased."

This system is targeted at aircraft operating in tourism, VIP transportation, and utility missions.

AIRBUS DELIVERS ACH145 FOR USE ON SUPER YACHTS

Airbus Corporate Helicopters (ACH) has delivered the first of two ACH145 helicopters to an existing private customer as the first step in a fleet renewal program.

The two aircraft will be primarily flown from super yachts in the Mediterranean and Caribbean regions on behalf of the owner.

Isle of Man-based helicopter management and operation specialist Luvair will manage the ACH145s, as well as an ACH160 that has been acquired. The three aircraft will replace another three currently in service.

The second ACH145 will be delivered in the final quarter of 2019 and the ACH160, which will be used for onshore transport, will be delivered following certification.

Luvair has operated a fleet of VIP Airbus helicopters for almost 20 years, managing every aspect of its clients' operations from operational bases in London, the Mediterranean, the Caribbean and on board some of the largest super yachts in the world.

The ACH145s feature the ACH Line interior cabin concept in a bespoke version designed by London-headquartered Harrison Eidsgaard, which also created the exterior livery inspired by the yacht

environment. The ACH160 will have the ACH Exclusive concept for a high level of luxury.

"We greatly value our relationship with this customer who knows our aircraft well,

and we strongly appreciate their loyalty in selecting the ACH145 and, in particular, the new ACH160 after nearly two decades of operating Airbus helicopters," said Frederic Lemos, head of ACH.



The new ACH145 will be primarily flown from super yachts in the Mediterranean and Caribbean. **Airbus Photo**

CHC ANNOUNCES NEW OFFSHORE CONTRACT

CHC Group has been awarded a contract from Capricorn Norge AS, a wholly owned subsidiary of Cairn Energy PLC, to provide helicopter services in support of Capricorn Norge's forthcoming drilling program at the Lynghaug and Godalen prospects in the Norwegian Sea.

"We are excited to support Capricorn's first drilling operation on the Norwegian Continental Shelf," said Helge Nesvåg, CHC sales director for Europe, Middle East and Africa. "We look forward to working with their team and their project partners at Ross offshore."

The operation will utilize the Transocean Arctic drilling rig from CHC's base in Brønnøysund. There will be up to four flights per week using a Sikorsky S-92A.

"We are always looking for opportunities to work with new customers across our global operation and are honored that Capricorn Norge AS selected us as the right partner to help them enter a new location," said Karl Fessenden, president and CEO of CHC Helicopter. "Our experience in Norway along with our strong global standards and proven services will help us make sure they have a safe and reliable aviation partner throughout their project."



CHC will be using a Sikorsky S-92A to service the contract in the Norwegian Sea. **CHC Photo**

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VERTICAL MOURNS THE LOSS OF GUY MAHER

On Apr. 22, *Vertical* lost one of its most frequent and beloved contributors. Guy Maher, who wrote and photographed for the magazine since its second issue over 16 years ago, was tragically killed when the plane he was piloting crashed on its way from Statesville Regional Airport to Twin Lakes Airport in North Carolina. He was the only person on board.

"All of us at MHM Publishing have been shocked and incredibly saddened by the news of Guy's death," said *Vertical* publisher Mike Reyno. "Guy was a valuable and respected member of the aviation community. Through his contributions to *Vertical*, *Vertical* 911, and *Skies* Magazines, as well as the educational videos he produced through his company Lanier Media, Guy dedicated his life to helping to educate and inform the helicopter and fixed-wing communities."

Guy began flying in 1968, and held an airline transport pilot certificate for helicopters and a commercial pilot certificate for single- and multi-engine airplanes, and gliders. He was also a certified flight instructor, qualified to teach single- and multi-engine airplane, helicopter, and instrument flight. In all, he logged over 17,000 hours, including a long period as an air medical pilot for AirCare Wake Forest Baptist Health.

In addition to his career in aviation, Guy soon embarked on a parallel and complementary career in writing and multimedia production. He began his work as a photojournalist in 1980, writing and shooting for *General Aviation News*. Over the years, he also contributed to *North Carolina Aviator*, *Rotor & Wing*, *Southern Aviator*, *Air Ambulance*, *Air Progress*, *Helicopter World*, *Twin Cessna Flyers* and *Cessna Pilot's Association* magazines.

When *Vertical* launched in 2002, he was one of the very first people to join the MHM Publishing family. He wrote his first story for the magazine in 2003, and contributed dozens of in-depth pilot reports, operator profiles, and safety-focused stories over the following years. He was a regular member of the *Vertical* team attending the annual Helicopter Association International (HAI) Heli-Expos, and joined us at the most recent show in Atlanta, Georgia.

"Guy was an incredibly talented writer, giving our readers a real inside-the-cockpit feel with his stories," said Oliver Johnson, editor-in-chief of *Vertical*. "Reading his work, you felt like you were the one doing the flying — he had a rare gift. While he never pulled punches with honest criticism in his reports, his enthusiasm and love for aviation always shone through."



Guy learned to fly in 1968, and shared his passion for aviation throughout the industry for the next half century. **Guy Maher Photo**

Guy won numerous awards for his work over the years, including HAI's Excellence in Communications Award for lifetime achievement in the creative dissemination of information regarding the international helicopter community.

"In the very small field of aviation communicators, Guy stood out amongst his peers," said Dan Sweet, director, public relations and communications at HAI. "It was easy to see that he had a passion for all forms of flying, and his advocacy of the industry was equally apparent in his columns and stories. The breadth of his aviation knowledge and experience, coupled with a keen eye for photography and deft use of language, made his stories approachable and enjoyable for his readers. HAI joins in the industry in mourning his loss."

Vertical publisher Mike Reyno said Guy's colleagues will sorely miss his wit and charm — "he had both in abundance," he said. "Our deepest condolences go to Guy's wife, Staci, and to all his family, and friends."

Guy Maher shown flying his Robinson R22. Guy was a contributing writer and photographer for *Vertical* Magazine for over 16 years, winning an award from HAI for Excellence in Communications in 2011. **Staci Maher Photo**

HELIWELDERS

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ALPINE AEROTECH 505 BEAR PAW NOW COMPATIBLE WITH HIGH GEAR



Alpine Aerotech's Bear Paw Kit is compatible with both types of Bell 505 skid gear.
Alpine Aerotech Photo

Alpine Aerotech LP has completed the modification of its Bear Paw Kit to be compatible with both standard and high skid gear on the Bell 505.

The Bear Paw Kit is constructed from high grade UV-resistance polymer and retains its shape through continuous landings and take-offs. Alpine Aerotech said the kit's clamping system allows for safe, efficient installation and removal. It said all new kits delivered will be directly compatible with both types of skid gear to make it easy for procurement and potential seasonal changes between gear.

"Adding high skid gear compatibility was at the top of our priority list," said Taylor Wilson, manufacturing manager at Alpine Aerotech LP. "The kit has already been an outstanding success. We have been overwhelmed with the positive feedback and demand."

SLOANE HELICOPTERS SIGNS FOR 2 ADDITIONAL AW109s

Leonardo has renewed a distributorship agreement in the U.K. and Ireland with Sloane Helicopters that anticipates the purchase of at least eight new helicopters by 2021.

The agreement covers the AW109 GrandNew, AW109 Trekker and AW169, with the two companies signing a contract for an AW109 GrandNew and an AW109 Trekker in VIP configuration at the European Business Aviation Convention & Exhibition (EBACE) in Geneva, Switzerland.

"We are delighted and honored to continue our close partnership with Leonardo Helicopters," Sloane Helicopters said in a press release announcing the agreement. "The AW109 series and AW169 helicopters have consolidated their positions as the benchmark for helicopters in the corporate/VIP market."

Leonardo's partnership with Sloane has led to the sale of nearly 80 aircraft to date. Following in the footsteps of earlier variants of the AW109 and the AW109 GrandNew, the new AW109 Trekker has more recently found success with three aircraft ordered in the region. The AW109 GrandNew and the AW109 Trekker share the same engines, dynamics, cabin size and performance and maximum cruise speed, while offering different digital core avionics and with retractable landing gear/skids, respectively.

Leonardo has now received over 450 orders for Grand/GrandNew and Trekker helicopters from customers around the world. 🚁

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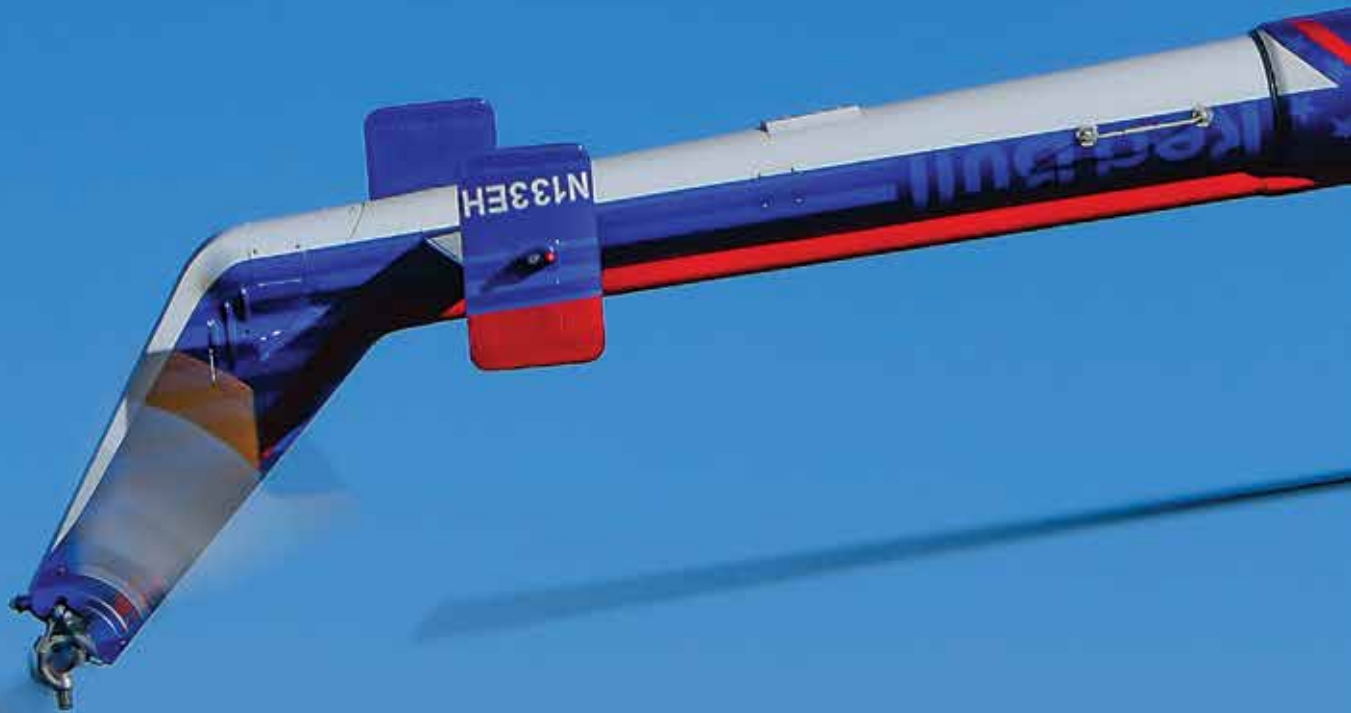


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You probably know about Red Bull's helicopter aerobatics program, but you may not know how it came to be. Here's the story behind the vertical lift component of The Flying Bulls.

STORY BY ELAN HEAD // PHOTOS BY MIKE REYNO & SKIP ROBINSON

GOING inverted



DOWNLOAD THE WALLPAPER!

Red Bull helicopter pilot Aaron Fitzgerald practices aerobatics over Southern California in one of Red Bull's MBB Bo.105 helicopters. Fitzgerald can be seen in air shows across the United States this summer.



[▶ WATCH VIDEO](#)



The first thing you learn, when you're learning to fly a helicopter, is just how little you need to move the controls. The control inputs required to maintain a hover are so slight as to barely be perceptible, and if you're moving the cyclic more than a few inches in forward flight, you're probably scaring yourself and everyone else on board. From the moment they pick up this delicate control touch, helicopter pilots spend their entire careers cultivating it. It's comparable to getting very good at balancing one basketball on top of another — if the penalty for dropping a ball were potentially death.

All of which is to say that aerobatics do not come naturally to helicopter pilots (or to helicopters). That was true for Siegfried

“

Airplane aerobatic pilots are a dime a dozen, but helicopter aerobatic pilots are still few and far between.

”

Based in the Los Angeles area, Fitzgerald has his own aerial production company called Airborne Images. He supported Red Bull with filming and other project work for years before joining The Flying Bulls.



The Bo.105 is inherently well suited for aerobatics. Red Bull removed excess weight from its aircraft and relocated the battery from aft of the engines into the nose for a more favorable center of gravity. "Other than that it's more or less right out of the box," said Fitzgerald.



The view from the cockpit as Fitzgerald rehearses his six-minute air show routine, which is sketched out on the piece of paper attached to the instrument panel. The routine starts with a hammerhead, followed by a loop, a half Cuban eight, a roll, a split S, another loop, a slow loop, an "Immel flip," two barrel rolls, an Immelman, an Immel flip with roll, and a bow turn.

"Blacky" Schwarz, an Austrian who is currently the chief helicopter pilot of The Flying Bulls and a two-time Helicopter Freestyle World Champion. By the time he started learning aerobatics, Schwarz had spent decades flying helicopters, doing everything from building ski lifts to performing mountain rescues. Learning how to loop and roll was a different experience entirely.

"If you are a pilot and doing sling load work, you only make the movements on the cyclic a millimeter; just very slight movements and gentle," he said. But some aerobatic moves require full displacement of the cyclic — a control input that, in the beginning, went against every fiber of his being. "It was really terrible!" he laughed. "That was really one of the hardest things. And the other thing is to know your position in the sky. . . . This took some time."

Airplane aerobatic pilots are a dime a dozen, but helicopter aerobatic pilots are still few and far between. Starting up a safe, successful helicopter aerobatics program demands not only skillful pilots and capable aircraft, but also intensive training, attentive maintenance, and close cooperation with the regulator. Sustaining one requires an enormous commitment of time and resources, meaning that few commercial organizations have both the wherewithal and the appetite for it. Red Bull, the founder of The Flying Bulls, is the exception to the rule.

From their headquarters in Austria, the aerobatic helicopter pilots of The Flying Bulls have been performing continuously in

Europe and other parts of the world for more than a decade. However, the North American branch of the program had a quiet few years following the departure of its first U.S. pilot, Chuck Aaron, in 2015.

Now, the program is back with a new pilot, Aaron Fitzgerald, and a renewed commitment to inspiring audiences across North America through inverted vertical flight. In May, Fitzgerald surprised bystanders in New York City with a demo over the Hudson River; in July, he'll be making his second appearance on aviation's largest stage, EAA AirVenture Oshkosh in Wisconsin. In advance of this summer's air show season, we paid a visit to Red Bull's hangar in Southern California to learn more about the organization's helicopter aerobatics, and the pioneers who made it all possible.

EXPANDING THE ENVELOPE

The first documented loop in a helicopter was flown by Sikorsky test pilot Harold E. "Tommy" Thompson in 1949. The aircraft was an S-52, with three all-metal main rotor blades and a Franklin six-cylinder piston engine. Although it's possible that other loops predated Thompson's, no conclusive evidence of them has surfaced, whereas Thompson's loops can be readily viewed on YouTube.

Since then, helicopter aerobatics have primarily been the domain of people who have had a good reason to do them,

WHAT IS A STATEMENT OF AEROBATIC COMPETENCY?

It may come as a surprise to learn that in the United States, civil helicopter pilots do not need specific approval to perform aerobatics, provided they are flying an appropriately certificated helicopter in accordance with applicable regulations. However, to perform at an air show, a pilot must hold a statement of aerobatic competency (SAC).

Although these statements are issued by the Federal Aviation Administration (FAA), the process of evaluating pilots for aerobatic competency has been delegated to recognized industry organizations including the International Council of Air Shows (ICAS), which has approved aerobatic competency evaluators (ACEs). Because there are so few helicopter aerobatic performers, at the moment, ICAS only has four ACEs qualified to evaluate helicopter applicants. These include Scott Urschel of Pylon Aviation, who is currently the primary helicopter ACE, along with Rich Lee, Patty Wagstaff, and Sean D. Tucker.

The evaluation for a SAC includes both a ground and a flight portion. The ground portion includes a discussion of air show safety concepts and emergency procedures, and a review of the applicant's proposed performance sequence. The flight portion, which may take place over multiple flights, starts with specific tasks such as aggressive pitch and roll maneuvers, half Cuban eights, and hammerheads (depending on the aircraft being flown). After demonstrating the ability to perform basic air show maneuvers safely, the applicant must then perform his or her full aerobatic sequence, while maintaining an agreed-upon safe altitude level and compensating for winds in order to keep the performance balanced and centered.

SACs are issued for specific categories of aerobatics (such as helo aerobatics) and include endorsements indicating which types of displays the pilot is authorized to perform. Initially, pilots are authorized at Level 4, which allows them to start and complete aerobatic maneuvers at a minimum altitude of 800 feet above ground level. There are three lower levels: Level 3 (500 feet), Level 2 (250 feet), and Level 1 (unrestricted). Pilots must stay current with annual evaluations and complete a certain number of air show performances to move to a lower level.

Like an FAA airman certificate, a SAC can also be suspended or revoked if the holder's aerobatic competency or safety compliance comes into doubt. As Lee explained, "The process is all about safety; the regulatory requirement for safety of persons and property on the ground first, and only then, safety of the performer."

Scott Urschel is an experienced civilian test pilot and ACE who holds statements of aerobatic competency in the MBB Bo.105 and the MD500 E, 530F, and 520N.



notably civil or military test pilots seeking to explore or illustrate an aircraft's flight envelope. One of those pilots is Rich Lee, who after serving as a U.S. Army scout pilot in Vietnam eventually wound up at Hughes Helicopters, the manufacturer of his OH-6 Cayuse. There, first as a production and then as an experimental test pilot, he learned how to perform maneuvers that crossed the line into aerobatics.

A defining moment for Lee came in 1981, when he was asked to demonstrate a TOW missile-equipped version of the Hughes 500 at the Paris Air Show. Before the show, Lee provided a VIP demo to Bob Hoover, the Second World War fighter pilot and colleague of Chuck Yeager who had gone on to become perhaps the greatest air show pilot of all time.

"During the demonstration, Bob asked me what I intended to do during the show, and I told him, and he said, 'Well let's see what you're doing,'" Lee recalled. "So I did a demonstration with him, and as a result of that he made several safety recommendations that I hadn't considered."

Lee modified his plans accordingly, and his display was a success. From that point forward, Lee said, "Bob Hoover became a lifetime mentor, as he did for Sean D. Tucker as well. We could pretty much call on him and ask his advice for everything."

For Lee's employer, the purpose of aerobatics was obvious: it was a way to sell more helicopters. And Hughes (later McDonnell Douglas, then Boeing) was not alone in this. "We would compete for contracts, and part of those competitions involved demonstration flights," Lee explained. "The goal of manufacturers is to present their aircraft in the best possible light, and if you could maneuver in ways the other helicopters couldn't, that was seen as competitive one-upmanship. So we all got pretty good at flying demonstrations to potential customers," he said of his fellow test pilots.

During his time with Hughes and its successors, Lee flew aerobatics in the Hughes 300, all models of the Hughes/MD 500, the MD 900, and Boeing AH-64D/E Longbow Apaches at mission gross weight. Although he has never been a civilian entertainer, he has performed at nearly every major air show in the world.

"I can't say I'm the most experienced helicopter air show pilot in the world, but I would say I'm right up there with the best," Lee said. "And that just comes with longevity, and exposure to numerous types of aircraft and various types of situations."

MASTER OF THE BÖLKOW

While Lee was busy looping Apaches, across the Atlantic another legend was emerging. Rainer Wilke became a pilot for the German Army Aviation Corps in 1972. The following year, he was assigned to fly the German Army's very first Messerschmitt-Bölkow-Blohm (MBB) Bo.105s, which were being trialed as anti-tank helicopters.

By the time deliveries of a specialized anti-tank version commenced in the late 1970s and early 1980s, Wilke was one of the German Army's most experienced Bo.105 pilots and instructors. If Lee was a generalist, flying many different types of helicopters, Wilke was a specialist — starting early on one model and learning it better than anyone else in the world.



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The Bo.105 wasn't just any helicopter, either. The Bölkow design was pioneering at the time for its rigid rotor system, titanium main rotor head, and fiberglass blades, which gave the aircraft exceptional maneuverability. The German Army realized its aerobatic potential, and assigned one pilot to perform displays in the aircraft. In 1984, with that pilot on the eve of retirement, Wilke was selected as his replacement. During their handover training, however, Wilke found that his predecessor wasn't particularly eager to pass along his knowledge.

"I was only allowed to sit on the left side, normally the pilot is sitting on the right side . . . and I was allowed to feel the controls for one loop and one roll, that was all," Wilke recalled.

"When I came back to my squadron, the commander asked me how was the training, was everything fine? I told him about the situation and then he asked me [if I felt] safe enough to do my own training for myself. I said OK, that's fine, I would do it — and so I started training on my own."

In 1988, the German military suspended aerobatic flying following the Ramstein air show disaster, in which three Italian Aermacchi MB-339s collided during a flying display. Not long afterward, however, the MBB successor Eurocopter (now Airbus Helicopters) asked Wilke to provide aerobatic training to some of its test pilots. In the years that followed, Wilke worked regularly with the manufacturer as an instructor and display pilot.

At one point, Airbus recommended Wilke to provide instruction in aerobatics to some Chinese students at the Test Flying Academy of South Africa. He wrote an article about his experience for an aviation magazine, and in early 2005, that article came to the attention of Blacky Schwarz.

Among his many other pursuits, Schwarz had started a flight school in Graz, Austria, through which he met Red Bull co-founder and passionate aviation enthusiast Dietrich Mateschitz. Schwarz taught Mateschitz how to fly helicopters on an Airbus EC120, then helped him acquire The Flying Bulls' first two rotorcraft, a Bell 47 and an Airbus AS355 N. Eventually, Schwarz went to work for The Flying Bulls full-time.

It just so happened that around the time he learned of Wilke, Red Bull North America, which is headquartered in Los Angeles, expressed an interest in developing its own aviation presence. Schwarz thought an aerobatic helicopter program might be a perfect fit, so he gave Wilke a call. Two weeks later they were in L.A., talking late into the night as they laid the groundwork for the new venture.

GETTING PAST THE GATEKEEPERS

When Rich Lee and his fellow test pilots at Hughes started flying helicopter aerobatic displays in the '80s, the Federal Aviation Administration (FAA) wasn't really sure what to make of them. Unlike airplanes, no helicopters had ever been certified in the acrobatic category, and while aerobatic maneuvers weren't specifically prohibited in the 500, the FAA's representatives were generally wary of them. As Lee recalled, "They were a little concerned that here was an activity that they hadn't thought about very much."

Lee ended up working with the FAA to write definitions of aerobatic flight for helicopters, which were initially based on pitch and bank angles. (Today, aerobatic flight is defined simply as an intentional maneuver involving an abnormal attitude or acceleration not necessary for normal flight.) Initially, the FAA also reserved the right to issue statements of aerobatic competency to helicopter pilots, although now that privilege rests with the



Siegfried "Blacky" Schwarz is the chief helicopter pilot of The Flying Bulls and a two-time Helicopter Freestyle World Champion. **Balazs Gardi Photo**



In May, Fitzgerald surprised onlookers in New York City with an aerobatic display over the Hudson River. **Predrag Vuckovic Photo**



Rainer Wilke explains an aerobatic maneuver to Mirko Flaim, one of Red Bull's European-based helicopter pilots. **Balazs Gardi Photo**

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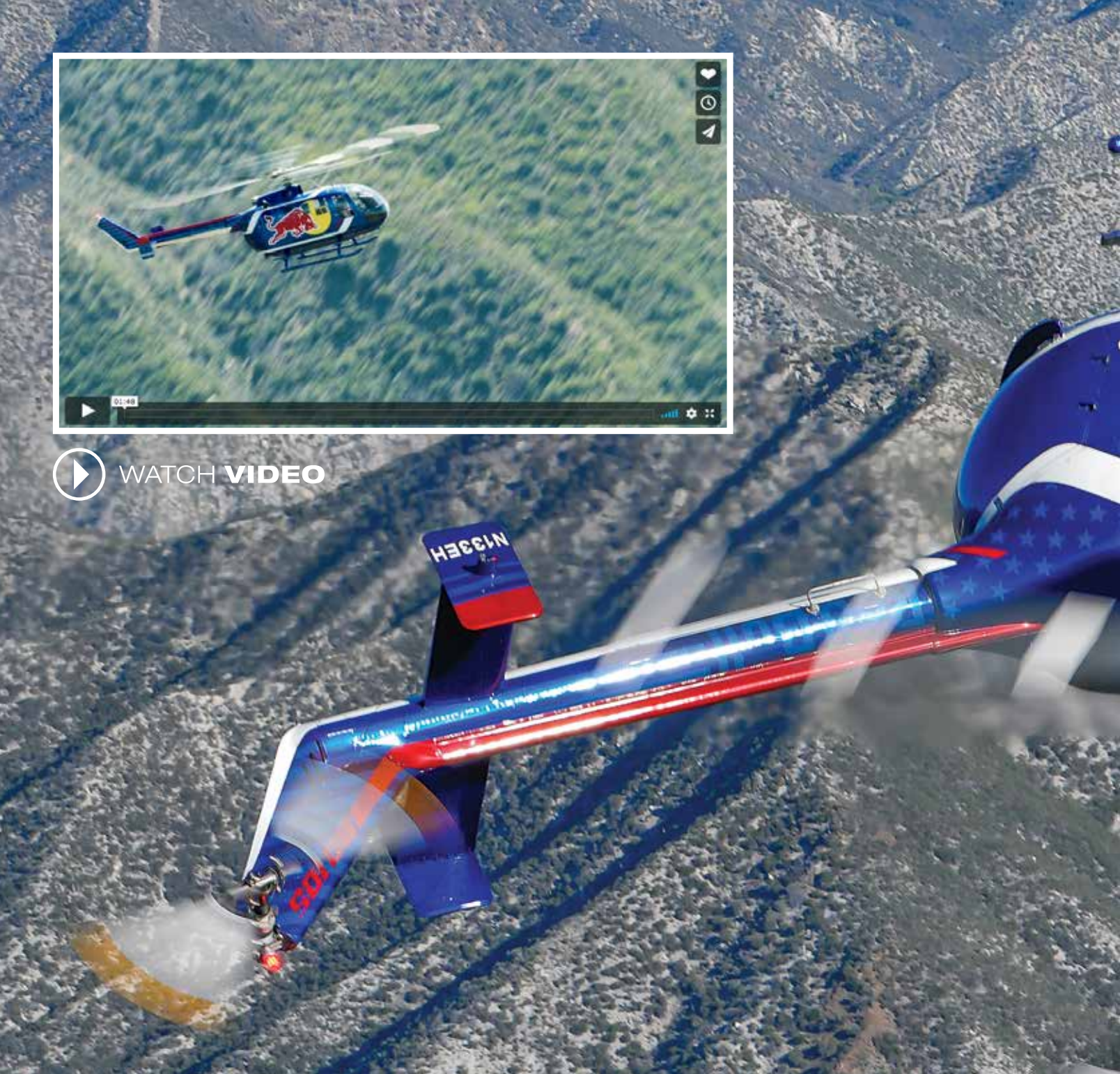


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In Europe, Red Bull flies the Bo.105 C “short” version, which weighs around 60 kilograms (130 pounds) less than the longer version (shown here) used for the U.S. program.



Fitzgerald maneuvers in front of the Statue of Liberty as part of his recent #RedBullFlipsNYC performance. **Predrag Vuckovic Photo**



In a typical Red Bull display, the G loads range from about zero to +2.6. The Bo.105 is capable of going down to -2 G, “but we hardly ever do that,” said Aaron Fitzgerald. **Predrag Vuckovic Photo**

International Council of Air Shows (ICAS), as it does for fixed-wing pilots.

Lacking in-house expertise on the subject, the FAA relied on Lee and similarly qualified individuals to evaluate helicopter pilots for aerobatic competency. Lee said that during the 1990s and early 2000s, he saw applicants perhaps three or four times a year.

“[First] I would start asking questions: well, who trained you, what aircraft are you going to use, what’s the purpose you’re doing this?” he recalled. “And most of the time, that would be the end of the conversation because most of these people didn’t understand how expensive it was going to be, what a commitment it was, what kind of equipment they needed. They just had no concept — they just saw someone do aerobatics in an air show and figured that would be a fun thing that they would like to do.”

For those handful of applicants who weren’t deterred, the next step was to present the aircraft they intended to use. In the U.S., performing aerobatics in a helicopter generally requires a

special airworthiness certificate, which is issued with a limitations letter that clearly states what the aircraft can and can't do. Once a helicopter is used for aerobatics, restoring it to a standard airworthiness certificate is prohibitively expensive — “so expensive that you would be better off selling the helicopter for scrap,” Lee said.

Very few applicants bothered to obtain this special airworthiness certificate. But of those who did, almost all of them washed out during the flight evaluation, “because they hadn't been taught by anybody and they couldn't do a routine with consistency, or they couldn't do what they said they were going to do,” Lee explained. “So the number of pilots who were doing helicopters at air shows was very, very small.”

Then along came Red Bull. Schwarz had gotten the green light from Mateschitz and acquired four Bo.105 helicopters: two for the U.S., which were certificated for aerobatics in the experimental category, and two for Europe, which were eventually certificated in the normal category following extensive negotiations with Airbus. Wilke signed on to the program and provided initial aerobatic training to Schwarz and to Chuck Aaron, who had developed a relationship with The Flying Bulls when he sold them their AH-1F Cobra. With that backing and training behind him, Aaron was granted his statement of aerobatic competency, and began performing aerobatic displays in 2006.

“Red Bull does an excellent job,” said Lee. “They're well funded, they've retained the very best instructors, they spare no expense in helicopter safety or pilot safety. . . . They have the money and, more importantly, the dedication to safety that's necessary to demonstrate at air shows.”

STRIVING FOR PERFECTION

If there are tricks to flying aerobatics in a helicopter, one of them is knowing where to look. Aaron Fitzgerald explains this to me before taking me up in a demo in one of Red Bull's U.S.-registered Bo.105s. For example, he says, when you're moving backwards through a loop, you should be tilting your head back, not looking straight out through the windscreen. I liken the advice to looking through the turn while taking a curve on a motorcycle, and it seems to work — both for staying oriented and avoiding airsickness.

Fitzgerald grew up fascinated by helicopters in Wenatchee, Washington, which at the time was home to an active helicopter logging industry (and source of the term “Wenatchee snatch,” a maneuver that logging pilots used to carry more weight than was good for them). After serving as a paratrooper in the U.S. Army's 82nd Airborne Division, Fitzgerald did his helicopter flight training in L.A., then started working in news helicopters both as a pilot and a camera operator. Although he did a variety of flying jobs over the years — including building power lines with MD 500s — film and television support remained a focus for him, and he eventually started his own aerial production company, Airborne Images.

Fitzgerald began working with Red Bull about 12 years ago, when he dropped the company's skydiving team, the Red Bull Air Force, into a NASCAR race.



Red Bull's U.S. aerobatic helicopters are certificated in the experimental category. Its European helicopters are certificated in the normal category with a maintenance manual that prescribes shorter life limits for 36 specific parts. Because components must be replaced so frequently, operating costs for the aircraft are extraordinarily high, around 35,000 Euros (US\$39,000) per flight hour.

"That gave way to a whole bunch of filming jobs over the years, and I've worked very closely with them on very big projects," he explained. When the aerobatic position came open, Schwarz asked Fitzgerald if he'd like to give it a try. His answer was, "Of course."

For Fitzgerald, the process of learning from Wilke and Schwarz how to fly aerobatics was "enlightening." Much as Schwarz had, he struggled with the process of unlearning 20 years of muscle memory devoted to keeping helicopters upright.

"Mentally, you understand how the maneuver is done, and it's easy to enter it; your hands and feet do what you want," he said. "But then once you're in the maneuver and you're inverted or you're in a strange attitude, your hands and feet do everything they can to get you back right side up, and that's instinctive. So for me, it was learning counterintuitive control inputs in order to continue around in a roll instead of immediately trying to right it."

After he broke those instincts, the bigger challenge came from learning how to combine individual maneuvers — loops

and barrel rolls and Immelmans and backflips and half Cuban eights — into a smoothly flowing routine. As he explained, "It's not so challenging to go learn how to do a loop, you can do that over and over again and get it just right. What's really challenging is to get ahead of yourself a couple of maneuvers, so as you're recovering from one maneuver you're setting up for the entry into the other one, and all the while managing the show line, and the altitude, and the airspeed."

Of course, that challenge is also a large part of the appeal of aerobatic flying. No matter how successful a routine, it's always possible to make it better: smoother, faster, more precise. Said Fitzgerald: "I don't know that it's possible to fly a perfect aerobatic sequence, so the fun for me is in the challenge of trying to make it more perfect every time."

THE IMPORTANCE OF MENTORSHIP

The 1981 Paris Air Show wasn't the only time that Bob Hoover saved Rich Lee's performance, and possibly his life. Lee recalled a private air show for the secret club of airline executives called "Conquistadores del Cielo," which took place

"Performing in front of a crowd can be nerve-wracking in the beginning, but it's also really exciting to be able to share what this helicopter can do and what we can do together in front of all those people, and have everybody watch, and see the result of all that practice and all that training," said Aaron Fitzgerald.

Predrag Vuckovic Photo



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in Ruidoso, New Mexico, at an elevation of around 7,000 feet. Hoover was there in a North American P-51 Mustang, while Lee was flying an MD 500.

"It was hot, so it was very, very high density altitude," Lee said. "I'd never flown at that altitude before. I went out to practice and was immediately surprised by how poorly my aircraft was performing. I was going into deep blade stall; I was seeing rpm excursions I wasn't used to. And it became quickly evident that I was not going to be able to fly the show that I had trained for, and was experienced in and was expected to do at the show."

Instead of bowing out, or, more perilously, persisting with his original plan, Lee went to Hoover for advice. "Bob and I talked over what we were doing, the aerodynamic reasons that I was having problems, and how we could structure the show to do maneuvers in a way that would be safe, yet still somewhat exciting," Lee said.

"There have been people who stepped in at various points in my career and given me important insights. But if I have to say why I'm alive and talking to you right now, and why I've had a successful air show or demonstration career, it's directly the result of Bob Hoover's mentorship."

For Lee and Wilke, the time has come to pay it forward — sharing their decades of accumulated wisdom with a new generation of helicopter aerobatic pilots. Although Lee is still an aerobatic competency evaluator, he has been handing over the reins to Scott Urschel of Pylon Aviation, who now performs evaluations for the Red Bull program on behalf of ICAS. Likewise, Wilke has been spending less time on the air show circuit recently, ceding the spotlight to younger pilots like Fitzgerald and the Italian Red Bull pilot Mirko Flaim. Next in line is the Austrian Felix Baumgartner, who gained fame for skydiving from the stratosphere for the Red Bull Stratos project, and recently gained his own statement of aerobatic competency in helicopters.

"I see my main thing at the moment to train the other pilots — to give all my experience, what I have learned, to them, so that they are able to continue and do all the same like I did in the past," Wilke said. There are still a few maneuvers that no one besides Wilke is performing, and unlike the pilot who gave him his initial

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Helicopter pilots Fitzgerald and Flaim fly in formation with Kirby Chambliss in his Zivko Edge 540 during an aerobatics training camp in Arizona in October 2017. **Balazs Gardi Photo**

“training,” Wilke is eager to pass them along.

As far as Lee is concerned, aerobatic maneuvers in a civil helicopter have no useful purpose beyond an aerobatic display. And the motivation for such displays is often to sell something, be it aircraft or energy drinks. Nevertheless, programs like Red Bull’s also serve to raise the profile of the helicopter industry with people who might otherwise ignore it.

“In most types of helicopter flying, we work really hard out in the middle of nowhere, doing some tremendous flying, and no one sees it,” Fitzgerald pointed out. For him, the real privilege of his work with Red Bull is not in being able to fly a helicopter upside down, but in sharing his passion with tens of thousands of spectators.

“When I’m in front of a crowd at an air show, I’m representing all of the helicopter industry, because there’s not too many helicopter performers out there,” he said. “It’s a great honor to be able to represent our little sector of the aviation world in front of the greater air show audience.” 🚫



Elan Head | An award-winning journalist, Elan is also an FAA Gold Seal flight instructor with helicopter and instrument helicopter ratings, and has held commercial helicopter licenses in Canada and Australia as well as the U.S. She is on Twitter @elanhead and can be reached at elan@mhmpub.com.



From left, Scott Urschel, Mirko Flaim, Gerhard Moik (The Flying Bulls technical manager), Aaron Fitzgerald, Siegfried “Blacky” Schwarz, Felix Baumgartner, Rich Lee, Stan Gray (Red Bull North America helicopter operations manager) and Kirby Chambliss at a recent training camp.



According to Blacky Schwarz, training is the most important part of any aerobatics program: “You have to do I think 1,000 loops until you are really safe. . . . At Red Bull we are lucky that we have the money and we can do training, and we take it really [seriously].”

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Heli-One aircraft maintenance engineer (AME) Josh Bonderoff performs a visual main rotor hub inspection on a Sikorsky S-76.





A MODIFIED COURSE

Having endured a prolonged downturn in its major market and the Chapter 11 reorganization of its parent company, maintenance, repair and overhaul provider Heli-One has found new opportunities that promise to keep its hangars full well into the future.

STORY BY OLIVER JOHNSON
PHOTOS BY HEATH MOFFATT

Founded in 2004 as an offshoot of CHC Helicopter, the fortunes of maintenance, repair and overhaul (MRO) provider Heli-One have largely been tied to those of its parent company. With an enormous range of capabilities, from aircraft storage to component maintenance, and engine overhaul to the modernization or modification of an entire aircraft, Heli-One found a steady flow of work in its early years through its roots in the offshore oil-and-gas industry. While it operated as a distinct entity from CHC, providing services for a range of third party operators, the vast majority of its work was tied to its parent company.

And then came the historic downturn in the offshore market, closely followed by CHC filing for Chapter 11 bankruptcy protection in May 2016 as the company began a 10-month reorganization process. A new CHC emerged, and along with it was an evolving Heli-One.

The oil-and-gas market continues to provide challenges for those traditionally reliant on it (offshore operators PHI and Bristow have subsequently begun their own Chapter 11 processes), but Heli-One has adapted to the changing climate well, developing a growing niche in the modification of Airbus H225s from offshore configurations. This, along with a growing body of work in support of military and government fleets, and robust performance in Heli-One's existing MRO operations, has meant that much of the company's capacity for the next 12 months is already accounted for.

"If you went back a year/year-and-a-half ago, we laid people off, we had a downturn, and now we've seen it really pick up again to the point where we're actually constrained in the amount we can take on," Eddie Lane, the company's president, told *Vertical*. "So, across the board we are hiring people."

When Heli-One was established as a separate business unit in 2004, its specialty was in Sikorsky airframes (the S-61, S-76, and S-92). It established a component shop and purchased an engine shop for those types the following year. In 2010, the company signed its first AW139 and H225 support contracts. Subsequent landmarks included the signing of

a 13-year contract with the U.K. Ministry of Defence for Makila engine support in 2012, Heli-One Norway becoming an approved Flight Test Organization in 2015, and Heli-One Poland winning a Royal Netherlands Air Force AS532 Cougar on-base support contract in 2018.

“One of the key things about the business has been being able to leverage the experience that we obtained as a repair facility for CHC, and then expand that out and utilize what we have, in terms of people and capacity, to really add value,” said Lane. “On the supply-chain side of things — inventory, you could really service the bigger [offshore] fleet with relatively less investment and inventory. So it kind of builds economy of scale, which is one of the benefits that we have had over the years.”

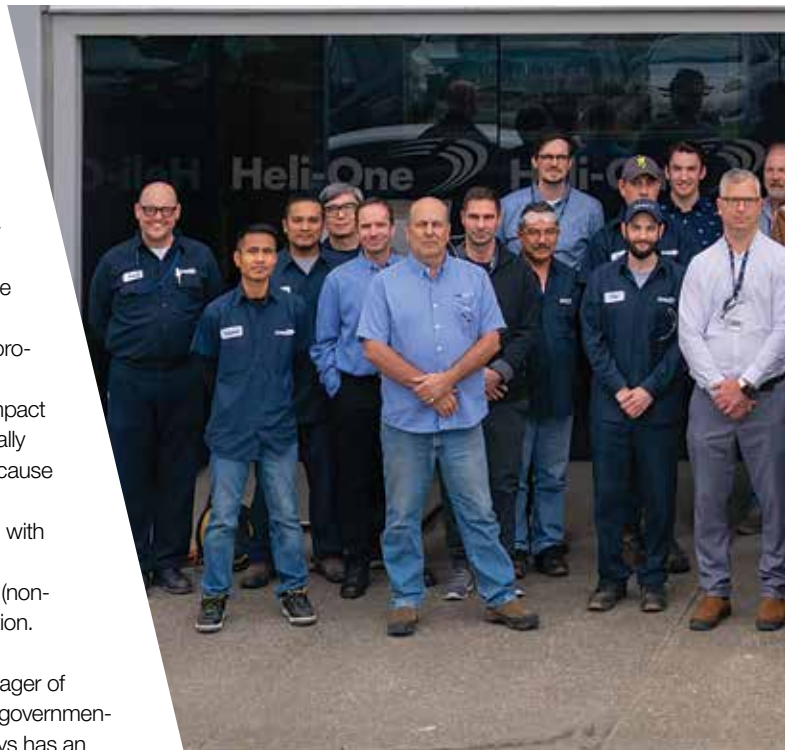
According to Lane, the biggest impact on Heli-One of CHC’s bankruptcy process was mainly on the administrative side of the business.

“From a customer point of view, just like with CHC, there wasn’t a major impact in terms of losing any major work,” said Lane. “Through it all, we didn’t actually lose any customers because of [the] Chapter 11 [process]. We lost work because of the market changes and reduction in flying hours.”

Today, Heli-One’s customers come in all shapes and sizes, from operators with one or two aircraft to the major offshore operators and various militaries.

And where just 25 percent of Heli-One’s business was once from external (non-CHC) customers, the balance has swung dramatically in the opposite direction. Seventy-five percent of the company’s business is now from other sources.

“We are very much externally focused now,” Carolyn Forsyth, general manager of sales and marketing, told *Vertical*. “Our biggest customers are really on the governmental and military side. That’s a big switch for us. The oil-and-gas market always has an



Heli-One’s largest site is in Stavanger, Norway, where it has 360 staff. Much of the facility’s work revolves around the Airbus H225 and AS332 Super Pumas. **Heli-One Photo**



Heli-One’s main hangar facility at Vancouver Airport. Here, it contains an S-76 and an Airbus H225, both completing major overhauls and upgrades.



AME Clemente Samson performs an inspection on an S-76.



H225 tail assemblies sit behind the main airframe in the Heli-One hangar.



Heli-One recently hosted Harjit Sajjan (front, center), Canada's defense minister, at its facility in Vancouver. The company hopes to bolster its business with an increasing amount of military and government support work in the future. **Heli-One Photo**

impact on the helicopter market, and some of that is just going to be natural ups and downs over the years. But some of it is more structural for us — it's part of a longer term strategic move to grow in other industries, in other sectors."

A BROAD REACH

Heli-One's footprint is spread across three sites in North America and Europe. Its headquarters is in Richmond, British Columbia; it has a large facility in Stavanger, Norway; and a third base in Rzeszow, Poland. Each has its own main area of focus.

The Stavanger site is the largest, with 360 staff, and various workshops, avionics, rescue equipment and rotor blade shops.

Much of the Stavanger facility's work revolves around the Airbus H225 and AS332 Super Pumas. Whereas this would once have involved performing routine maintenance and modifications for the offshore fleet, it now means modifying those aircraft for life in another sector.

Following the fatal crash of a CHC-operated H225 off the coast of Norway in April 2016, the type was temporarily grounded by regulatory agencies around the world. While Airbus implemented a variety of safety measures in a service bulletin as part of the type's return to service following the grounding, the H225 has struggled to find a role in an offshore fleet that has been streamlined by an ongoing industry downturn.

Just days after that fatal crash, CHC became the first of the major offshore operators to file for Chapter 11 bankruptcy protection. With the drop in demand for Super Pumas (particularly H225s) for offshore transport, operators have taken the opportunity to return those types to leasing companies as part of their restructuring efforts.

"A lot of [the H225s] were sent back to the lessors, and the lessors being the customers of Heli-One, they worked with us to get those aircraft back into service," said Lane. "Prior to [CHC's] Chapter 11, we serviced the 225s as an oil-and-gas aircraft, so we did a lot of work on all the components and giving modifications for the oil-and-gas fleets. Then, of course, [that work] went down to zero,

effectively. But now we see a real peak in demand."

Heli-One had also been offering storage services for idle aircraft during the oil-and-gas downturn. The modification process for the 225s therefore often involves bringing the aircraft out of storage, performing work mandated by an Airbus service bulletin to enable the type to safely return to service, and then upgrading them for their new role — whether that be heavy-lift operations or government services.

The company has quickly developed a reputation for completing these modifications, and is performing them for both existing and new customers. So far, it has helped more than 20 H225s return to service in new sectors, with many more conversions in the pipeline.

A recent contract saw former Bristow H225s, owned by Norwegian helicopter lessor Knut Axel Ugland Holding AS, converted into a search-and-rescue configuration for use by the Icelandic Coast Guard. The Coast Guard was an existing Heli-One customer that had previously been flying Airbus AS332 L1s.

The conversion included a Euronav 7 upgrade, as well as the installation of a night vision imaging system-compatible cabin, dual hoist, Trakka searchlight, FLIR console, AIS transponder system, and a USB charging port.

Air Center Helicopters, which recently began operations with the H225 in a big way with the acquisition of 17 of the type, is a newer Heli-One customer. The Fort Worth, Texas-based company is using the aircraft for utility and government contracts around the world.

Aside from the modification work on the H225s, Heli-One's Stavanger facility is a certified Airbus Service Center, and also performs maintenance work on Sikorsky, Bell, and Leonardo aircraft. In terms of engines, it specializes in the Safran Makila 1 series, which power the Airbus SA330 Puma, AS332, AS562, and H215.

In Canada, Heli-One's activities are spread across two facilities: Richmond and Delta, British Columbia. The former is a relatively new facility, having opened in 2017, and about 200 staff work across the two.

Heli-One Canada focuses primarily on supporting the Sikorsky S-92 and S-76, with the CHC S-92 fleet providing a large amount of activity.

"We are also in the middle of expanding capability on Leonardo's AW139," said Lane.

Additionally, the Canadian facility is the new home of Heli-One's AS350/H125 support capability, following the closure of its facility in Fort Collins, Colorado. It will provide major component and airframe MRO for the type. As *Vertical* went to press, Heli-One expected its AS350 capability to be live by the end of June 2019.

"There's tons of [AS]350 aircraft in the U.S. and Canada, so we're expecting there will be a big demand for service," said Lane.

Finally, the Polish facility has a staff of about 100, and focuses largely on airframe work. "Lately they've been focusing on 139s, and there's been a fair bit of business in the 139 area," said Lane.

The facility is set to become the new home for the company's Bell 212 and 412 work, which was previously completed in Canada. "That's a really competitive and fragmented market," said Lane. "We're in the process of transferring that equipment to Poland because we think that we can be more competitive there at servicing those aircraft."

ENGINEERING A SOLUTION

Heli-One's engineering and design department, which focuses on mechanical and avionics customizations, is split between its facilities in Canada and Norway. The departments have gained official approval as design organizations from their respective regulatory agencies (Transport Canada and the European Aviation Safety Agency), and have developed an enviable reputation for their work across an enormous variety of modification projects.

The company's modification expertise spans the spectrum of operating sectors, from oil-and-gas to search-and-rescue, air medical, military, governmental, VIP, and utility. "There's not really a use or an application for a helicopter that we haven't got solutions for," said Forsyth.

Over the years, Heli-One has developed a catalogue of hundreds of STCs and modifications. "[The catalogue] is a strong base for our engineers to look at a customer's problems and think about what we've got on the shelf that can meet their needs," said Forsyth. "But they listen to the customer and are able to develop new modifications if they need to."

Alan Stewart is the senior design manager at Heli-One's facility in Richmond. The department has a staff of about 10, while Stavanger's design department has about 20 people. Major projects will see the teams swell through the use of contractors, when needed.

"We have a search-and-rescue machine that is in our hangar right now that the customer wants turned into a utility machine — he's going to do heavy lift with it," said Stewart. "When you get an aircraft repurposed like that, it usually adds up to anywhere between 10 and 25 individual modifications and maybe half a dozen removals as well."

Each modification begins at the design stage, in which the team finds the piece of equipment that will work best with the customer's operational and functional needs, and figures out how to install it.

According to Stewart, some modifications are very popular and frequently requested, while others are entirely unique.

"We have a traffic system on the S-76, for example, that we've probably used on 40 different aircraft," he said. "But another example might be infrared cameras, where no two customers want the same camera. They just have a favorite and they want us to do it differently every time."

Among the recent major projects completed in Richmond was a VVIP cabin and avionics upgrade on an S-76B.



Alan Stewart, senior design manager of Heli-One Canada, sits in front of an S-76 undergoing a modernization upgrade.



AME Adrian Villavicencio inspects an H225 drive shaft.



Steve Bains (component lead hand) and Michael Valeroso (component technician) remove an Airbus AS350 bevel reduction gear from its case.

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Inspection technician Marcin Obidowski uses a CMM machine to measure a piece of housing.



Aircraft painter Devon Hunter applies Rockhard coating to a Sikorsky S-61 gearbox.



Heli-One is upgrading the S-76 to a VIP finish for a private customer in Malaysia.

The cabin upgrades included all-leather seats that were custom-shaped and feature custom gold embroidery; carbon fiber furnishings with a polished dark finish, offsetting gold-plated hardware; multi-spectral LED lighting controlled via touchscreen displays; audio/visual entertainment on demand via a 15-inch display; inter-cabin conferencing with Bose noise-cancelling headsets; and external cameras.

In the cockpit, three Universal Avionics EFI-890H advanced flight displays were added, along with a Universal Avionics UNS-1Lw flight management system with Vision-1 synthetic vision system.

"It's the first really high quality luxury interior we've ever done," said Stewart. "We learned an awful lot on this job."

The customer, a private operator in Malaysia, was so pleased with the aircraft that Heli-One is now completing an identical modification on a second S-76 for them.

The low cost of used aircraft right now is driving a lot of modification work, said Stewart.

"There are 76s that are in flyable condition selling for ridiculously low prices," he said. "The same thing with Super Pumas and 225s. People are buying them and finding work for them, and that all drives a little or a big mod program on every change of ownership."

In terms of general trends in modifications, interconnectivity is driving a lot of work, said Stewart. "We're seeing people that want to do satellite communications or broadband or video streaming from satellites," he said.

STRENGTH THROUGH VARIETY

The sheer variety of work offered by Heli-One is one of its key strengths, said Lane.

"Customers like to just have one place to go [for MRO support] if they can," he said. "For example, somebody that would need to work with Airbus for the airframe, with Safran for the engines, with Honeywell for the avionics — they can come to us and we can do all three. We may not do all work on all three, but then we'll subcontract or get what we need to service the full agreement by subcontracting."

Air Center Helicopters, based in Fort Worth, Texas, is a newer Heli-One customer. The operator has a fleet of 17 H225s, used largely for utility work. **Dan Megna Photo**



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Heli-One's support continues to evolve to meet customer demand for reduced turnaround times and convenient service, through flexible MRO support packages, mobile repair teams who can travel to customers to perform work, and continued investment in cutting-edge tooling, such as a new plasma spray capability that can rebuild a part that otherwise would need replacing.

The company has also applied lessons learned from the Chapter 11 process, merging its supply chain with CHC's to enhance its planning, use of inventory, and its ability to negotiate with suppliers.

"That's a big aspect of MRO and something that we've put a lot of focus on recently in our sales and operations planning with the supply chain — to have the right parts at the right time," said Forsyth.

While the H225 modification work is providing a boost to Heli-One's business now and into the immediate future, the company is planning new directions to further secure its position and provide ballast against the fluctuating fortunes of the offshore industry. A key element of this is military and government work.

The support contracts with the U.K. MoD and Royal Netherlands Air Force are examples of the type of business upon which Heli-One is keen to build. In May 2019, the company announced another large government contract win: an upgrade contract with the German Federal Ministry of the Interior to modify its new fleet of four Airbus H215s, with an option for an additional 16 AS332 L1s/H215s. The aircraft, which will be operated by the German Federal Police, will be used for public safety services, and will also take part in international missions. Each aircraft will require more than 50 modifications to tailor them to their role, including cabin installations, communication/navigation equipment, searchlights, cameras, and rescue equipment, and the project could take up to eight years to complete.

Future targets include Canadian military upgrade and support programs for the Bell CH-146 Griffon, Sikorsky CH-148 Cyclone, and Leonardo CH-149 Cormorant, said Lane, with Heli-One Canada recently hosting Harjit Sajjan, the country's defense minister, for a tour of its facility.

"What we can do to benefit the military is we can bring commercial aspects to the military operation," said Lane. "In return, we get that stable piece of work which then allows us to flex up and down when the commercial market goes up and down."

In terms of expanding its geographical presence, Heli-One is considering various options, said Lane. The company recently appointed a new sales and business development team member in Brazil, but Lane said establishing a facility in South America isn't necessarily a planned next step.

"Everything is on the table," he said. "We are looking at expanding; we just want to make sure that it fits in with the overall strategy. So it could be China; it could be Brazil. But these things take a while, and nothing's imminent."

Despite the continuing challenges in the offshore sector, Heli-One's ability to adapt and evolve to the new opportunities presented by the new reality have allowed it to not only endure, but thrive. With a broadened focus going forward, it appears well set for future growth. 🚀



Component lead hand Nathaniel Roque performs inspection and measurement on lower housing.



Engineering specialist Tom New performs a metallographic evaluation.



Component technician Scott Richardson performs fluid fitting on an S-76 main gearbox.



Oliver Johnson | Editor-in-Chief of *Vertical Magazine*, Oliver has been covering the helicopter industry since joining MHM Publishing in 2012. He can be reached at oliver@mhmpub.com. Follow him on Twitter @orjohnson_

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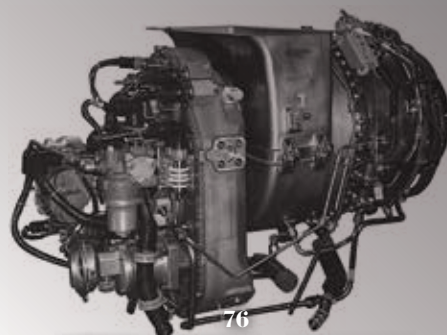


Vertical 2019

HELICOPTER & ENGINE MANUFACTURERS SURVEY

Nearly 1,000 members of the helicopter industry took part in our fifth annual industry survey, which once again combined our airframe and engine surveys. Here's what they told us.

BY ELAN HEAD // DATA ANALYSIS BY PMG INTELLIGENCE





W

hen we launched our annual Helicopter Manufacturers

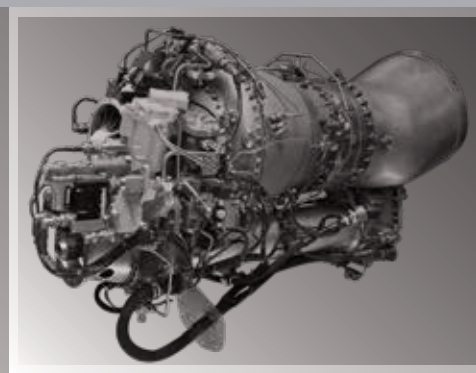
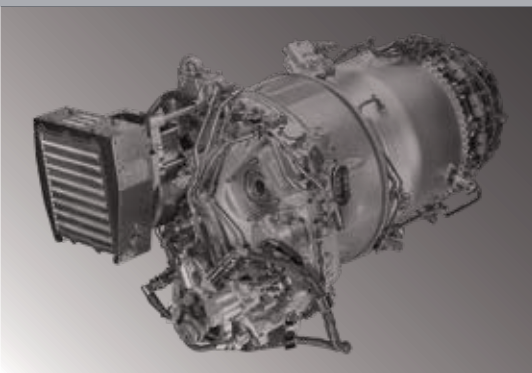
Survey in 2015, we wanted to produce a survey that was truly representative of all sectors of the civil helicopter industry, with the goal of making the industry better and safer. Now, with our fifth survey behind us, we couldn't be happier with how it's working out. Participation in our survey is as strong as ever, with readers sharing valuable insights into the design, manufacturing, and customer support issues that impact their operations. Even more importantly, the original equipment manufacturers (OEMs) are listening to what they have to say. In fact, last year Bell made a major change to its parts distribution policy as a direct consequence of our 2018 survey results.

This year, we had a new entrant to our survey: Guimbal. While the French manufacturer of the two-seat Cabri G2 scored well in our survey in previous years, this was the first year it surpassed our minimum threshold of 50 evaluations for inclusion in our rankings. And Guimbal had an exceptional first showing, easily outscoring the

other OEMs across most measures of customer satisfaction. The other piston-engine helicopter manufacturer in our survey, Robinson Helicopter Company, came in second, while Bell continues to lead among OEMs who only manufacture helicopters with turbine engines.

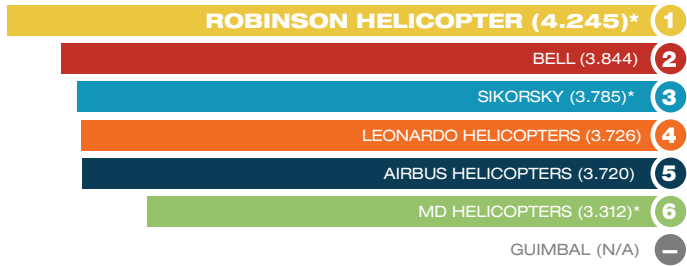
Speaking of engines, GE Aviation and Pratt & Whitney Canada both did exceptionally well to tie for first place in our Helicopter Engine Survey. This is the third year for our Helicopter Engine Survey, and the second in which we've combined it with our Helicopter Manufacturers Survey. The response was outstanding, with the vast majority of respondents completing evaluations for both the airframes and the engines that they operate. That reflects a serious time commitment on their part, and one we're very grateful for. We're also grateful to the OEMs who put considerable time and thought into addressing our respondents' most frequent complaints (you can read what they had to say on the pages that follow).

Once again, we partnered with the independent research firm PMG Intelligence to ensure that our data collection and analysis met industry best practices. *(For more details on our survey methodology, see p.106.)* If you didn't have a chance to take part in our surveys this year, don't worry — we'll be repeating both our airframe and engine surveys in the first half of 2020, and look forward to hearing from you then. 🍀

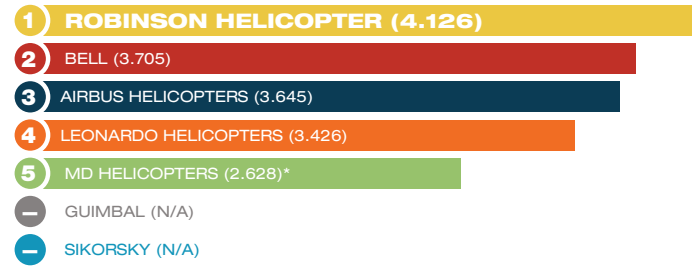


AIRFRAME RESULTS BY SECTOR

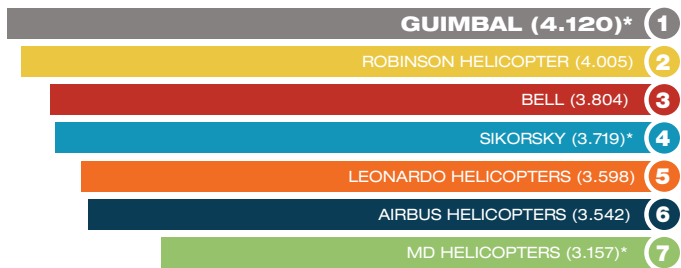
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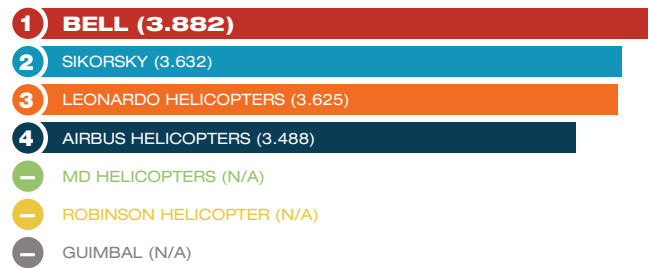
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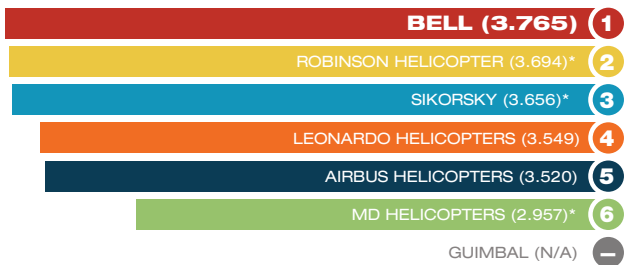
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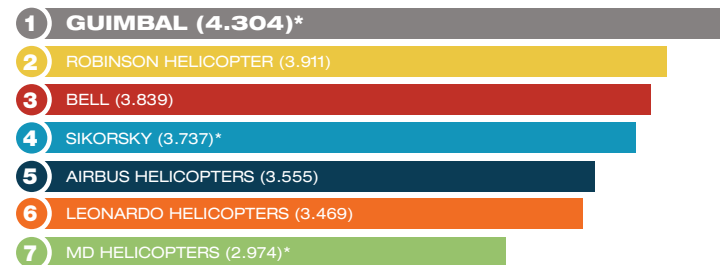
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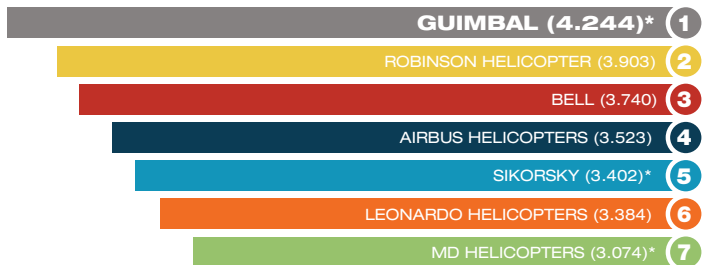
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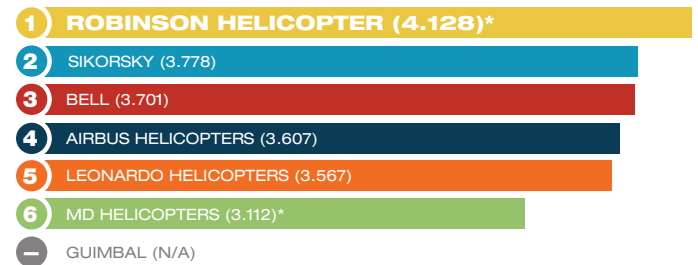
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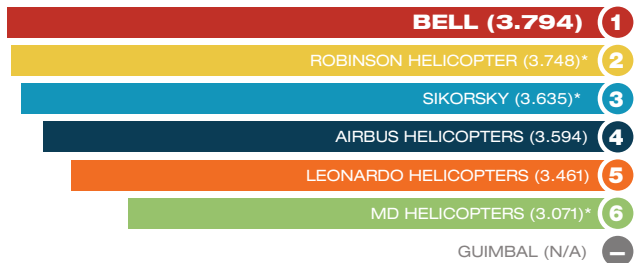
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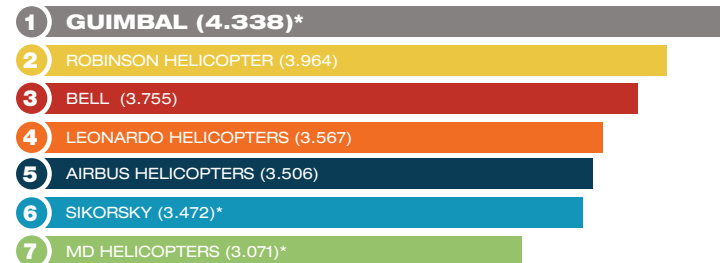
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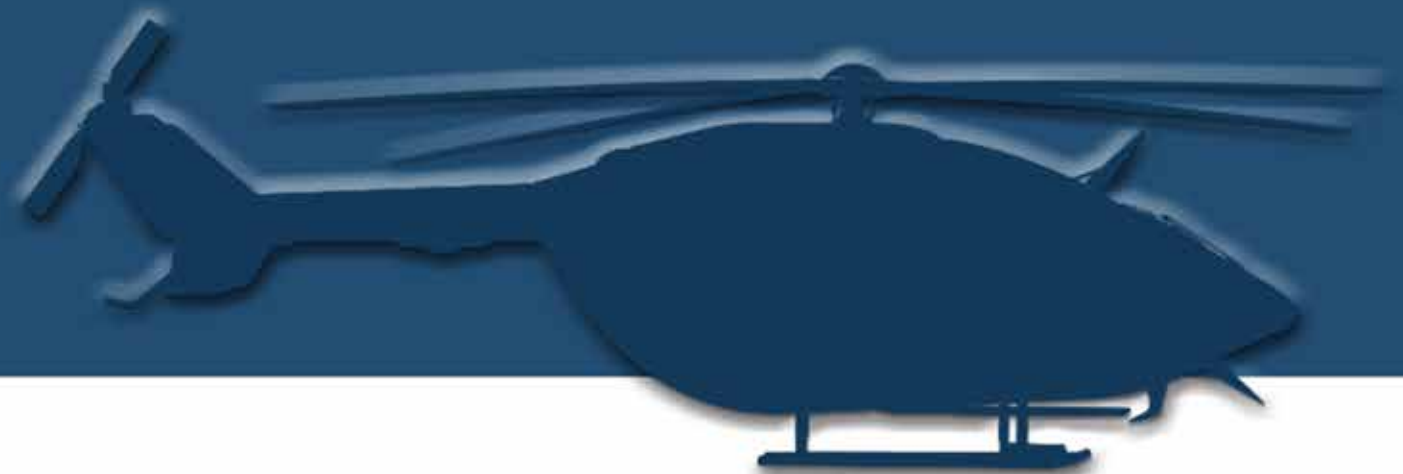
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Airbus Helicopters

Airbus has been holding steady in our survey for the past several years, turning in a consistently solid performance with room for improvement. While the company scored slightly higher on some measures this year (and slightly lower on others) the only statistically significant change was an improvement in **“quality of technical publications.”** Technical publications have been a perennial weak point for Airbus, and a number of our correspondents complained that the company’s online tech pubs are still “glitchy.” Once again, we also heard a number of complaints related to **“cost of parts,”** so we asked Airbus how they are continuing to address these top customer concerns.

“While most of our spares prices increased by less than inflation in 2019, we’re continuing to address this concern of our customers,” the company responded. “We’ve put in place dedicated action plans to freeze price increases for many parts such as main gear boxes, filters, avionics, hydraulic units, and servo controls. Moreover, the weighted-average catalogue prices of our spare parts vary depending on aircraft model and age, with the lowest increases occurring on our current production models, and out-of-production models experiencing higher increases.

“We’ve also created solutions for customers looking to better secure the cost of their parts over the long run through our HCare contracts. These provide mid-term cost visibility and below-inflation cost escalation thanks to our efforts in terms of reliability and our extensions of time-between-overhaul and shelf life limitations.”

With respect to tech pubs, the company said, “Over the last year our

interactive online tech data viewer (O.R.I.O.N.) achieved 99 percent availability, in line with our target. We continue to put a lot of work into making our technical publications easier to use. Recent improvements include simplifying the PDF format of our electronic flight manuals, creating a connector that enables shopping carts to be pushed directly from O.R.I.O.N. to eOrdering in Keycopter, and putting in place simplified processes for superseded parts. In addition, thanks to a major improvement deployed this year, all O.R.I.O.N. features will be available for efficient offline work, therefore eliminating connectivity and server issues.”

This year, several respondents mentioned that they’d like to see properly qualified A&P mechanics and part 145 repair stations **be allowed to perform deeper levels of maintenance.** One pointed out that “Airbus has been removing maintenance and repair data that previously was available in repair manuals, structural repair manuals, etc.” In response, the company confirmed that it recently made two main changes in the maintenance and repair manuals available to customers and service centers.

“Firstly, the e-Repair booklet that was proactively launched by Airbus two years ago, containing detailed procedures for 120 generic repair solutions, has been removed from Keycopter and transferred into our standard maintenance documentation. Therefore, these 120 repair solutions can still be accessed via our O.R.I.O.N. interactive tech pub viewer,” Airbus said.

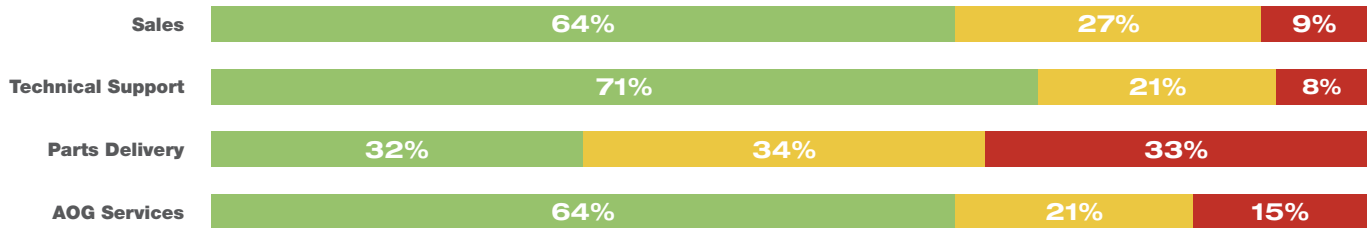
“Secondly, Airbus Helicopters is no longer allowed from a legal standpoint to offer information concerning level 3 maintenance

“*Too many restrictions on parts and service options.*”



ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

procedures to non-authorized Airbus service centers,” the company explained. “This means that this information is now only available for those Airbus-authorized centers. Airbus Helicopters has an extensive network of some 100 service centers worldwide. Particularly strong in the United States and Europe, we’re continuing to expand this network in North Asia, Southeast Asia, and Latin America.”

Other respondents told us that they’d like to see Airbus offer **more comprehensive, practical pilot and maintenance training**, at a lower cost and with more flexibility for their schedules. Airbus told us that the company has been working to deploy additional training means, including simulators, in close proximity to customers through its network of Airbus Helicopters Training Centers.

“Recent examples include the new H155 mock-up in Singapore, the introduction of H145 technician and pilot capabilities in the United States, and H125 and H130 practical means in almost all training centers. In addition, Airbus Helicopters and Helisim have already developed full flight simulators (FFS) for most helicopter models, deployed as close as possible to our main customer operations, such as those in the United States, Malaysia, and Brazil,” Airbus said.

“We will continue in this direction by having the H160 FFS available at the entry into service of the aircraft, and by deploying new simulators such as the H145 FFS at Helisim in the United States. Later this year, we’ll offer new training solutions for the H145 in Japan, refresher

courses for technicians, and new safety-dedicated modules for pilots.”

Finally, communication remains a concern for our respondents. Many of them wanted to see better **communication** from Airbus with owners and operators, especially on issues related to safety.

In response, Airbus told us it has put several initiatives in place to help ensure that the global helicopter community can learn from its collective experiences and improve safety awareness. These include the deployment of a worldwide network of aviation safety officers in Airbus’s customer centers, who are also supported by “aviation safety roadshows.” The company noted it is also an active member of different associations, such as HeliOffshore and the International Helicopter Safety Team (IHST), to assure a continued high-level dialogue within the industry.

“Moreover, we regularly use safety information notices (SIN) and flight operation briefing notes (FOBN) to provide our customers with recommendations based on operational feedback from our global fleet. And whenever an incident is reported we perform an analysis and provide preliminary consolidated information to the relevant authorities,” the company said.

“While we believe these actions reflect our commitment to supporting customers when it comes to safety, we’ll continue to look for ways to improve how we do this, focused on better communication and exchange with industry stakeholders.”



Skip Robinson Photo

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.



Bell

Bell has always done well in our annual survey, and while the company ranked behind Guimbal and Robinson for overall customer satisfaction this year, it still came in first among OEMs who only manufacture turbine-powered helicopters.

Last year, our respondents were outspoken against Bell's decision to limit parts sales to owners and authorized customer service facilities only. To Bell's credit, the company moved swiftly to reverse this unpopular policy, resuming sales to Federal Aviation Administration-approved part 145 repair facilities and their international equivalents as of July 2. The move was part of a **comprehensive effort to re-evaluate customer support practices** as part of a broader reorganization, which moved Bell's customer support and services under the umbrella of a Commercial Business unit helmed by executive vice president Susan Griffin.

"Bell's customer experience initiatives continue to move along," Griffin told us this year. "For example, [we're] upgrading our e-commerce capabilities to make it easier to purchase Bell parts, notably through our Aeronautical Accessories brand."

She continued, "As we continue to look at changes to our aftermarket business, we value these surveys to ensure we have as much information possible before implementing any significant changes to our product offerings or any policy changes. In last


year's *Vertical* Magazine survey, we heard the customers loud and clear and made a significant policy change.

"Customers will note the increased amount of surveys and conjoint studies as we look to improve our support and services; we want to ensure we have the voice of the customer at the heart of any future changes Bell makes."

This year, our respondents' most common complaint related to Bell's **decision to charge for access to technical publications**. As one respondent put it, "The recent decision to charge for technical publications is contrary to the core values Bell has preached for decades. Free, up-to-date publications decreases Bell's product liability and allows operators to maintain the aircraft to the latest standards."

Responding to this concern, Griffin told us, "Bell is making investments to improve our customer experience, websites, and other support systems. We want to ensure we have the resources to continuously upgrade these systems to provide the best support for our customer network."

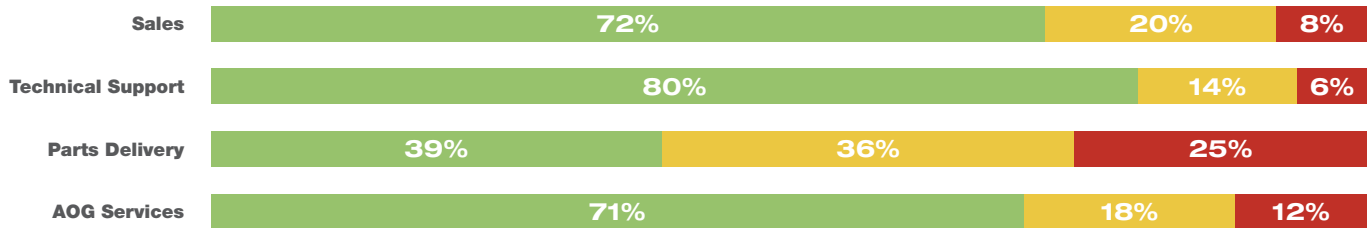
Compared to its turbine-only peers, Bell continues to score relatively well when it comes to "cost of parts." However, we once again heard some concerns about **escalating parts costs for legacy models**, with one respondent telling us, "pricing of parts



"Bell needs to rescind its new technical publications policy where Bell customers are charged [for] access to online publications. Safety is enhanced by having unrestricted access to current publication data."

ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

on older types has risen to levels where the aircraft are difficult to maintain at a decent price point.”

According to Griffin, “In 2019, the average price increase across all models was less than one percent. On legacy aircraft, the average increase was higher but within a range of one to three percent. This is reflective of low volume and higher cost to make or procure these parts. Parts that are still in high demand on legacy models incurred increases in the lower of the range.”

Finally, our respondents had some thoughts about Bell’s **shift in strategic direction** to embrace new forms of vertical takeoff and landing (VTOL) aircraft, like the hybrid electric Nexus mockup that was on display at HAI Heli-Expo 2019. Generally speaking, they weren’t enthusiastic about it. As one respondent summed up, “Overall feel that Bell is disengaging from its customers and more interested in Army contracts and making drones and VTOLs

for Uber.” So we asked Griffin what she has to say to traditional helicopter customers who feel that the company is abandoning them.

First, she pointed out, “Bell continues to invest in commercial helicopters, with the most significant investment being the Bell 525 Relentless. Last year, Bell launched the 407GX and 412EPX upgrades. Additional improvements and upgrades are in process and we look forward to introducing them to the market soon.”

Griffin continued, “Bell has always been on the leading edge of flight and we will continue to do so. Bell’s R&D investments in future technologies are not mutually exclusive; they support both the military and commercial business.

“As we develop technologies for urban mobility, these technologies will find their way into future civil and military applications.”



Skip Robinson Photo

TECH REP SPOTLIGHT

Ron Orndoff

“Available anytime and is super sharp at technical problems.”

Andrew Watt

“Andrew helped me solve a problem with our brand-new 407, he spent countless days driving to and from the aircraft trying to solve the issue with me. . . . Top guy!”

Honorable Mentions:

Greg Arnold, Hans Arnold, Carl Barnett, Ernie Burger, Michael Devenney, Mike Doucette, Todd Ellison, Peter Empson, Jim Fogle, Edward Horodeski, Greg Judd, Scott Lane, Paul Lusker, Seigo Matsubara, Erin McMahon, Marcos Ortiz, Daniel Prairie, Lukas von Benecke, Karel Vostal, Brock Lee Wright

Leonardo Helicopters

Leonardo struggled in our survey last year, but the company appears to be turning things around — this year, it was the only OEM to achieve statistically significant gains across all measures of customer satisfaction. While the company still lags other manufacturers on many of those measures, Leonardo clearly deserves recognition as the **“most improved”** OEM in our 2019 survey.

As in previous years, **parts availability** was a top concern for many of our respondents. This seemed to be particularly true in the United States, where our respondents wanted to see “more parts available in the USA, and not as many in Italy — adds days of out-of-service and outrageous shipping cost for AOG aircraft.” So, we asked Leonardo for an overview of what the company has been doing to address the needs of its customers.

“We’re always striving to improve,” Leonardo said. “In terms of parts availability, Leonardo continues to invest in making sure the right parts are available at the right time. We achieved 90 percent on-time delivery across all platforms for the third year in a row and we made our inventory more efficient (number of turns increased) without an increase in cost for the customer, also for the third year in a row.


“To be closer to many customers and decrease repair and delivery time, earlier this year we opened our Gulf of Mexico Support Center in Broussard, Louisiana. This investment will allow us to perform international shipments from the Gulf.”

Moreover, the company told us, “Leonardo Philadelphia is consistently working on having the right inventory for our customers.

Our planning settings are continually reviewed to optimize input from the field, the fleet, product support engineering, and the supply chain. This has led us to confirm in 2019 — as in 2018 and 2017 — that 94 percent of customer deliveries in the Americas originate with our warehouse in Philadelphia or our distribution centers in Nevada and Louisiana. However, when deliveries do originate in Europe, Leonardo Philadelphia is constantly looking at ways to quicken the process for our customers (alternatives, canning options, or engineering extension letters).”

Another recurring concern for our respondents was **quality control**. According to Leonardo, “In terms of quality control, we have defined areas of improvement. Last year, the Philadelphia warehouse moved to a larger dedicated site. The transition was smooth, except for some quality escapes. The Philadelphia site takes these escapes seriously and took actions including: reviewing the learning process for shippers and receivers; reviewing our quality organization set up in the warehouse; and reviewing our outbound process in order to have additional safety steps before material is shipped.”

Last year, several of our respondents suggested that Leonardo **open up the aftermarket** for maintenance, repair, and overhaul (MRO), so we asked the company if it had taken any further steps along these lines. “Yes, we’re proud that ‘excellent’ service centers have recently opened in South Africa, Japan, the United States, the United Kingdom, and Italy. Each is expertly managed by a third party,” Leonardo told us. Additionally, the company said that its new Gulf of Mexico Support Center supports customers on every Leonardo



Anthony Pecchi Photo

TECH REP SPOTLIGHT

Roman Carreto

“Excellent person and excellent tech rep.”

Michael Sheppard

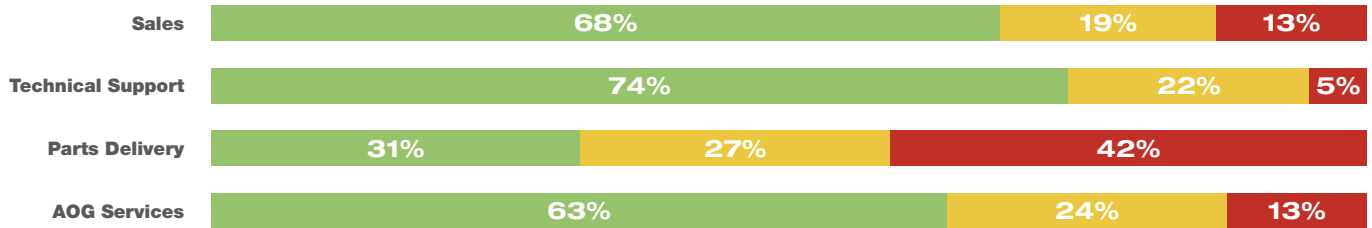
“Exceptional customer service and a pleasure to work with. Extremely knowledgeable and helpful.”

Honorable Mentions:

Graham Allan, Arber Boja, Donald Brown, Marco Cardinotti, Mickey Chaney, Chad Daigle, Matthew Davidson, Marco Espejel-Ortega, Timothy Giles, Andrea Di Giovanni, Andrew Hanschke, Michael Kennedy, Joao Lourenco, Javier Matos, Fabrizio Mazzetti, Jafari Mehran, Jeffrey Pearl, James Reynolds, Curtis Sutton, Fabrizio Tenardi, Said Torres, Al Vazquez, Terry Ward

ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

blade and will grow to include additional MRO services. This will be on top of Philadelphia's existing MRO capability, where all main dynamic components are supported.

With many Leonardo helicopters flying offshore, **corrosion** is a recurring problem for the airframes that several respondents mentioned again this year. The company stated, "Leonardo continues to take a 360-degree approach to corrosion prevention and have been quite encouraged by the positive feedback and positive trends seen over the life of our products in all environments, including the challenging offshore environment. The 360-degree approach starts with a continual review of the in-service experience across all of our platforms to improve all aspects of performance against corrosion.

"In turn, we have been focusing on continuous improvement of the design data, along with associated manufacturing process improvements, as well as the large focus we have placed on the aircraft corrosion control publications. All of the proven solutions to improve corrosion prevention have also been endorsed within in the latest basic configurations in production. For the in-service fleet, multiple service bulletins have also been published over the years in order to allow in-service aircraft to take advantage of all the latest improvements."

Some of our respondents also wanted to see **better avionics and**

moving maps for the offshore environment. Leonardo granted that the Primus Epic avionics system on the AW139 was initially derived from an avionics suite shared with fixed-wing platforms. However, the company noted that it has added many helicopter-specific functions after seven phases of software released over the past 13 years. "Further to the already incredible success of the AW139, we are continuing to incorporate the latest helicopter technologies into the Primus Epic system. For example, the Phase 8 Primus Epic software release will offer additional helicopter-specific features in addition to the new synthetic vision capability, such as offshore automatic approach, and EGPWS [enhanced ground proximity warning system] with offshore mode."

Leonardo added that it is embracing the potential of mobile devices to enhance its aircraft: "All Leonardo Helicopters platforms are certified to be compatible with mobile devices in the cabin and cockpit as an additional option, if preferred. In fact, we have developed an advanced suite of OEM-developed ground and air based applications for mobile devices, such as Skyflight, with planning and navigation capabilities. We continue to look forward and invest into all of the opportunities mobile devices are bringing to the industry for both pilots and maintainers alike."



Guimbal

Guimbal has been receiving consistently high scores in our survey for the past several years, but this year was the first that it passed our minimum threshold of 50 evaluations. With that hurdle cleared, the relatively young French OEM blew past the competition, **ranking first across most measures of satisfaction** in our survey, often by large margins.

Of course, there are some big caveats. Guimbal produces only one model of helicopter — the Cabri G2 — and that model seats only two people. For many of our readers, Guimbal simply isn't relevant to their operations, and won't be for the foreseeable future. But for those customers that it does serve, notably in the training and private sectors, Guimbal is clearly doing many things right.

"The Cabri was introduced as a modern alternative to well-proven helicopters, intended to bring a better safety and a lower operating cost. Of course, this has an initial cost and to convince operators that the end result is a benefit, we have to help keep the helicopters flying intensively and the support is essential," said Raphaël Yver, head of customer support, when asked to discuss Guimbal's approach to customer service.

"Thus, we developed from our very beginning **a very fast response culture** to any customer query. Whether it is a request for technical assistance, spare parts, training, or a warranty request, we try our best to answer within a few hours either by email or phone and we never leave an email unanswered. In addition, we do have technical skills and knowledge within the

support team. We don't just go ask the design office whenever we have questions; in most cases we have the answers ourselves."

According to Yver, when it comes to **spare parts**, most are available at the factory at all times. If an order is placed under aircraft on ground (AOG) conditions, the shipment is made on the same day. "Taking into account the current shipment efficiency, we claim a next-day delivery capability anywhere within Europe. Regular orders are usually shipped within two to three working days," he said. Guimbal's distributors in New Zealand and Australia (Pacific Aircraft Services), the United States (Precision LLC), and China (X-Square Aviation) hold a comprehensive stock of parts and provide a next-day delivery service in most of South Pacific, North America, and China, he added.

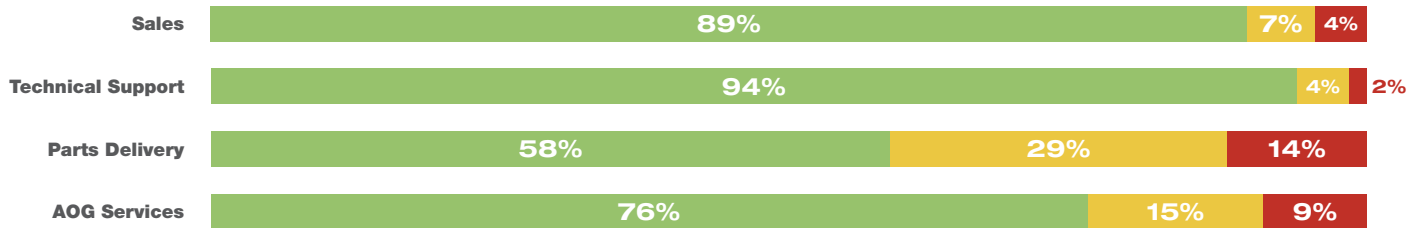
"As for **transmission overhauls**, although they may only be carried out at the factory for now, we keep a stock of freshly overhauled transmissions ready for shipping at all time and mostly do standard exchanges," said Yver. "There is only one flat price for overhauls whether it is exchange or not. Consequently, the customer knows exactly how much he is going to be charged and does not have to wait a few months until his core has been overhauled by the factory to get a credit which will be... whatever it is!"

Yver also touted Guimbal's **advanced customer support portal**, which is fully integrated to the factory system. This provides customers with a 24/7 ability to order parts and check on the status of those orders, make payments online, request



ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

return merchandise authorizations for warranty and repair/overhaul services, and access technical publications. "All our customers love this service!" Yver said. "The next step will be an online interactive IPC [illustrated parts catalog], which will be part of the website and not only a pdf document."

A number of our respondents had suggestions for **minor improvements and new options** for the Cabri, so we asked Yver what the company has in the works. He reported that Guimbal has just received European certification of a heated pitot tube, with U.S. and Canadian approvals expected shortly. Guimbal is now focusing on certifying an air conditioning system for the Cabri, and aims to make it available this year.

"Regarding mission-capability equipment, following our emergency flotation system, very successful cargo hook, and bearpaws, we are developing a universal mount for all types of gimbal devices," said Yver. "We have worked initially with Shotover for their new model B1 and will follow with other popular models. Many customers love the Cabri as a great platform for aerial filming and the demand seems good, in an effort to compete with drones."

One respondent mentioned they'd like to see Guimbal offer a

factory safety course to help educate instructors and pilots who are new to the Cabri on the ways in which it differs from Robinson helicopters. Yver acknowledged, "The Cabri is quite different from a Robinson: right power pedal, fenestron, stiffer cyclic, much more maneuverable rotor." He said that Guimbal has been issuing service letters since 2010 to help people better understand the Cabri, and has recently developed tutorial videos that will soon be available online. Guimbal has also been providing a factory course to several of its distributors to help their instructors better demonstrate and teach the specificities of the Cabri.

Overwhelmingly, however, our respondents' top request was for **a four- or five-seat version of the Cabri**. "Indeed, we have a strong demand for a big brother, too," Yver told us. "It makes a lot of sense to fill the gap between [the Airbus] H125/H120 single turbine and the Cabri with our technology. We have different very exciting projects in the pre-work stage and you may see the best one flying quite soon — in the very long helicopter timescale. We have to be patient! However, the first factor of success for a bigger helicopter is the customer satisfaction on the Cabri G2."



“The hands-on approach from this manufacturer is awesome. This approach goes right up to CEO level.”

Heath Moffatt Photo



MD Helicopters

MD Helicopters, Inc. (MDHI) struggled in our survey last year, and continued to do so this year. While it saw increases in some of its scores compared to 2018, none of these were statistically significant (although it didn't register any significant declines, either).

This year, the top concerns for our respondents were **spare parts availability** and pricing. According to MDHI, "Spare parts fill rate did decline last year largely due to supplier performance. With the addition of new supply chain leadership and additional buyers, we believe this issue is behind us."

"Over the past three years, MD has consistently lowered spare parts pricing for our single-engine fleet with a specific focus on lowering DOCs [direct operating costs] and price matching PMA [Parts Manufacturer Approval] parts. While there have been exceptions to this rule, we encourage MD owner/operators and our global network to reach out to us directly for immediate resolution when issues do arise. Without specific details from the respondent, we don't have the information necessary to address individual concerns."

"Twin-engine parts pricing and availability will improve as MDHI initiates operational improvements to the production line," the company added.


Once again, we heard some complaints related to MDHI's decision to bring single-engine **main rotor transmission overhauls in house**. Last year, the company told us that

this was a safety decision made following a joint review with the Federal Aviation Administration (FAA). However, one respondent told us, "The 'spin the wheel and guess the cost' factory transmission overhaul program is a nightmare for operators and direct operating costs for the airframe and needs to be abandoned," and also questioned why transmissions were coming back from so-called "factory" overhauls with EM Heli-Logistics tags.

MDHI responded, "MDHI stands behind the decision to bring transmission overhaul and repair in house. We maintain the need for OEM oversight to ensure optimized safety and optimized performance. Additionally, MD is always performing continuous improvement efforts. The resulting improvements are passed to our customers in order to reduce pricing and lead times and improve customer satisfaction."

Regarding the EM Heli-Logistics tags, MDHI said that all overhaul/repair orders are initiated and completed at the OEM, but that it does leverage EM Heli-Logistics' overhaul/repair capability as overflow capacity to improve customer satisfaction and turn-around time. Upon completion, all transmissions are run through the FAA-approved test stand at MDHI for final acceptance and issuance of the FAA 8130-3 form.

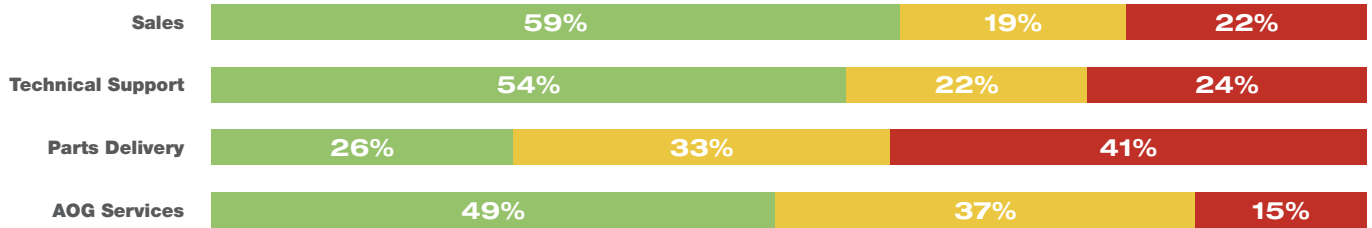
"MDHI is continuing to work on reducing transmission overhaul/repair pricing," the company continued. "Overhaul pricing is based upon the scope of work required during overhaul/repair. MD also



“It is getting harder to buy parts that should be available right now... not 360 days from now.”

ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

offers an exchange program with fixed standard pricing and reduced lead times which many operators have used since the transmission overhaul program was implemented.”

We also heard a number of complaints related to MDHI's **technical publications** and its web-based portal, MyMD.aero. In response, the company told us, “From an operational/functionality perspective, we encourage the individual respondents — and all MyMD.aero users — to reach out to the MyMD.aero support team via phone or email when specific issues arise.”

With respect to the content of its tech pubs, the company said, “MDHI has always encouraged customers to alert us with questions about or when changes or corrections are needed in our technical publications. To facilitate this communication, MDHI is adding a technical publications change form to MyMD.aero in the next release.”

Finally, while the MDHI product line continues to have a devoted following, our respondents continue to ask for various **updates and improvements** to their aircraft. So, we asked the company to give us an overview of what improvements are currently in

development for its civil product line.

“MDHI continues to focus on delivering technology and performance improvements across both our single- and twin-engine fleet,” the company said. “We are implementing production line improvements for both the MD 902 twin-engine Explorer and the developing MD 969 Armed Explorer, the benefits of which will be in place by [end of year] 2019.”

Meanwhile, the company added, the MD 902 is currently being upgraded with a full glass cockpit and digital autopilot for single-pilot instrument flight rules (IFR) operation. On the single-engine side, MDHI is developing a commercial crash-resistant fuel cell for its 500E, 530FF, and 500N aircraft.

Additionally, the MD 530F is undergoing certification flight testing aimed at increasing the model's takeoff gross weight to 3,350 pounds (1,520 kilograms). This represents a 250-lb. (115-kg) increase in useful payload. MDHI said it is also pursuing a glass cockpit supplemental type certificate for the 530FF aircraft. The glass cockpit is the baseline for the armed 530G variant.



Lloyd Horgan Photo

TECH REP SPOTLIGHT

Chris Pierce

“Committed.”

Brad Rushton

“Nicest guy to call. Always helps and is very knowledgeable.”

Robinson Helicopter

Last year, Robinson earned top honors in our survey with outstanding scores across the board. The company had another generally strong showing in our survey this year, and while it did see declines across some measures of customer satisfaction, none of these drops were statistically significant.

"Robinson Helicopter Company continually strives to improve our support to better respond to our operators," said company president Kurt Robinson. "We are excited about the internal changes made over the last year to expand our support and keep pace with the growing worldwide fleet. During the last year Robinson brought more manufacturing operations in-house and we continue to develop new methods and evaluate vendors to improve quality, efficiency, and on-time delivery."

He continued, "Unfortunately our changes did produce a **temporary backlog in 2018**; however, over the long term it will result in better quality and reduced delivery times. Additionally, last year Robinson started construction on a new 37,000-square-foot aircraft/component teardown and inspection facility which will become operational this summer. The expanded facility will greatly increase our capacity and ability to

process parts and aircraft returned from the field."

We did hear some complaints this year about the **lead times for overhaul kits**, with one respondent telling us, "They need to get the overhaul kit delivery back to six to eight weeks or better. It is now 14 to 16 weeks. Their big components are too far out."

Robinson responded, "Our goal is to ship all field overhaul kits in less than 10 business days — order times for kits made to specific requirements or paint schemes may vary. During 2018, back orders temporarily increased while we made changes and implemented production improvements. Today, the lead time is about five weeks on all field overhaul kits. We expect to reach our fulfillment goal of two weeks before mid-year."

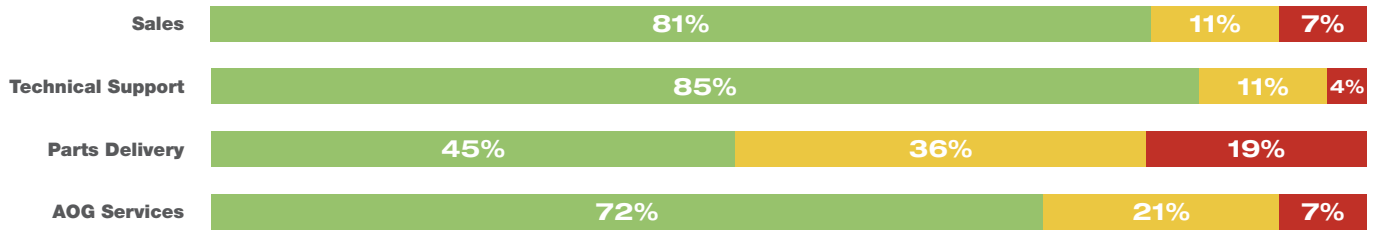
We also received a few complaints related to **factory paint work and corrosion problems**. Robinson told us, "Depending on the environment, corrosion and erosion can be two of the most difficult maintenance items on helicopters. Robinson continues to make improvements to all our aircraft, components, blades, etc. to increase durability and reduce maintenance. Based on considerable research performed over the last several years, various new coatings and other enhancements were made, and

"I would like to see quicker delivery times for overhaul kits. Older aircraft are less supported than newer aircraft."



ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



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continue to be made, to the main rotor blades and other parts of the aircraft.”

Some of our respondents wanted to see **extended times before overhaul** and/or more on-condition components, so we asked Robinson whether this is something the company is considering.

“Based on field service, Robinson continually reviews life-limited parts and component overhaul times for improvements. The R44 Cadet is an example where we were able to extend the component and aircraft overhaul times, and reduce operating costs, based on the previous experience and history of the R44,” he said.

Finally, on a positive note, in a year in which many of our

respondents criticized OEMs for charging for technical publications, Robinson earned particular praise for **keeping its tech pubs freely available**. So, we asked Robinson to explain the company’s philosophy in this respect.

“From a safety and reliability standpoint, Robinson believes maintenance manuals, pilot operating handbooks, safety notices, etc. should be freely available and readily accessible online,” he said. “This ensures that any mechanic or pilot, wherever they are located, has access to the latest information available whenever they need it. In addition, we employ a staff of highly knowledgeable customer service agents, technical representatives, and safety course instructors to provide assistance, answer questions, or clarify ambiguities.”



Mike Reyno Photo

TECH REP SPOTLIGHT

Sandra Aure

“Sandra is very responsive and always helpful. She goes above and beyond to ensure our needs are met.”

Mike Thrush

“Mike has a commitment to providing information and dependable service to his clients which allows companies to continue operation. He is one of the most professional and attentive reps in the industry!”

Honorable Mentions:

Lea Bass, Monica Campos, Pat Cox, Peter Hallqvist, Daniel Huesca, Frank Nieto

Sikorsky

After rebounding from a relatively poor showing in our survey in 2016, Sikorsky, now a Lockheed Martin company, appears to be holding more or less steady when it comes to customer support. This year, the company saw some slight decreases in its scores across many measures of customer satisfaction, but none of these declines were statistically significant. As in previous years, the **cost and availability of parts** remained the biggest concerns for our survey respondents, so we asked Sikorsky for an update on these issues.

"We appreciate our customers' feedback and continue focusing on reducing our operators' costs while at the same time improving their availability. We work hand-in-hand with our customers to accomplish this — from working collaboratively through Sikorsky's maintenance review steering groups, to having deployed field services representatives throughout the world who maintain daily, face-to-face relationships with our customers," Sikorsky said.

"We also work closely with our customers when it comes to data analytics, and we continue using big data to monitor, predict, and improve parts availability. To best serve our customers, Sikorsky is working with data to reduce the number of times parts need to be replaced and the turnaround time for repairs. We leverage the data to assess how frequently parts need to be replaced, how old they are, and how long they take to be replaced, as well as why they need to be replaced.

"With our advanced data analytics, we not only strive to keep our customers mission-ready, but we also are able to efficiently predict when and where a specific part will be needed, cutting down on the

time and cost required to operate an aircraft. The large amounts of data that we collect and analyze allow us to identify opportunities to forecast economic ordering quantities from our supply base and partner with them to create long-term agreements to drive costs lower."

According to Sikorsky, the company made changes to two of its forward stocking locations (FSLs) in the past year in order to bring parts closer to operators and maximize fleet availability. In June, the company relocated and expanded the Brazil-based FSL to Barra da Tijuca, where it now houses seven times the amount of inventory than at the previous Multiterminais location. Sikorsky said the turnaround time for receiving parts from this location has improved from 24 hours to two hours.

Meanwhile, in January, the company relocated its Australian FSL from Brisbane on the east coast to Perth on the west coast. Since then, Sikorsky said, it has increased stocking volumes in Perth by 30 percent and shipment volume by 50 percent.

With last year's sale of the S-300 line to Schweizer RSG, Sikorsky now produces only two commercial helicopter models: the S-92 and the S-76. At HAI Heli-Expo earlier this year, the company announced two upgrade options for the former: the S-92A+ and the S-92B. Our respondents are eager to see **improvements to the S-92**, especially when it comes to cockpit noise and vibration, which were major concerns for many of them this year. As one put it, "12 hours in an S-92 repeatedly will damage body and hearing."

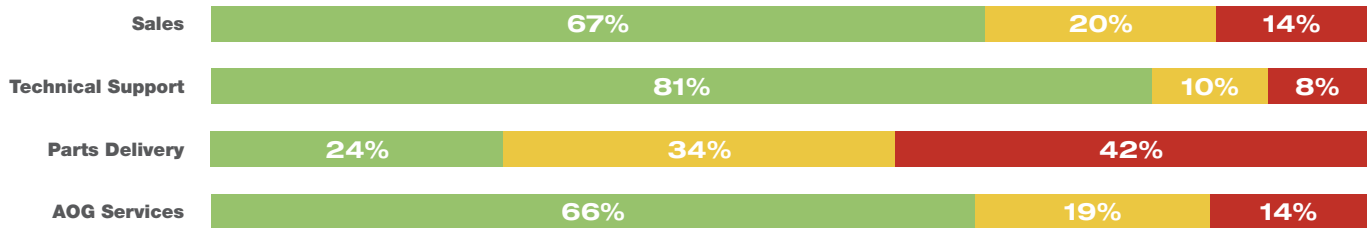
According to Sikorsky, both new variants of the S-92 will feature improvements focused on reducing noise and vibration in the

“Focus more on cockpit noise attenuation. Noise and vibration generates fatigue amongst the aircrew, which ultimately reduces the margin to error.”



ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

cockpit-side windows and clamshell door, as well as increasing comfort of the crew seats. "These changes, and others, to the S-92 helicopter will introduce new technology that is focused on reliability and capability, while at the same time delivering operating cost reduction," the company said, noting that the global S-92 fleet recently surpassed 1.5 million flight hours while averaging greater than 92 percent availability.

While Sikorsky and Lockheed Martin are clearly investing heavily in the future of the S-92, our respondents expressed some doubts about their commitment to the **future of the S-76**. One respondent complained, "The entire product support line for the S-76 has gone downhill in the last 10 years with very little more than empty promises of improvement."

In response, Sikorsky said it is proud of the S-76 helicopter's 40-year legacy and more than seven million hours of safe flight, and that it works to maintain an average day-to-day availability of 95 percent for the model. The company noted that it is adding Eagle Copters Ltd. as a Sikorsky Customer Support Center in Calgary, Alberta, adding to the growing network of 22 Sikorsky support centers worldwide.

"We also remain committed to continuous product improvement and continue to invest in this on the S-76. Recent examples include the improved reliability transformers for the remote data acquisition unit (RDAU) on the S-76C+/C++ models. The transformers will increase the RDAU's time on wing and reduce operating costs. Additionally,

we listened to our customers' feedback and have worked directly with operators to make improved and more reliable landing gear electrical harnesses available to all S-76 operators."

The company added, "In the near-term Sikorsky is working to produce further improvements for the S-76D, including a new exhaust made from high-strength material and systems to improve avionics performance during engine starts."

Finally, some respondents questioned **how much Lockheed Martin actually cares** about Sikorsky's commercial business, as opposed to its military programs. "Since LMCO has taken ownership of the company, it seems like the commercial helicopter group has become totally non-responsive and they have priced themselves out of the market for new aircraft," one respondent told us.

In response, Lockheed Martin highlighted its recent investments on the commercial side, including through the opening of a 24-hour, state-of-the-art Customer Care Center in Trumbull, Connecticut, and four forward stocking locations worldwide. "We have also increased the number of Sikorsky field service representatives and continue to authorize Sikorsky Customer Support Centers," the company said. "Lockheed Martin and Sikorsky remain committed to the commercial market; we continue to invest in areas of our business, including customer and aftermarket support, to keep the fleet flying and provide added value for our operators."



Lloyd Horgan Photo

TECH REP SPOTLIGHT

Mick Little

"Very responsive and accommodating!"

Kenji Okabe

"Excellent support, speed, and service quality. Everyone agrees."

Honorable Mentions:

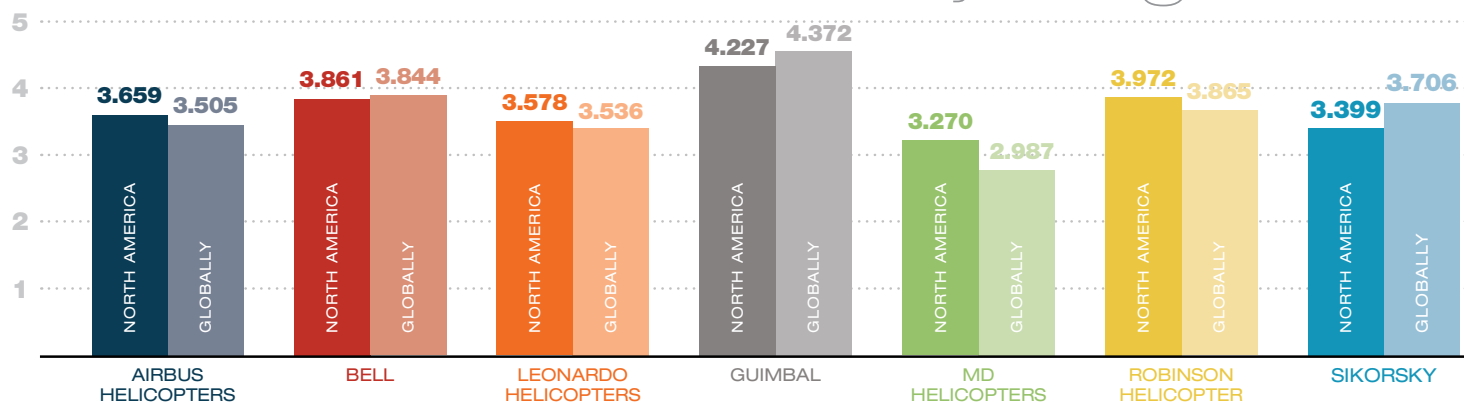
Megan Behan, Fernando Brandão, Vincent Bugge, Pete Cloukey, Gavin Coach, Ola Henning Dahl, Dolapo Odunayo, Justin Ferris, Stephen Goodall, Peter Hansen, Guilherme Lopes, Erin Marlor, Warren Matthews, David P. McConnell, Michael Petras, Pete Sack, Gary Tate, Carl Violette, Sean Whitman

All Mean Scores

		AIRBUS HELICOPTERS	BELL	LEONARDO HELICOPTERS	GUIMBAL	MD HELICOPTERS	ROBINSON HELICOPTER	SIKORSKY
COMMITMENT TO PRODUCT IMPROVEMENT	2018	3.69	3.66	3.20	4.44	2.76	3.86	3.68
	2019	3.72	3.71	3.65	4.39	2.91	3.66	3.50
PARTS AVAILABILITY	2018	3.31	3.67	2.59	3.94	2.58	4.32	3.09
	2019	3.25	3.71	3.04	4.26	2.78	4.09	2.93
COST OF PARTS	2018	2.57	3.06	2.42	3.63	2.36	3.64	2.81
	2019	2.62	3.04	2.76	3.74	2.49	3.75	2.71
WARRANTY FULFILLMENT	2018	3.52	3.84	3.15	4.25	3.27	3.82	3.71
	2019	3.55	3.91	3.71	4.54	3.18	3.68	3.77
SPEED OF SERVICE RESPONSE TIME	2018	3.49	3.87	2.73	4.20	2.96	3.99	3.54
	2019	3.41	3.83	3.26	4.46	2.81	3.96	3.46
RESPONSIVENESS OF SERVICE REPRESENTATIVES	2018	3.75	4.10	3.21	4.33	3.20	4.11	4.21
	2019	3.68	4.12	3.79	4.62	3.13	4.15	4.11
SATISFACTION WITH AUTHORIZED SERVICE CENTERS	2018	3.56	3.91	3.20	4.33	3.46	4.30	3.78
	2019	3.52	3.85	3.63	4.42	3.41	4.28	3.51
SATISFACTION WITH FACTORY-OWNED SERVICE CENTERS	2018	3.44	3.63	3.06	4.00	3.06	4.09	3.61
	2019	3.43	3.63	3.60	4.61	2.94	4.19	3.50
QUALITY OF TECHNICAL PUBLICATIONS	2018	3.42	4.18	3.39	4.00	3.27	4.07	3.81
	2019	3.73	4.11	3.80	4.15	3.41	4.01	3.73
QUALITY OF PILOT TRAINING PROVIDED	2018	3.89	4.35	3.69	4.56	3.63	4.33	4.19
	2019	3.96	4.18	4.08	4.45	3.71	4.31	4.05
QUALITY OF MAINTENANCE TRAINING PROVIDED	2018	3.94	4.25	3.63	3.85	3.57	4.29	3.98
	2019	4.04	4.14	3.97	4.21	3.57	4.25	4.12
OVERALL SERVICE SATISFACTION	2018	3.59	3.88	3.11	4.18	3.69	4.17	3.77
	2019	3.58	3.85	3.56	4.45	3.68	4.03	3.57
OVERALL AIRFRAME/ PRODUCT SATISFACTION	2018	3.81	4.02	3.30	4.33	2.99	4.13	3.96
	2019	3.90	4.01	3.68	4.47	2.98	3.93	3.83

ON A SCALE OF 1-5, WHERE 5 MEANS 'EXCELLENT' AND 1 MEANS 'POOR'

Overall Mean Scores by Region



ON A SCALE OF 1-5, WHERE 5 MEANS 'EXCELLENT' AND 1 MEANS 'POOR'
* DENOTES LOW SAMPLE SIZE

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GE Aviation

GE Aviation had an exceptional showing in our survey this year, **tying for first place** with our perennial leader, Pratt & Whitney Canada. GE ranked first in a number of measures, including “speed of service response time,” “quality of service and technical reps,” “communication,” “cost and value of hourly cost-guarantee program,” and “overall engine/product satisfaction.”

“GE Aviation is proud to partner with our valued customers and provide them with high-quality engines and systems that allow them to perform important missions,” the company told us. “Over the past 12 months, we have continued to invest in building out our engine monitoring capabilities for predictive maintenance, as well as expanding both our global field support and product support engineering teams as CT7-powered aircraft enter new regions.

“Our engineers, both in the field and at GE facilities, are in constant communication with our operators and are available to provide 24/7 support. At every available opportunity, the Customer Support/Product Support team attends operator conferences and symposiums such as Heli-Expo to have the opportunity to meet with and discuss concerns each commercial helicopter operators identifies. In addition, the Customer Support/Product Support engineering team schedules operator visits each year to discuss engine technical issues.”

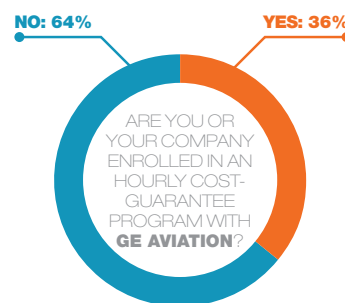
While our respondents were generally satisfied with GE’s **hourly programs**, some of them told us that the cost of those programs is “outrageous.” In response, GE noted that it recently launched its TrueChoice Flight Hour program, which “offers a range of options, from all-inclusive care to more self-managed programs, to allow our customers to maximize value for their needs. Furthermore, GE is consistently surveying our customer base to ensure our program and costs provide maximum value that is not only competitive but market-leading.”

Meanwhile, multiple respondents mentioned that they’d like to see some specific **improvements to technical manuals**, including improved documentation and updated borescope pictures, and better online search capabilities. GE told us that its Product Support team actively participates in the maintenance steering groups for each commercial helicopter platform, and issues publication change requests for engine manuals based on operators’ recommendations. Concurrently, it works with the Technical Publications team to bring the CT7 engine manuals up to the latest technical publication standard.

“The team has initiated the addition of engine hardware borescope photos, as well as including high-resolution photos when submitting requests for manual updates and has implemented search improvements within each engine platform manual. The GE team will work to continually improve the engine manuals based on operator recommendations,” the company told us.

Finally, given the growing number of **commercially operated Black Hawks**, we asked GE what interest it is seeing from these customers in upgrading to T700-701D engines.

“GE is pleased with the strong level of interest for T700-701D,” the company said, adding, “We are extremely proud to provide the effective maintenance-cost-per-hour support services for the Los Angeles Fire Department for well over 10 years; building upon that success, we will be servicing several other state and local agencies along the U.S. West Coast. GE is also evaluating and anticipates launching a similar TrueChoice Flight Hour program to support global T700 customers, to provide both products and services for each customer’s unique missions and needs.”



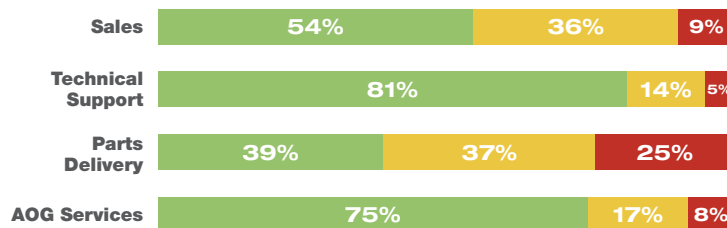
WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH GE AVIATION?



RATED ON A SCALE OF 1 - 5, WHERE 5 MEANS EXCELLENT AND 1 MEANS POOR

ACTION TIME OF MANUFACTURER

Within 2 days 3-7 days More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

TECH REP SPOTLIGHT

Andy Morris

“Always quick to acknowledge an issue, willing to help anytime, polite and friendly service.”

Honorable Mentions:

Craig Ackerman, Scott Shepherd, Jeff Simpson, Brent Vlasman, Gary Webber

Honeywell

Honeywell ranked last among engine OEMs in our survey last year, and finished in the same place this year. Although there were some minor year-over-year variations in its scores, none of these were statistically significant. Once again, most of our respondents evaluated Honeywell on its **legacy engines**, notably the T53 and LTS101, with only nine percent of Honeywell respondents claiming experience with its new-generation HTS900 engine.

We asked Honeywell for an overview of what the company has been focusing on in terms of customer support over the past 12 months. The company mentioned that it has improved functionality of its Direct Access Application, empowering customers to obtain required support faster. Additionally, Honeywell said it has incorporated commercial helicopters into more of its Regional Operator Conferences, making it easier for customers to meet and communicate directly with Honeywell. (The next such conference is scheduled for June 18 in Washington, D.C.)

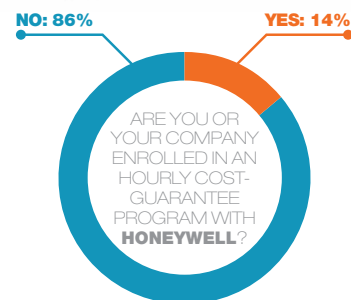
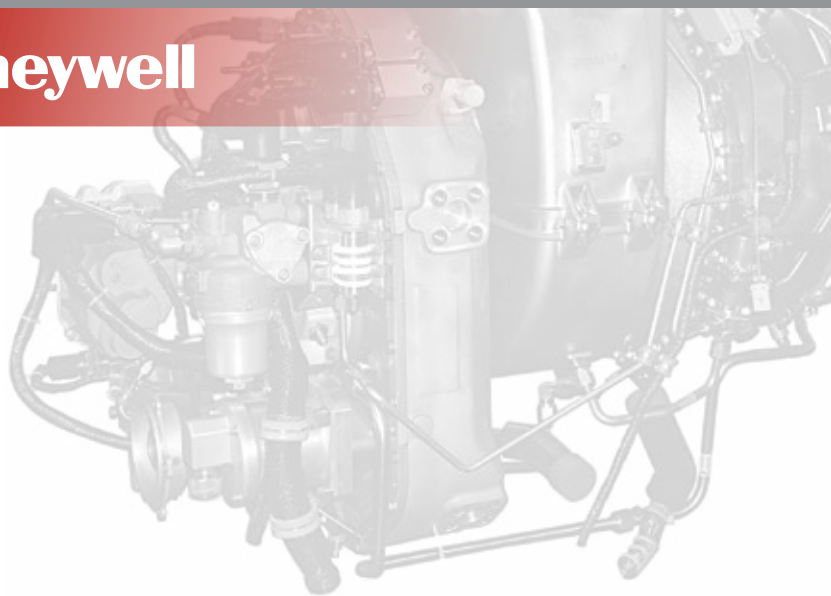
“**Cost of parts**” continues to be a weak point for the company. According to Honeywell, “commercial helicopter engines saw minimal price increases in 2019 across the product lines. Honeywell is conscious of market pricing and cost to operate, which is taken into consideration when developing our pricing catalog.”

This year, we also received numerous complaints related to Honeywell’s **tech pubs**. The company responded, “Honeywell’s MyAerospace.com roadmap includes a significant enhancement of the technical publications application, improving the customer’s experience in 2020. Honeywell has continued to transform the MyAerospace portal, with a focus on customer experience improvements through integrated search engines, technical knowledge accessibility, order interface, and reporting.”

Honeywell’s **HTS900 engine** is currently installed on the Eagle 407HP, and while there are currently fewer than 30 of these in operation, the engine is poised to achieve much greater market penetration once the Kopter SH09 is certified and begins deliveries. Although HTS900 operators accounted for relatively few of our respondents, they had some specific concerns related to the engine, and to what they perceived as a monopoly on HTS900 services by Utah-based Intermountain Turbine Services. As one respondent told us, “This needs to be changed. . . . There has to be more Honeywell-approved overhaul and repair facilities for the HTS900 than just one.”

Honeywell responded, “Intermountain Turbine Services was chosen as the launch service center for the HTS900 due to their capabilities, familiarity and experience with other Honeywell engines, commitment to customers, and strong ratings from operators. Honeywell will add additional service centers to the network as the fielded fleet grows. Service centers will be chosen based on their capabilities, financial strength, positive customer ratings, strong quality and safety practices, and ease of doing business with.”

With respect to the SH09, which will receive its initial certification from the European Aviation Safety Agency, Honeywell said it views the launch of the aircraft as the catalyst for more European service centers. “Honeywell continues to review regional fleet penetration and adjusts the support network to accommodate. As the fleet of Honeywell engines grow in Europe, we will ensure the capacity is available to support the fleet,” the company said.



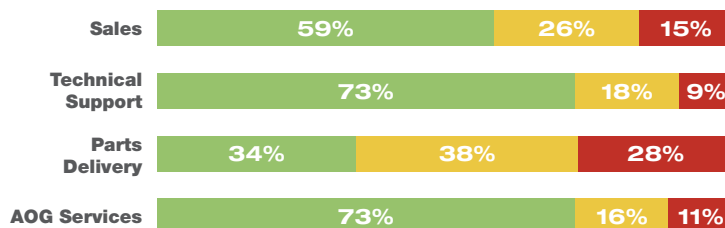
WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH HONEYWELL?



RATED ON A SCALE OF 1 - 5, WHERE 5 MEANS EXCELLENT AND 1 MEANS POOR

ACTION TIME OF MANUFACTURER

Within 2 days 3-7 days More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

TECH REP SPOTLIGHT

Lee Kirchhofer

“Extremely knowledgeable, always available, always understanding our issues, always helpful.”

Honorable Mentions:

Roger Gibbs, John Sanner

Lycoming Engines

Lycoming saw slight increases in its scores across most measures of our survey this year, although only its improvement in parts delivery times was statistically significant. We asked the only piston engine manufacturer in our survey to give us an update on what they've been focusing on over the past 12 months. The company told us it has been making enhancements to its 170+ year old facility; investing in new, advanced manufacturing equipment; and adding to its workforce.

"These investments are expanding our manufacturing capabilities, and we are enthusiastic about our continued efforts to modernize both our facility and manufacturing processes," Lycoming said. "Once we are at full capacity, our investment will help us provide a competitive and high-quality product on time to customers."

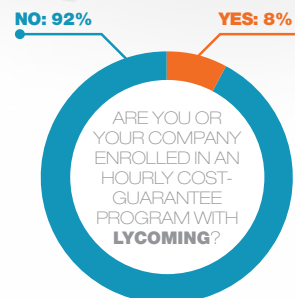
The company said it has also been focused on supporting customers' operating fleets of Lycoming-powered aircraft. "Airline growth and pilot retirement has driven significant demand on **flight training providers**. We recognize that those flight training businesses require a very specific level of support, and we have been working collaboratively with our fleet customers to assure that they have the engines and spares they need to support their high utilization operations," Lycoming stated.

The company said it has also extended **time between overhaul** (TBO) by 200 hours for a significant number of genuine Lycoming factory new, rebuilt, and overhauled engines. "In some cases, 400-hour TBO extensions can be approved," Lycoming noted. "The TBO extension may also apply to future field overhaul engines that meet requirements listed in Note 15 in Lycoming Service Instruction 1009. Lycoming's continual investment in the materials science research and development needed to increase the durability of genuine Lycoming engines and parts . . . has enabled some of these TBO extensions."

Some of our respondents wanted to see **shorter lead times** for new engines. The company responded, "Lycoming is currently experiencing higher than anticipated engine demand. This high demand has affected our lead times, which are currently longer than we would like them to be. Our Integrated Operations team has been working diligently to ensure parts availability and to reduce lead times. The team is working to decrease our backlog over the next two months, and to increase our daily engine build rates to get back to a normal engine backlog."

Finally, as in previous years, many respondents remain anxious to see Lycoming incorporate **new technology** into its helicopter engines. The company told us it has now achieved Federal Aviation Administration (FAA) and European Aviation Safety Agency certification for its advanced iE2 engine, "the first electronically controlled piston aircraft engine certified to assurance levels that allow its use on single- or multi-engine aircraft. Lycoming is open to partnering with helicopter manufacturers to provide this product to the rotorcraft market."

The company said it is also monitoring and evaluating retrofitable technology: "We have a good working relationship with the FAA and we continue to work directly with them to find solutions to bring reliable, safe, and technologically advanced products to market. While we do not have any specific products to announce at this time, Lycoming is continually working on technology enhancements and supports fuel research activities."

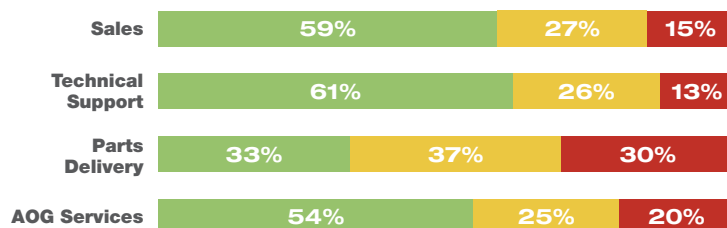


WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH LYCOMING?



ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

“They are building engines to order and it’s an automatic eight-week lead time. This should be reduced to four weeks in my opinion.”

Rolls-Royce

Rolls-Royce's scores in our survey this year were generally consistent with its scores in previous years, with one statistically significant drop in **"availability of parts and assets."** That reflects parts supply issues that for many of our respondents are an acute concern. Indeed, some of them resorted to all caps to reflect their frustration with the situation: "PARTS ARE NOT READILY AVAILABLE!! WE WERE DOWN FOR THREE MONTHS FOR A NORMAL COMPRESSOR INSPECTION BECAUSE WE COULD NOT GET WHEELS!!" Another respondent told us, "Availability and affordability of parts needs vast improvement. No. 3 wheels are not available currently. Costs are going up and there is no relief in sight. This is getting spooky."

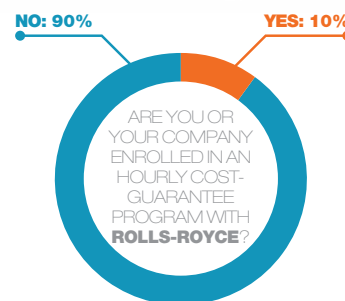
In response to these concerns, the company told us, "Rolls-Royce is aware of the current disruptions being experienced by our valued customers due to shortages of M250/RR300 spare parts. As you may know, we are experiencing unprecedented demand for spare parts due to the strong recovery of the helicopter market. This recovery, coupled with the overall pressures on the global aerospace supply chain, has resulted in capacity issues within the broader aerospace supply chain community."

"Rolls-Royce supply chain commodity specialists are evaluating the impacted M250/RR300 components and are actively tracking them on a day-to-day basis in order to increase the availability of these components as quickly as possible. We continue to execute on our recovery plan and are in regular discussions with our exclusive service parts distributor, Aviall."

Speaking of **Aviall**, we received a number of complaints this year about Aviall's customer service and slow response times. One respondent commented, "[Rolls-Royce] needs to take control of their own parts. Having Aviall handle them is a very stupid idea. Had a warranty issue that took over five months to handle." When we asked Rolls-Royce to address these complaints, the company told us, "The Rolls-Royce FIRST (Fully Integrated Rolls-Royce Support Team) network is the authorized global support network for operators of M250 and RR300 engines, providing affordable, reliable support solutions."

"The FIRST network includes more than 30 approved, licensed service centers and Aviall locations around the world, and its competitive structure means operators can find affordable and reliable service anywhere for Rolls-Royce M250 or RR300 engines. Aviall Inc. (a Boeing company) is a key part of the FIRST network and is the global authorized distributor for Rolls-Royce M250/RR300 engines, parts, modules, and tooling. Rolls-Royce and Aviall work closely together to optimize service solutions for customers."

We also received some specific complaints regarding both the content and format of **technical publications**, which we shared with Rolls-Royce. The company responded, "Thank you for the feedback and we will pass this on to our web team to address. We are constantly seeking improvements and appreciate the comments."



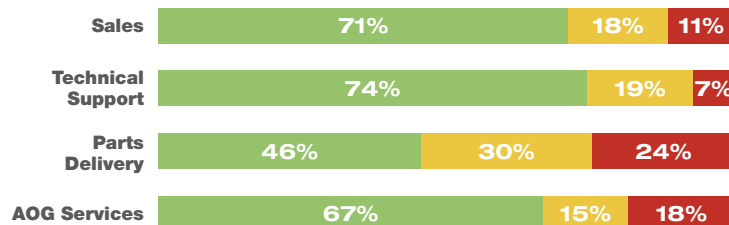
WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH ROLLS-ROYCE?



RATED ON A SCALE OF 1 - 5, WHERE 5 MEANS EXCELLENT AND 1 MEANS POOR

ACTION TIME OF MANUFACTURER

Within 2 days 3-7 days More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

TECH REP SPOTLIGHT

Simon Kemp

"Very fast, very friendly, very helpful."

Honorable Mentions:

Greg Houston, Marcos Matos



Pratt & Whitney Canada

Pratt & Whitney Canada (P&WC) has dominated our Helicopter Engine Survey since we launched it in 2016, and while this year the company shared top honors with GE Aviation, that was due to gains by GE, rather than any slips by P&WC. Indeed, P&WC's scores across almost all measures of customer satisfaction were higher this year than they were in 2018, although none of these improvements were statistically significant.

"We work every day to deliver cost-effective solutions throughout the life cycle of the helicopter," P&WC stated. "We're always listening to our customers to better understand their needs so that we can deliver the best engine performance, reliability, and durability as well as world-class service and support."

Over the past 12 months, the company told us, it has been focused on **growing its global service network** and **improving its service offerings** to better meet the needs of customers. To this end, it launched three new service offerings at HAI Heli-Expo 2019. First, P&WC has extended its Certified Pre-Owned (CPO) program from a one-year, 500-hour warranty to a two-year, 500-hour warranty. "Sellers of used helicopters could benefit from a more attractive asset and buyers could benefit from a credit toward an Eagle Service Plan (ESP)," the company noted.

P&WC has also improved its Fleet Service Plan (FSP) pay-per-hour maintenance program to meet the needs of customers with fleets of two to five helicopters. The revised program includes three optional packages for parts coverage, rental engines, and life-limited parts. And, it has introduced an ESP New Engine Option (NEO), allowing ESP customers of certain engine models, for a limited time, to apply their ESP contributions toward a new engine instead of an overhaul.

"In the past 12 months we've added helicopter engine capabilities through Helipark in São Paulo and COHC in Shenzhen," the company added. "We'll be continuing to grow this network of facilities and capabilities, with more news to come in 2019."

P&WC's impressive performance in our survey notwithstanding, our respondents had some suggestions for continued improvements. A number of them called out the **cost and availability of tooling**, with one telling us, "special tools are expensive and lead time is so long." In response, P&WC said, "We are constantly reviewing and strengthening our network and services. We provide customers with several choices through a large tooling supplier base, as well as through our mobile repair teams (MRTs), MRO satellite facilities, designated overhaul facilities, and designated maintenance facilities around the world who have invested in tooling."

We also heard some complaints related to P&WC's **online technical publications**, which were also a sore point for many of our respondents in 2018. Last year, P&WC said that according to its internal surveys, 79 percent of the portal's 20,000 registered users were satisfied with it. As of the fourth quarter of 2018, that satisfaction score had increased to 88 percent, the company told us.

"We are always focused on improving and driving value for our customers. In early 2019, we have made improvements to the online publications content structure and navigation, the visual rendering and the offline feature. In the second half of 2019, we are committed to enhancing the search functionality. A centrally located window

will also provide users with an aggregated view of their document library, reducing the amount of steps required to reach the intended document," P&WC said.

“

"Every person I have worked with or even spoken with at Pratt & Whitney [has been] very committed to the company. I feel Pratt & Whitney has not only an amazing culture in the company for their product but customer service as well."

”

Other respondents wanted to see **more options for overhauls and hot section inspections** (HSIs). According to P&WC, "As we've worked to make our engines smarter, we've been able to move from maintenance that is regularly scheduled to maintenance that's more proactive and as-needed, or what we call 'on-condition.' For example, our PW200 engines enjoy on-condition HSI, and an increasing number of our customers reach overhaul without requiring HSI. These actions result in fewer maintenance needs.

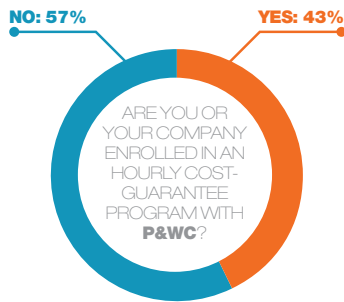
"When maintenance is required, customers are able to choose between owned and designated facilities for their engine overhaul and HSI needs. We have established a large network of designated overhaul facilities that complement our owned facilities in supporting our customers around the world with a cost structure that's right for them. We continue to expand our suite of maintenance programs and solutions and encourage our customers to work with their sales and field support representative (FSR) to customize a solution to their specific needs."

Speaking of those FSRs, while our respondents were very appreciative of P&WC's tech reps, several commented that the company seems understaffed on this front. So, we asked P&WC whether it plans to **hire more tech reps** in the near future.

"We're constantly evaluating the size and capabilities of our global service network and global support team, including our sales team, customer managers, FSRs, and MRTs, which we've recently been growing across several regions of the world," the company told us.

"All of our customers continue to have access to our Customer First (CFirst) Center, which is open 24 hours a day, 365 days a year, staffed from Montreal and Singapore. We have also been increasing the reach and capability of our support team by deploying tools like Onsite by Librestream, which allows customers to use their mobile device to connect with us and resolve issues on the spot."





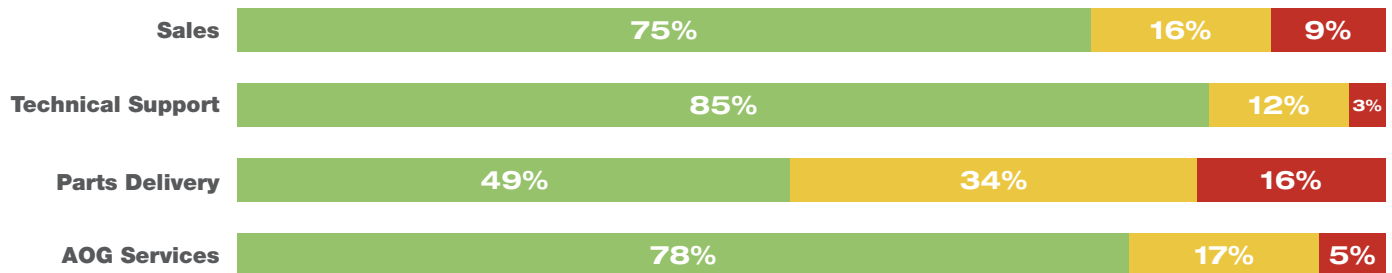
WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH P&WC?



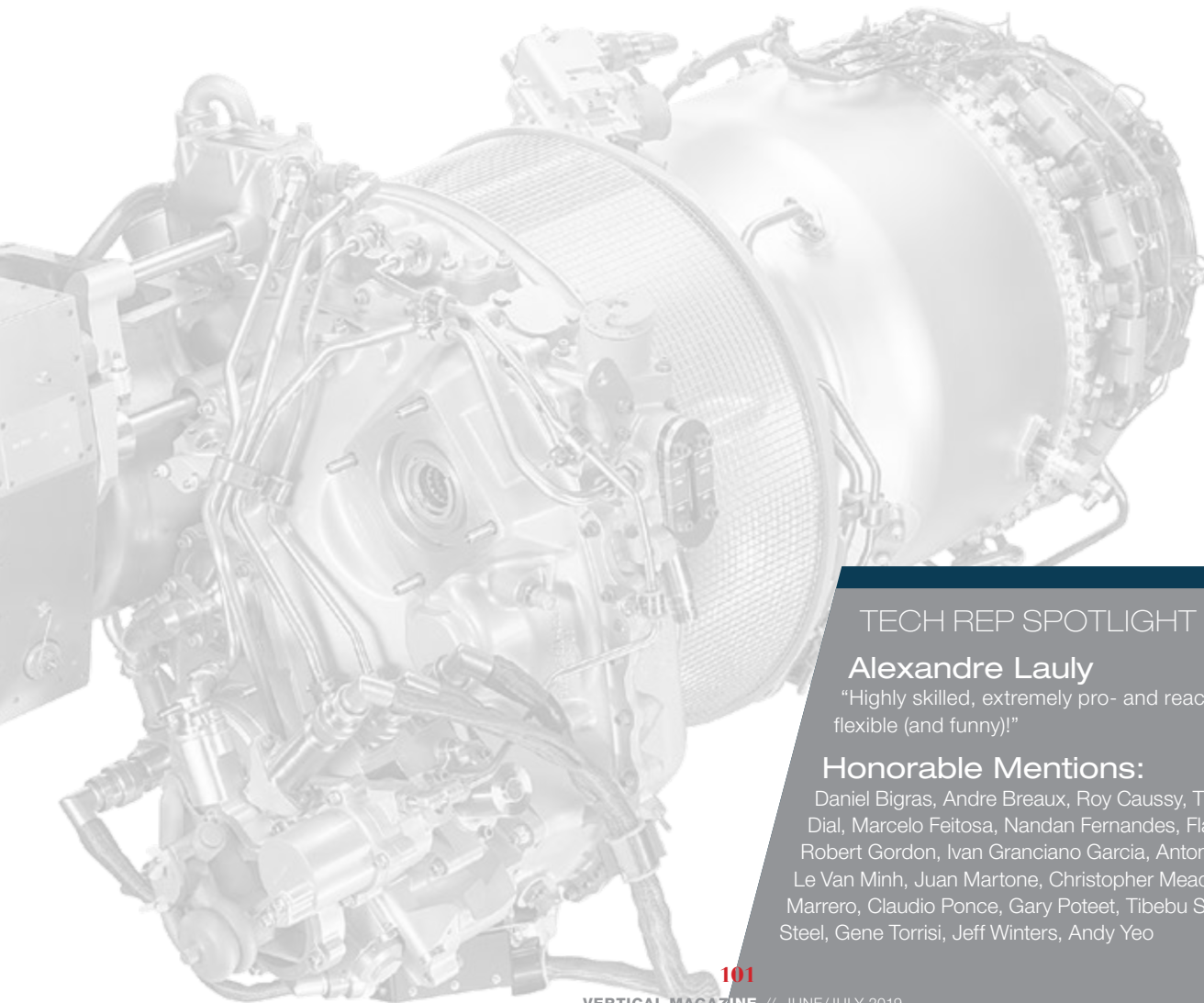
RATED ON A SCALE OF 1 - 5, WHERE 5 MEANS EXCELLENT AND 1 MEANS POOR

ACTION TIME OF MANUFACTURER

■ Within 2 days ■ 3-7 days ■ More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.



TECH REP SPOTLIGHT

Alexandre Lauly

"Highly skilled, extremely pro- and reactive, very flexible (and funny)!"

Honorable Mentions:

Daniel Bigras, Andre Breaux, Roy Caussy, Tim Clarke, Scott Dial, Marcelo Feitosa, Nandan Fernandes, Flavio Gomes, Robert Gordon, Ivan Granciano Garcia, Antonello Greco, Ivan Le Van Minh, Juan Martone, Christopher Meadows, Victor Marrero, Claudio Ponce, Gary Poteet, Tibebe Sileshi, Rob Steel, Gene Torrisi, Jeff Winters, Andy Yeo

Safran Helicopter Engines

Safran did well in our survey last year, and remains not far behind our leaders of GE Aviation and Pratt & Whitney Canada. This year, it ranked first among OEMs with respect to “quality of training provided” as well as “quality of technical publications” and “website functionality and ease of use,” categories in which it chalked up statistically significant improvements. Safran also saw a significant improvement in “cost of parts,” although that remains the company’s weakest measure.

“Over the last 12 months, Safran Helicopter Engines has focused our efforts on enabling our customers to gain in competitiveness,” the company told us. “It is done by bringing more added value to our customers through our services, to ease their lives and operations, and by improving our products.”

With respect to **product improvement**, Safran noted that it recently made a joint announcement with Airbus regarding a 25 percent increase in time between overhaul (TBO) of the free wheel shaft to 5,000 hours, now aligned with the Arriel 2D engine TBO. In addition to this, a new three-year/2,000-hour warranty policy was also implemented. On Arriel and Arrius 2 engines, Safran removed a calendar limitation previously requiring an engine inspection at a repair center every 15 years.

“Another important topic for our customers in terms of competitiveness is the engine accessories,” Safran told us. “A global action plan to improve the reliability and repairability of specific engine accessories has been launched. In collaboration with customers around the world, especially in our ‘Customer Councils,’ this action plan has been developed and is now being implemented on a number of accessories.”

As two examples of actions taken so far, Safran said it has introduced new intermediate repair schemes on several accessories such as bleed valves, and design or maintenance improvements on accessories such as magnetic seals.

To reduce its customers’ administrative workload, Safran told us it has also been taking action to **improve and reduce paperwork**. For example, the engine logbook now includes a new document, “ENR1808,” that customers can refer to at a glance for a clear, complete status of the airworthiness and configuration of their engines when delivered to them. Safran said it has also reworked and standardized its technical reports and quotes “to bring clarity and transparency to our customers on the reason and level of repair to be performed.”

The company has also been working to improve the quality of its technical documentation. To help customers use the new Web-IETP (Interactive Electronic Technical Publications) to its full potential, Safran organized a series of webinars with its technical publication experts, and more such webinars are planned throughout 2019.

Additionally, Safran continues to enhance its **health monitoring service**, which is now compatible with Airbus Helicopters’ onboard data management system installed on H145 and H225 helicopters. “The aim is to collect the engine data natively stored by the onboard system and facilitate the analysis for the customers and our technical experts,” Safran

explained, noting that more than 400 customers subscribe to the service, covering more than 2,700 engines worldwide.

This year, a number of respondents mentioned that they’d like to see Safran **open the market for repairs and overhauls** as a way of keeping costs and turnaround times reasonable. Safran told us that it is happy to consider proposals for MRO services from third parties, although “it is important to note that Safran Helicopter Engines does not receive many requests, probably due to the limited size of the helicopter market and the huge investment the buy-in represents, preventing new players from launching such projects.

“Nevertheless, we have heard our customers request to have more options in the market, particularly for accessories,” Safran continued. “This is a topic that we are addressing with our North American Customer Council. A project is being launched to identify new sources of repair while keeping in mind the vital need to keep the traceability and return on experience in order to comply with highest Safran standards in terms of safety, quality, and reliability.”

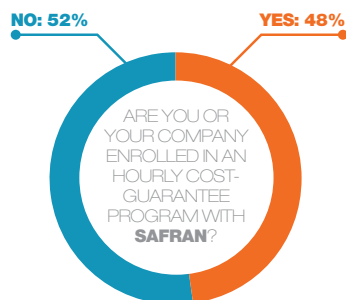
The company added that it has largely expanded its network of Certified Maintenance Centers and Certified Distribution Centers, which now number more than 40 around the globe. Safran also said it is committed to reducing customers’ costs through continuous improvements of repair processes, and to helping them manage cash flows through its wide range of SBH hourly programs. “The recently developed Ready2Fly option also helps customers enroll in a SBH program through specific buy-in conditions that can avoid a costly entry ticket,” Safran noted.

With respect to **turnaround times**, the company said, “After a great improvement over the previous years, we have seen a degradation of the performance since 2018 due to supply chain difficulties. Despite a rather flat helicopter market, Safran Helicopter Engines succeeded in increasing market share, thus rapidly increasing its production demand after a three-year period where the demand drastically decreased (mainly due to the offshore market crisis). In the same time the commercial aviation has grown a lot, creating tensions on all suppliers of the industry.”

As a consequence of this demand, Safran said, it has experienced supply chain difficulties, but is now actively working on strengthening its supply chain, gaining in efficiency, and increasing capacity. “Multi-million euro investments on state-of-the-art machines have been made to gain in production cycles of major parts such as turbine blades,” the company told us.

“Safran has also invested in its largest Repair Center based in Tarnos, France, to modernize the plant and the industrial MRO capabilities. With brand-new industrial means and a streamlined organization, we believe that this new facility will help us to further improve turnaround times. Finally, tens of people have been recently recruited and assigned to part production and MRO activities.”





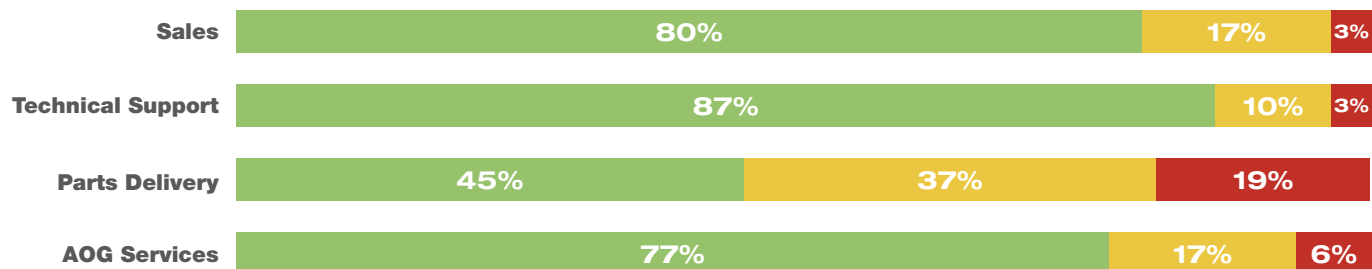
WHAT IS THE COST AND VALUE OF THIS PROGRAM WITH **SAFRAN**?



RATED ON A SCALE OF 1 - 5, WHERE 5 MEANS EXCELLENT AND 1 MEANS POOR

ACTION TIME OF MANUFACTURER

Within 2 days 3-7 days More than 7 days



TOTALS MAY NOT EQUAL 100 PERCENT DUE TO ROUNDING ERRORS.

“Safran needs to open the market somewhat, in particular for accessories. Operators need a choice and better service with direct access to shops.”

TECH REP SPOTLIGHT

Rich Fullmer

“Rich has replied within 24 hours, if not only a few hours, whenever I have had a question . . . and has provided nothing but outstanding assistance and knowledge.”

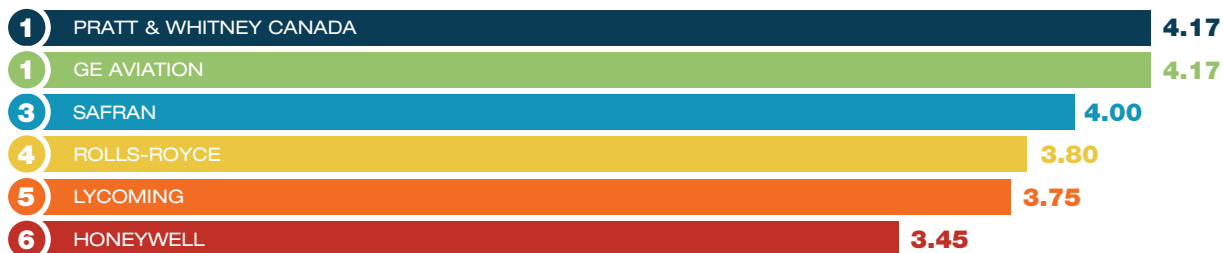
Alan Dillemath

“Always goes above our expectations to help us when called. He will call us out of the blue just to check in and ask how things are going.”

Honorable Mentions:

Wei Wen Boo, Mark Brannon, Joe Braz, Pierre Cohere, Philippe Dardinier, Lionel Duprat, Christian Gabriel, Juan Carlos Lopez Galicia, Jason Mitchell, Raj Naggyah, Arioaldo Silva, Robert Snow, Suresh Subramaniam, Marcos Zanon

Overall Ranking



All Mean Scores

		GE AVIATION	HONEYWELL	LYCOMING ENGINES	PRATT & WHITNEY CANADA	ROLLS-ROYCE	SAFRAN HELICOPTER ENGINES
COMMITMENT TO PRODUCT IMPROVEMENT	2018	4.00	3.00	3.13	3.99	3.37	3.94
	2019	4.01	3.25	3.23	4.09	3.37	3.95
AVAILABILITY OF PARTS AND ASSETS	2018	3.83	3.04	3.84	3.95	3.75	3.66
	2019	3.67	3.18	3.75	3.95	3.51	3.79
COST OF PARTS	2018	3.23	2.57	3.20	3.20	2.98	2.80
	2019	3.10	2.61	3.23	3.33	3.06	2.90
WARRANTY FULFILLMENT	2018	4.02	3.22	3.30	3.88	3.46	3.75
	2019	3.90	3.34	3.48	4.07	3.54	3.80
SPEED OF SERVICE RESPONSE TIME	2018	3.87	3.24	3.43	3.88	3.56	3.90
	2019	3.97	3.16	3.46	3.97	3.50	3.86
QUALITY OF SERVICE AND TECHNICAL REPS	2018	4.12	3.65	3.50	4.06	3.87	4.21
	2019	4.29	3.58	3.57	4.14	3.85	4.16
COMMUNICATION	2018	3.94	3.21	3.26	3.89	3.56	3.99
	2019	4.09	3.16	3.47	4.01	3.56	3.69
AOG SERVICE	2018	4.05	3.41	3.39	4.03	3.75	3.97
	2019	3.93	3.39	3.56	4.10	3.60	3.99
SATISFACTION WITH AUTHORIZED SERVICE CENTERS	2018	3.93	3.73	3.62	4.02	3.93	3.87
	2019	3.96	3.65	3.86	4.09	3.92	3.95
SATISFACTION WITH FACTORY-OWNED SERVICE CENTERS	2018	3.92	3.20	3.38	3.89	3.65	3.75
	2019	3.86	2.89	3.72	4.10	3.74	3.87
COST AND VALUE OF HOURLY COST GUARANTEE PROGRAM	2018	N/A	N/A	N/A	N/A	N/A	N/A
	2019	3.89	2.86	3.62	3.84	3.51	3.56
QUALITY OF TECHNICAL PUBLICATIONS	2018	3.80	3.27	3.50	3.85	3.71	3.90
	2019	3.83	3.18	3.54	3.96	3.80	3.97
WEBSITE FUNCTIONALITY AND EASE OF USE	2018	3.60	2.82	3.35	3.52	3.33	3.69
	2019	3.62	2.87	3.53	3.70	3.42	3.86
QUALITY OF TRAINING PROVIDED	2018	4.02	3.50	3.49	4.04	3.91	4.07
	2019	4.04	3.46	3.71	4.10	4.03	4.13
OVERALL SERVICE SATISFACTION	2018	3.83	3.27	3.43	3.99	3.66	3.94
	2019	4.00	3.23	3.60	4.07	3.74	3.92
OVERALL ENGINE/ PRODUCT SATISFACTION	2018	4.24	3.64	3.73	4.26	3.82	4.07
	2019	4.33	3.67	3.89	4.26	3.86	4.07

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Methodology

Our combined 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. That analysis also included significance tests to determine which mean score differences between our 2019 and previous surveys were statistically significant.

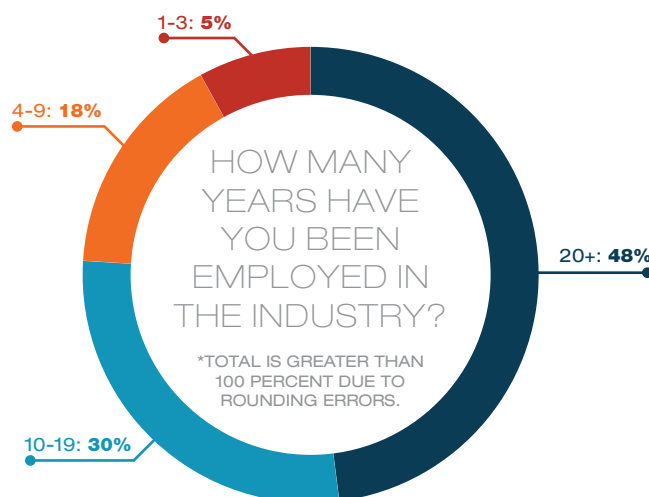
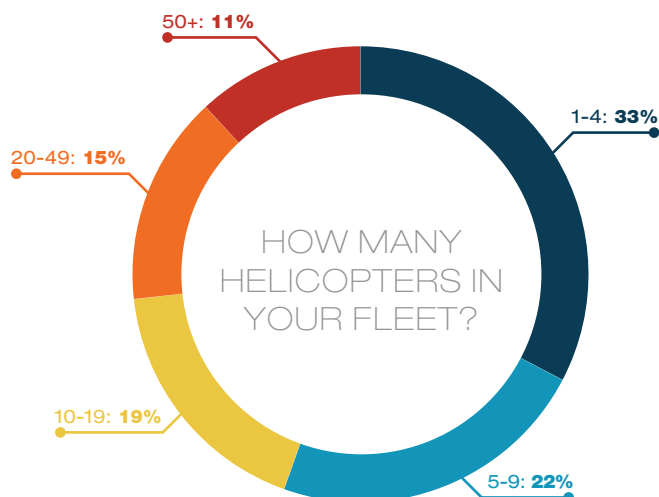
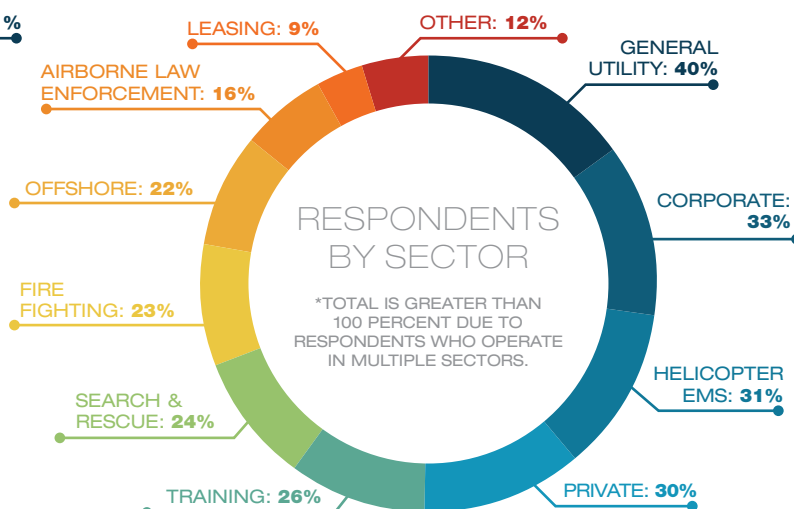
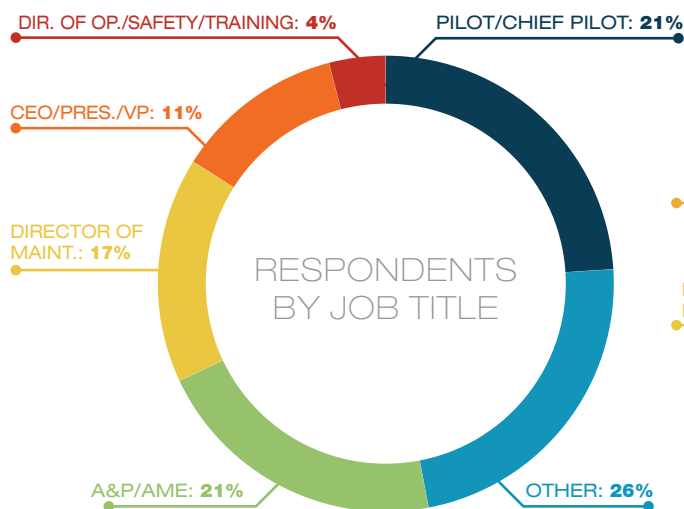
We distributed the survey link via email to subscribers on our *Vertical Daily News* email list, and to customers on mailing lists provided by helicopter OEMs. We also promoted the survey through advertisements on our website and in *Vertical Daily News*; and through promotion on Facebook, Twitter, LinkedIn, 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 cross-referenced 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 from April 2 to 23, 2019. A total of 984 respondents participated in the survey, with 941 respondents completing the airframe survey, and 752 respondents completing the engine survey. To qualify for ranking in our survey, an airframe OEM required a minimum of 50 evaluations, while an engine OEM required a minimum of 45 evaluations. 📈



NOTE: DEMOGRAPHIC INFO IS FOR AIRFRAME SURVEY RESPONDENTS. ENGINE SURVEY DEMOGRAPHICS WERE SIMILAR.



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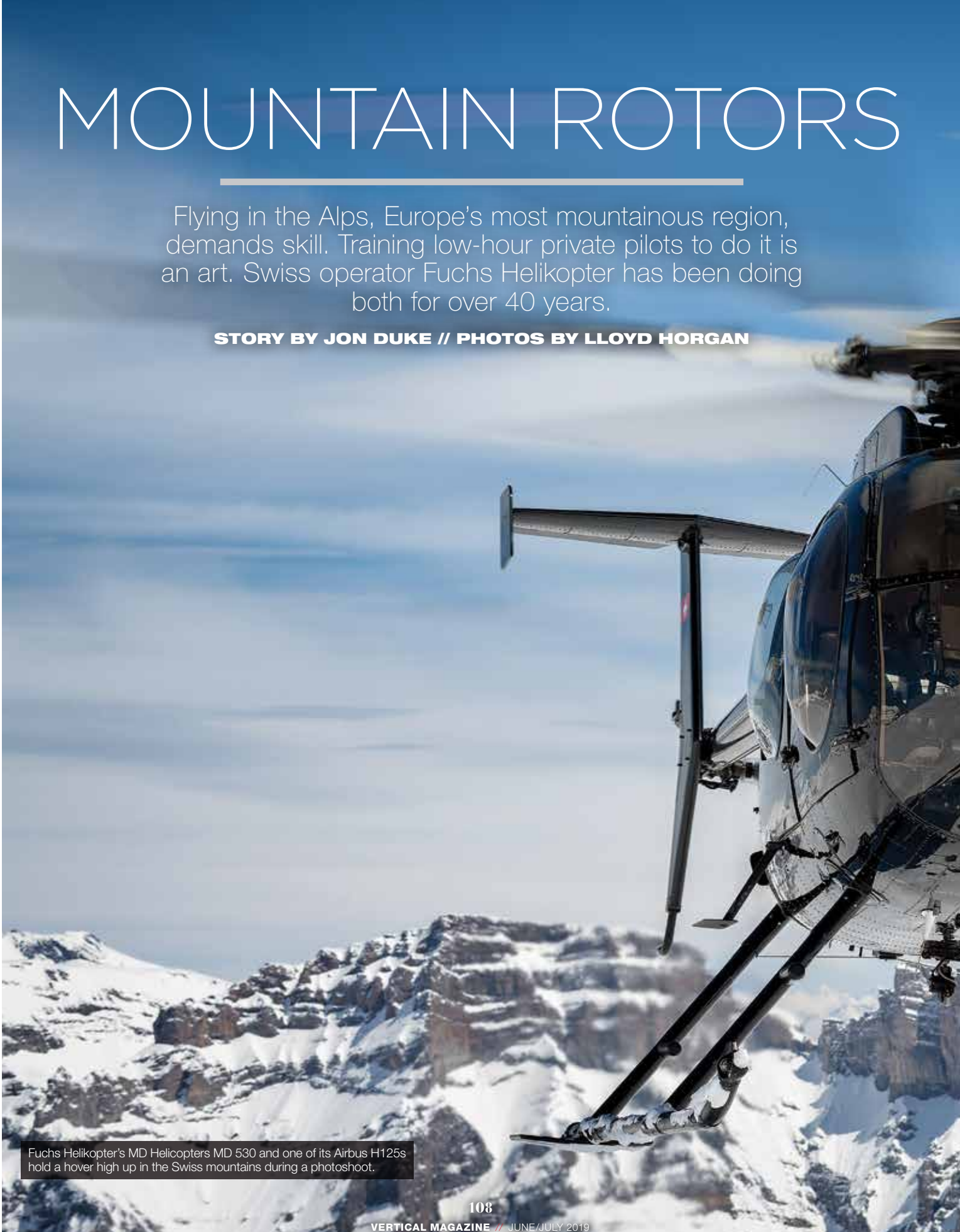
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MOUNTAIN ROTORS

Flying in the Alps, Europe's most mountainous region, demands skill. Training low-hour private pilots to do it is an art. Swiss operator Fuchs Helikopter has been doing both for over 40 years.

STORY BY JON DUKE // PHOTOS BY LLOYD HORGAN



Fuchs Helikopter's MD Helicopters MD 530 and one of its Airbus H125s hold a hover high up in the Swiss mountains during a photoshoot.



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On the top of an Alpine peak at just under 11,000 feet (3,300 meters), it is cold, calm and quiet; apparently a paradise for bird-watchers. This is until the arrival of a Fuchs Helikopter Robinson R66, announced by a cloud of recirculating snow and the whine and clatter of a turbine-driven teetering rotor. You might not expect to find such a helicopter up to its belly in snow on top of a Swiss glacier, but it's more common than you'd think. What is unusual is that this isn't a commercial pilot delivering a load, or the rescue of a stranded hiker. It's a routine training flight for a private pilot.

High terrain poses myriad hazards to aviation and it requires experience and training to operate an aircraft there safely. These factors alone deter the majority of PPL (Private Pilot License) holders. However, given that most recreation in Switzerland happens in the mountains, that is where anybody with the means to fly a helicopter for fun is likely to want to go.

The majority of the Swiss population lives on a relatively narrow plateau sandwiched between the rocky walls of the Jura mountains in the north of the country and the jagged peaks of the Alps that dominate the south. A 20-minute flight in any direction from any part of the country will likely require a mountain transit. For this reason, the Swiss government has designed a specific

mountain flying qualification (known as an MOU extension). "In Switzerland, if you want to be a professional pilot, it's pretty much a necessity to have [the MOU extension]," explained Philippe Gaillet, a pilot and dispatcher at Fuchs Helikopter.

The company's founder, Robert Fuchs, began his helicopter operation in 1974 at his factory in Schindellegi, not far from Zürich. In the same year he set up a flight school there as a means to make the aircraft profitable, but training is not the only thing the company does.

"We started with the flight school," said Robert Stokmaier, Robert's grandson and now CEO of Fuchs Helikopter. "Everything was built up by 1974 and the helipad at the factory was approved. We had the MD 500, then a [Schweizer] 300 and in the '80s we started the utility work. At that time the utility work was not how we do things now. Everything was directly hooked in to the helicopter. It wasn't so safety-focused, as the industry was still learning how to do it."

Since owning the first MD 500 in Switzerland, Fuchs has owned over 120 other aircraft, becoming a distributor and reseller for MD Helicopters and Schweizer in the process.

"Between [the] '90s and 2000s, we were mainly using the 500 series for utility, and after 1994 we went into aerial filming," said Stokmaier.

 **VIEW MORE
PHOTOS**

An MD 530 breaks away from a landing pad at a mountain lodge.

Despite the increasing use of unmanned systems, this continues to provide a steady stream of work for the company.

The addition of Airbus H125 AStars to the company's fleet presented an opportunity to corner the utility market. "There was not that much work for our first AStar, so it was rented and operated quite a lot by another operator," said Stokmaier. "But our location really suits that role, as there is nothing close by to get to Zurich by helicopter. When we bought our second AStar in 2016, we started doing sling jobs with it straight away."

In 2017, one of Fuchs Helikopter's H125s was equipped with the Swiss Rotor Solutions Maximum Pilot View Kit. Installation involves cutting parts of the aircraft to fit a much larger floor window and bubble door window. This dramatically improves the pilot's vertical visibility. "We knew the guy who designed the kit," Stokmaier said. "It really increases [the] safety margin on long line [operations], as the visibility of the load is far better."

Despite an increasing focus on utility operations, training has not been neglected. When the European Aviation Safety Agency (EASA) certified the R66 in 2014, Fuchs went to great lengths to ensure its was ahead of the curve.

"We found an R66 that was N-registered in the Czech Republic, and we wanted to have the first one in Switzerland," said Stokmaier. "We had it inspected there, drew up a contract and flew it back to Switzerland. It has a small turbine but it's a good high-altitude performer because of the big blades. If it's windy, we fill it with fuel to increase the weight as it's a bit light."

The latest fleet member is a Bell 505 Jet Ranger X, which was delivered in 2018. "We wanted a more comfortable aircraft than [the] R66, and the 505 is a little more roomy inside," Stokmaier said, explaining that it was currently limited to charter and training, but had the potential for utility work in the future. A cargo hook for

Philippe Gaillet (left) and Robert Stokmaier (right) in the MD 530 during a mountain flight.



Since owning the first MD 500 in Switzerland, Fuchs has owned over 120 other aircraft, becoming a distributor and reseller for MD Helicopters and Schweizer in the process.

The company took delivery of its Bell 505 Jet Ranger X in 2018, pictured here over Lake Zurich on a calm May morning.





The ground crew pushes out an H125 from the hangar. This aircraft has the Maximum Pilot View Kit installed. Fuchs plans to eventually have another fitted with it as well.



Derrick Cross performs maintenance on a Schweizer 300.

the 505 is yet to be certified by EASA, and other utility equipment such as baskets, which are widely available for other types, do not yet exist for the aircraft. "But it's a good aircraft," said Stokmaier. "These things will come."

SAFETY AS A CORNERSTONE

Jonathan Brandt, the company's chief pilot and chief instructor, has been at Fuchs for over 13 years. He was employed specifically to grow the flight school element of the business, and his success in doing so is evident from the pace of business.



But aside from commercial success, Brandt said that setting a safe and professional culture was what he was most proud of. "One of the most crucial things is to be a good example for everybody," he said. "People will copy role models, and act the same way."

While the site at Fuchs Helikopter has always conducted training, it is not a large airfield, and is located next to a factory surrounded by vertical obstructions. Despite this, its safety record is admirable.

"Since I started as chief pilot here we haven't lost a single helicopter," said Brandt. "And this place is maybe one of the most challenging airfields that a PPL pilot will fly to."

Most of Brandt's work — aside from the administration necessary to fulfill his various safety roles — is the mountain flying training necessary to qualify pilots for their MOU extension. While he has been flying in this locale almost his whole career, he initially found instructing in the mountains a challenge, as the mandated training was not always so rigorous.

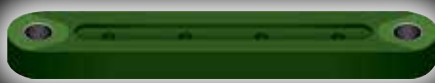
"A mountain qualification has always been a requirement in Switzerland," he explained. "But it used to be a lot less extensive than today. As a result, I didn't have the skillset necessary to teach the

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Jonathan Brandt in the right seat of the Bell 505 Jet Ranger X. Brandt is the company's chief pilot and chief instructor, and has been at Fuchs for over 13 years.

current syllabus when I came back to instruct the qualification, and I really had to go back to scratch and learn the basics.”

The current MOU syllabus is comprehensive, and governed by the Swiss aviation authorities. Applicants must fly 200 mountain landings, of which at least 150 have to be on “official mountain landing sites” — and there are 42 of these in the country. Most are on glaciers at high altitude, but some are lower down. At least 50 of these total landings must be at altitudes greater than 3,600 feet (1,100 meters). Once qualified, a pilot must carry out at least 50 mountain landings per year to remain current.

“It used to be only 12 landings, but there were a lot of accidents purely because people didn’t have the necessary recent experience, and suffered skill-fade,” Brandt said.

Taking relatively inexperienced recreational pilots from a complex landing site into a high-workload mountain environment presents obvious risks. Brandt explained that the main mitigation for this doesn’t necessarily lie in complex analysis or mathematics, but more a human touch.

“Accidents happen. They don’t have to happen, but they do,” he said. “There is always a probability of an accident and it is your actions that will decide whether it happens or not. So, when I hear the guys discussing risk factors and using the same language, I feel like I’ve done a good job.”

Arno Parli and Philippe Gaillet are both products of this approach to training. Parli came to Fuchs in 2019 following his military service, specifically with a view to fulfill an ambition to fly utility roles.

Having already qualified as a commercial pilot, he has experience flying in the U.S. and the U.K. He currently flies taxi and sightseeing flights while conducting the flight instructor course.

Gaillet completed his PPL training with Fuchs Helikopter in 2016, and qualified as a commercial pilot 18 months later while working in clerical jobs at the company. He is also cutting his teeth flying tourist and taxi flights. Following in his colleague’s path, his next step is to qualify as a flight instructor. He also works as a flight assistant, helping utility operations from the ground. Three years’ experience in this job is a pre-requisite to flying sling loads for Fuchs.

Parli has spent eight years as a flight assistant, including a spell as the chief flight assistant at another company. He is mindful of the need to have the necessary skills before moving into sling-load work. “Maybe I can start with sling loads next year, but it depends on how much experience I can gain,” he said. “One of the most important things that you learn as a flight assistant before going into the cockpit is an understanding of what’s happening on the ground underneath the helicopter.”

Having spent a significant amount of time as the person on the ground, Parli has seen the hazards first-hand. “The weather can be foggy and there are a lot of obstructions, particularly where we do our utility flying,” he said. “The cables are the main risk that we encounter every day.”

Mitigating the risk of collision with vertical obstructions is a perennial challenge to those who operate helicopters close to



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terrain. Fuchs has opted to install the FLARM collision avoidance system, with the obstacle avoidance extension; a vertical obstruction file that in its case is loaded with a database that's specific to its operating area.

Brandt is conscious of the need to develop pilot skills in the likes of Gaillet and Parli, but is not prepared to rush. While Fuchs builds its own talent pool, it also contracts sling-load pilots with the experience necessary to meet its own safety policies, and on these Brandt is uncompromising.

"To do safety well, you have to do it every day," he explained. "The worst thing you can do is make exceptions, because there will always be pressure. People don't like hearing 'no,' but sometimes it's good to hear because it's the right decision."

SUPPORTING THE FLEET

Having owned and distributed a diverse selection of aircraft over the years, it's no surprise that Fuchs Helikopter has a well-developed engineering support operation. Its facility is spread over three levels, all of which have helipads to position aircraft, and the maintenance facility occupies two of these floors. Aircraft are moved in and out of the hangar on an automatic rail system that is heated to prevent it seizing in sub-zero temperatures.

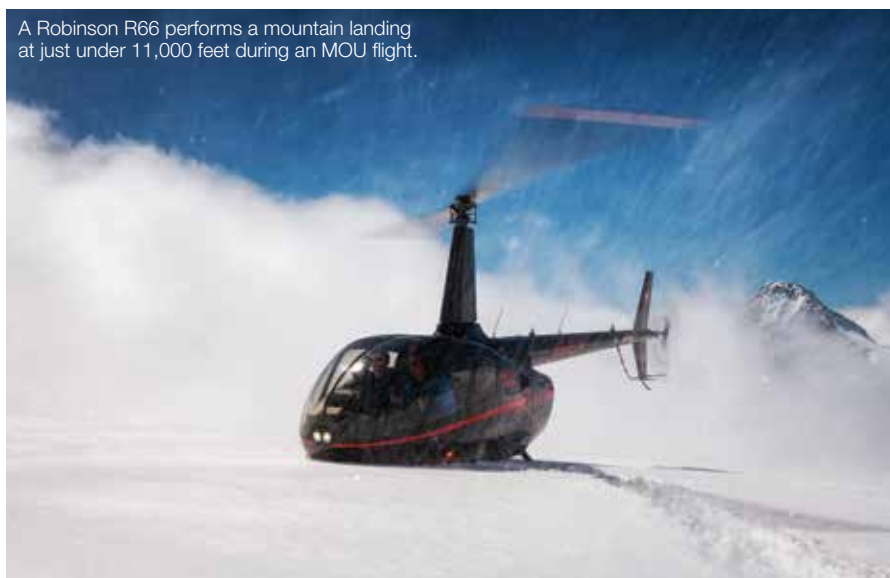
Engineer and deputy post-holder Derrick Cross has worked for Fuchs Helikopter for five years. Having experience working on a variety of aircraft both in the U.S. and for Fuchs, he explained that they all had their idiosyncrasies: "The [Schweizer] S300s are a little maintenance-heavy on the engine side due to the piston engine," he said. "But there is no better performer in the class at high altitude. The AStars are the most demanding, because they have a 25- and a 50-hour inspection interval."

Despite the demands of keeping well-used aircraft in the air, Cross explained that actual engineering problems are rare. "They fly the hours on them, but if you maintain them and you look after them, you usually won't have too many problems," he said. "But every so often you'll have to go out in the field to take care of it."

Considering that 'the field' is more likely to be a mountainside, it's perhaps for the better that problems are so rare. "I've only had an aircraft go AOG [aircraft on the ground] once in my five years here, and that wasn't an aircraft issue — it was engine monitoring hardware," Cross said. However, "I did once have to change a fuel controller on top of a glacier," he conceded.



Initially there was not that much work for the company's first AStar, so it was rented and flown by another operator.



A Robinson R66 performs a mountain landing at just under 11,000 feet during an MOU flight.



The financial burden of maintaining so many different types of aircraft must be significant, but Stokmaier explained that the variety is necessary to support the company's business model. "Having a broad selection of types allows us to accommodate [customers]."



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The 505 is currently limited to charter and training, but it has the potential for light utility work in the future. However, a cargo hook for the 505 is yet to be certified by EASA.



In 2017, one of Fuchs Helikopter's H125s was equipped with the Swiss Rotor Solutions Maximum Pilot View Kit.

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The financial burden of maintaining so many different types of aircraft must be significant, but Stokmaier explained that the variety is necessary to support the company's business model.

"Each aircraft has its niche, and individuals have their preferences," he said. "Having a broad selection of types allows us to accommodate them."

Fuchs Helikopter is certainly busy, and with the continuing success of its flight school and a legacy that stretches back over 40 years, it could be forgiven for resting on its laurels. But there is no room for complacency, as Brandt explained. "The problem that you can have is that people can overestimate themselves," he said. "They believe that what they have experienced is the total of the helicopter world, and it's not until they have an incident that they realize that there is much more to know."

Despite the company's evident successes, there is no sense of overconfidence at Fuchs Helikopter. That might be due to the government-mandated training, or the fact that whichever window you look out of, you will find the imposing Alpine peaks staring back. Taking an R66 safely to the top of a glacier demands a particular approach to risk; one which will serve an inexperienced and impressionable pilot well for the rest of their career. 🚫



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VIP GROWTH IN THE GTA

AS THE VIP/CORPORATE MARKET APPEARS TO
BE FLOURISHING ACROSS NORTH AMERICA,
WE LOOK AT HOW THE SECTOR IS DEVELOPING
IN CANADA'S LARGEST CITY.

BY OLIVER JOHNSON



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A VIP Sikorsky S-76D, operated by Fig Air, takes off from a private helipad at a luxury cottage north of Toronto.

Mike Reyno Photo



On May 7 and 8, National Helicopters, a utility operator and training school based on the northern edge of the Greater Toronto Area (GTA) in Kleinburg, Ontario, played host to a VIP-configured Bell 505 Jet Ranger X. The aircraft, visiting from the Bell facility in Mirabel, Quebec, was there to perform demo flights for over a dozen potential private customers in the region.

While the demonstration was, in relative terms, quite small, organizer Dan Munro, president of National Helicopters, said the interest it generated was illustrative of a growing corporate market in the region — and a desire for owners to upgrade to newer technology in the turbine market.

“The majority of these customers currently operate their own helicopters, which range from the [Robinson] R22, R44, and R66, to the Bell 47 and Bell 206 JetRanger,” he said.

At just over \$1 million for a basic aircraft, Bell has priced the 505 to compete directly against the Robinson R66 Turbine, which has been a major success for Robinson since it debuted on the market in 2010. Bell has now delivered over 150 505s, with the private market proving a rich source of orders.

Munro joined one of the demo flights, and said he had been impressed with the 505's power and the visibility from inside the cockpit.

“When I flew it, we had half a tank of fuel, myself, and four passengers — and we just basically performed a vertical takeoff from the facility,” he said. “Everybody was very impressed with the [505's] power and the simplicity of operation.”

Among those taking part in the flights were several customers who are using their existing aircraft to support their work in the newly-legalized marijuana industry. “The base of the aviation business [in the GTA] is certainly changing,” said Munro. “A significant number of our corporate charters last summer were for the marijuana grow-op industry.”

“

“Over the last five years or so, more and more corporate customers have decided to buy their own ships, and then get us, or operators like us, to fly them around and manage them.”

- DAVE TOMMASINI, FOUR SEASONS AVIATION

”



A corporate Bell 429 flies over downtown Toronto, with the iconic CN Tower behind it. **Mike Reyno Photo**

Most corporate helicopter use in the GTA is to get executives to and from leisure activities, rather than between meetings. **Mike Reyno Photo**



Within this new industry, the aircraft are used for flying investors out to the various marijuana farms and facilities that have sprouted up across the Southwestern Ontario countryside. For these charter flights, National is typically asked to use its corporate Bell 430 or Leonardo AW109.

"These people are legitimate customers and they seem to have some cashflow available to put into these helicopters," said Munro. "It's already huge [business] — people have no idea. A couple of former students manufacture the growing equipment for these grow ops — the watering system and the ultraviolet lighting systems — and they were telling me they can't keep up with the demand. The requirement for growing equipment is just unbelievable. It's become a real part of our agriculture industry."

The use of the aircraft for business, rather than as a means to travel between work and a vacation property, is reflected in the wider corporate market in the region, Munro added — as well as a move for many to purchase their own helicopter rather than simply chartering one. This has resulted in a boom in third-party maintenance work for companies like National.

"Business has probably doubled here in the last eight years as far as third party maintenance is concerned," said Munro. National keeps about a dozen customer aircraft in its hangar, and supports a fleet of about 24, including its own.

Despite the growth in corporate ownership, there is still a sufficiently high demand for corporate charter — to take clients golfing, to their cottages, to weddings or meetings — that National has largely moved away from the general utility work that many

Canadian operators have built their businesses around to focus on it.

MANAGING THE CORPORATE FLEET

Dave Tommasini, president and owner at Four Seasons Aviation, said he has noticed a similar trend in terms of an increase in the amount of corporate management work available. Four Seasons has provided both corporate management and charter over the years, flying or managing types including the Airbus AS350/H125 AStar, AS355 TwinStar, Leonardo AW109 and AW119, Sikorsky S-76, and Bell 429.

"Over the last five years or so, more and more corporate customers have decided to buy their own ships, and then get us, or operators like us, to fly them around and manage them," he told *Vertical*. "They want to have an aircraft at their disposal to fit their mission profiles — if they're going up to the cottage, or if they've got business opportunities that they need to use it for."

Tommasini said there has traditionally been a heavy flow of charter aircraft between Toronto and "Cottage Country" in the Muskoka region, a 30- to 40-minute flight north of the city. Flying avoids a packed highway that comes to a standstill around summer weekends.

These types of business-to-personal flights are more common in the region, said Tommasini, rather than aircraft being used to travel between meetings, as might be the case in the Northeastern U.S. "Increased development of helicopter-supportive infrastructure would probably encourage more corporate use of helicopters within the Toronto area [itself]," he said.

Four Seasons' corporate management work is offered in collaboration with Heli-Lynx, a completion and maintenance, repair and overhaul company based in Stoney Creek, Ontario.

"We're working with Four Seasons Aviation and HelicoStore in Quebec to try to promote helicopters in general in the Greater Toronto Area, and expose helicopters to people who otherwise



EuroTec Canada recently completed this VIP Airbus H130 for a private customer. The company also manages the aircraft. **EuroTec Canada Photo**

haven't thought about how this mode of travel could enhance their life," said Heli-Lynx co-owner Rob Tyler.

In addition to the maintenance provided for corporate customers as part of the management program, Heli-Lynx has also focused its completion work on the corporate market. The company recently delivered a high-level VIP H125 completion to a private customer from Texas, and Tyler said such projects represented a huge growth opportunity.

"That's the direction of the custom VIP ships that we want to see, we want to produce, maintain and support; we want to promote helicopters for the private owners," he said.

Along the same vein, the company is rebooting its "FX" program (see p.30), which gives the AS350/H125 new electrical systems and a new Honeywell LTS 101-series engine, with corporate customers primarily the target. Replacing the AStar's existing Safran Arriel engine aims to provide longer periods between overhauls, as the LTS 101 has no calendar limit. Heli-Lynx believes this holds great appeal to owners who aren't flying enough to get the full value from a time-limited engine.

A MOVE TO THE MEDIUMS

Hoss Golanbari, vice-president of EuroTec Canada — a helicopter sales, support and completion center based near Hamilton, Ontario — said that while the market in Southwestern Ontario has definitely grown over the past few years, it's still relatively small compared to the use of private aircraft in Quebec.

"We currently manage and maintain several aircraft for corporate and private owners here in the Toronto region," said Golanbari. "The difference between Quebec and Ontario is that the private owners in Quebec use the aircraft primarily for travel to and from private hunting and fishing lodges in remote areas in the province, while those in Ontario use the helicopter largely for corporate use and to avoid the traffic going to and from cottage country in the summer time."

Golanbari said his clients typically start with a single-engine helicopter, before moving onto a light twin or heavier aircraft.

"Over the past few years, the heavier cabin class twins like the Sikorsky S-76 have been a very good option for some of our corporate clients, who choose the initial lower acquisition offset by the slightly higher maintenance, fuel and insurance costs," he said.

A number of private S-76s have recently arrived in the GTA, including a VIP S-76D operated by Fig Air. That aircraft was the first of the type to enter service in Canada, and has been used solely for corporate charter work.

Fig Air, which launched in 2015 at Toronto Pearson International Airport, also owns a Bell 206L LongRanger and manages a Sikorsky S-76C++ for a client.

"We don't really advertise — we're kind of a low-profile operation — but word seems to get around," said Dean Fex, the company's operations manager. "We have a steady stream of charter work. Business is growing every year."

Many of those flights are to and from the Muskoka region, but the company has also taken clients as far as New York.

However, to truly expand the use of helicopters in Toronto, Fex believes a downtown helipad must be built — and Fig Air is working hard to make that happen in the city's Port Lands area.

Another new entrant in the corporate charter/management market in the GTA is Flight Solutions & Services (FSS). Based at Toronto Pearson airport, the company manages three private

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Heli-Lynx recently delivered this heavily-customized VIP Airbus H125. The company is focusing on VIP work to provide future growth.
Oliver Johnson Photo



Bell recently sent a Bell 505 Jet Ranger X to National Helicopters for two days of demo flights for private customers. Despite being in its infancy in terms of operational life, the type has already proved a good fit with private operators.
National Helicopters Photo

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helicopters (including an MD Helicopters MD 520N and a Sikorsky S76C+) and has one on a commercial certificate — in addition to a longstanding fixed-wing fleet.

Ian McDougall, chair and CEO of FSS, said the growth in rotary-wing interest the company had seen was likely due to several factors.

"You get a few people who develop an interest in helicopters and start flying," he said. "It becomes more a topic of conversation amongst people who can afford it and either are or become interested in having them."

McDougall also identified a demographic shift, as the city's wealthy start to move to the north of the city. "It's not just Muskoka, you can see it in places like Collingwood and elsewhere," he said.

In terms of future expansion, FSS is looking at different operating models that have proven successful elsewhere in North America. "We have looked at Blade out of New York . . . and it is a model of great interest to us," he said. "We want to keep an eye on any possibilities around a similar model."

AN OEM'S VIEW

Airbus Helicopters claims 44 percent of the VIP helicopter market in Canada, having steadily grown its share over the past five years.

According to Brian Reid, senior director of sales, Airbus Helicopters North America, the H125, H130 and H135 are popular choices for the VIP role, while the larger light twin H145 has also seen a surprising amount of success in the sector. And the Canadian launch customer for the H160 — the upcoming medium twin — will be a VIP aircraft.

"Clearly our hopes are, once the aircraft is delivered, more will follow, because it's just going to be an amazing machine and its appeal to that particular market is going to be significant," said Reid.

Airbus has also had decent success providing the VIP completions to aircraft, with Reid claiming the company wants to make the whole process a VIP experience — providing full story boards with interior and exterior renderings, and dedicating a program manager to each particular aircraft and customer.

"If the customer wants to hear every Friday what the state of their aircraft is, we'll do that and send pictures of what happened this week with a quick update," he said. "Or, if the customer prefers only to hear once every two or three weeks, we customize that whole experience at their request to make sure we're giving them exactly what they need."

Will Fulton, head of marketing, Airbus Helicopters North America, said many VIP customers still embrace the utilitarian nature of helicopters.

"We find that even our billionaire VIP customers . . . know they're going to go to their cabin that they can only access by a helicopter, so for them, they embrace a good blend of form and function with fit and finish."

In terms of use, Reid said VIP customers are finding benefits to using the aircraft for business as well as to escape the city.

"I think the high net worth individuals are realizing that avoiding sitting in traffic for two hours to go across town is a very useful part of their business," he said. "They're able to actually conduct meetings in the back of the aircraft, in particular the twin-engine helicopters that we offer, and make useful time of travel. And obviously in Eastern Canada, especially the Greater Toronto Area, you're seeing a lot of that desire to eliminate the traffic that you can see going up to the family cottage — and the usefulness of the aircraft to move things like equipment, furniture, and supplies, back and forth."

The VIP market around Canada's largest city is clearly growing, as executives and wealthy individuals discover the various benefits that having a helicopter can provide them, both personally and for their work. Should Toronto's infrastructure change to make the city's downtown even more accessible by helicopter, that growth could become exponential. 🌀

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THE CABRI IN AFRICA

SOUTH AFRICA'S BUSTLING STARLITE AVIATION TRAINING ACADEMY HAS INVESTED IN THE FUTURE, OFFERING STUDENTS THE ABILITY TO TRAIN IN THE GUIMBAL CABRI G2.

STORY BY SAMUEL PRETAT // PHOTOS BY ANTHONY PECCHI



 WATCH VIDEO

A Starlite Aviation Training Academy Hélicoptères Guimbal Cabri G2 flies over the South African coastline.

Flying over 7,000 hours each year and having trained over 4,000 ab initio pilots in its 20 years of business, South Africa's Starlite Aviation Training Academy is not only a major presence in the African helicopter market, but also in the global pilot training sector.

The company operates across two bases: a campus at Virginia airport in Durban, and another at Mossel Bay. Although both locations are on the coast, the Durban campus is based on a small but busy airfield in a controlled flying area, while Mossel Bay Airfield is in uncontrolled flying area (with a general flying area nearby).

The Starlite academy offers a full range of rotary- and fixed-wing pilot training courses, from introductory flights to private and commercial pilot licenses, type conversions, simulator training, and additional pilot training courses. The students it attracts for these courses come from around the world.

Until recently, the Robinson R22 was the mainstay of the company's fleet, but students today are typically completing their training in a Hélicoptères Guimbal Cabri G2. Starlite received its first two Cabris in 2014, and now has a fleet of nine. The aircraft has proved a solid performer for the academy, illustrated by Starlite reaching the 10,000-flight-hour milestone with the type in just four years.

The switch in type represents a change in generation, with the Cabri offering students an aircraft and avionics developed and certified in the 2000s. Created by former Airbus Helicopters engineer Bruno Guimbal, the Cabri first took to the air in 2005, and was certified by the European Aviation Safety Agency on Dec. 15, 2007.

"Our company vision was to bring large helicopter technology into a light helicopter," said Roland Mampe, Guimbal's operations manager. "Our Cabri is a 2000-vintage helicopter only challenged by 40-year-old models. Technology and demand have both changed a lot — this technology is acknowledged by all Cabri users."

The Cabri has now been sold in 19 countries (13 of which are in Europe), and the manufacturer has a growing network of agents and customers around the world, including China, Vietnam, the U.S., Brazil, and New Zealand. In South Africa, Starlite Aero Sales — Starlite Aviation Training Academy's sister company — acts as Guimbal's agent, serving as a registered dealer and service center for the company.

Starlite acquired its first Cabri in 2014 and now has nine in its training fleet.





Maintenance personnel take a look at the engine of one of Starlite's Cabris.



The maintenance teams meets to discuss plans for the day.



Starlite attracts students from around the world. Over 4,000 ab initio pilots have gone through its program over the academy's 20 years.

A MODERN FIT

Like the R22, the Cabri is powered by a Lycoming O360 piston engine — but the more advanced, powerful and efficient J2A variant. This drives a fully articulated three-bladed main rotor and a Fenestron shrouded tail rotor.

Klara Fouché, Starlite Aviation Training Academy's managing director, said the main factors the company considered in choosing the Cabri as its main training aircraft were safety, maintenance costs and noise sensitivity.

"With regards to safety, the aircraft exceeded our expectations," she said. "The Cabri has unparalleled safety features for a two-seat helicopter. The three-bladed fully-articulated main rotor system eliminates any chance of mast bumping and the Fenestron makes the aircraft noticeably quieter, which is a huge advantage as we operate in noise sensitive areas."

The Cabri was also designed with low maintenance costs in mind. "Only three components are time-limited on the aircraft, so the higher upfront cost will end up saving us money and downtime in the long run," said Fouché.

The extensive use of composite materials on the aircraft also provides more benefits than just in terms of weight and strength. "Both our schools are situated close to the coast, so the G2 being made

The extensive use of composite on the Cabri makes it more resistant to corrosion, which can be an issue in coastal environments.





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Starlite clocked up more than 10,000 hours in just its first four years of operation with the Cabri.

“

“The next step would be to have a big brother to our two-seater Cabri, as the market is demanding to fill the gap between the G2 and the H125. Our customers are asking us every day when we’ll release a bigger Cabri.”

”

of composite material makes it corrosion-resistant,” said Fouché.

The Cabri’s ability to serve as a bridge to Airbus’s fleet was also appealing. “Adding the Cabri to our fleet of training aircraft enabled us to offer our clients an ab-initio trainer with left advancing blades, a new generation glass cockpit and EPM [electronic pilot management — a screen showing engine and rotor readouts on a single display], making for easier transition onto Airbus helicopters,” said Fouché.

For Starlite, transitioning to the more modern airframe took a little adjustment.

“Initially there were some challenges, with the instructors having to learn and understand the intricacies of the Fenestron tail rotor and the sensitive control inputs on the cyclic,” said Fouché. “But the benefits of such a system is a huge advantage, as larger helicopter types require similar control inputs. The high inertia rotor system allows for exceptional maneuverability and safety in autorotation. The articulated main rotor system eliminates the



Starlite established its training academy in 1999, and today flies an average of 7,000 hours each year.



The Cabri's compatibility with the Airbus fleet makes it a great bridging aircraft for students to transition to the OEM's aircraft, said Starlite.



The academy has campuses in Durban and Mossel Bay — both coastal areas.

dangers associated with a teetering rotor head, making it exponentially safer in turbulent conditions and with harsh control inputs. The Fenestron is an added safety feature for ground personnel, and in confined areas the risk of tail strike is reduced."


GUIMBAL LOOKS AHEAD

South Africa promises to play an important role as Guimbal seeks to develop its global network, acting as a gateway to the continent. "In the aviation industry, South Africa is the one country reaching over most of the continent," said Mampe. "Starlite, who has purchased 11 Cabris, provides the armed forces of its neighboring countries with full operational training, and the credit of the Cabri is now well established with the military, both in terms of quality and operating costs."

While Mampe admitted that the private market is still playing

catch-up in the region, he believes the aircraft will ultimately thrive. He said the African market is very sensitive in terms of operating costs, and believes the Cabri is well placed in this respect.

"Competition is fierce in South Africa when it comes to costs, due to price and quality always being pulled down by low-cost policies," he said. "Starlite is doing a fantastic job standing out in quality, thanks to their high-standard operations and use of Cabris. We have shared our best knowledge with their instructors and mechanics so they can provide the best, [most] cost-efficient quality of service."

Following the success of the Cabri, Guimbal is busy planning its next move. "The next step would be to have a big brother to our two-seater Cabri, as the market is demanding to fill the gap between the G2 and the H125," said Mampe. "Our customers are asking us every day when we'll release a bigger Cabri." 

WHEELS, FLOATS & SKIDS

Soon after commercial production of rotary-wing aircraft started, the evolution of their landing gear began.

Today, most operational helicopters are on skids, wheels, and (where needed) floats. But during the early days in the development of helicopters, the vast majority were constructed with a wheeled undercarriage. This was likely due to the thinking that helicopters would mainly operate from airports. The concept of using skids — and other forms of landing gear — was born out of innovation from pilots and mechanics in the field to adapt the aircraft to their operational environments.

Germany became the first country in the world to build experimental operational helicopters and put them into limited production during the Second World War. These were the Focke Wulf (later Focke Achgelis) Fa 223 with twin boom main rotors (preceded by the Fw 61), along with the Flettner Fl 265 and Fl 282 (with intermeshing rotors). All were designed with wheels. The Fw 61 was considered to be the first practical helicopter to be built in Germany.

Meanwhile, in the U.S., Igor Sikorsky designed and constructed his VS-300 — also on wheels — in 1939. It went through many changes before the engineers settled on the main and tail rotor configurations. The helicopter was later flown with an experimental float undercarriage. Sikorsky's first production helicopter for the U.S. military was the three-wheeled R-4 helicopter, which was followed by the R-5 and R-6 during the war years. Bell Aircraft, Piasecki, Kaman, and Hiller all began producing helicopters after the war — and again, all of these had wheels.

Bell constructed 11 pre-production helicopters on wheels for experimental testing from 1945-46. They also tested several of the helicopters on floats for use on water and in wet swampy areas.

With the first civilian Bell 47B and agricultural 47B-3 and 47D helicopters entering service during 1947/1948, many pilots found that wheels were not the answer when landing on slopes and on soft wet areas. And they soon discovered that in high mountainous conditions, it was often difficult to locate level areas to land a wheeled helicopter.

"The front wheels of the Bell 47 would caster on you and often try to run you downhill if you didn't have somebody to chock them with a rock," said Carl Brady, an early pilot in the type, in an interview. "If you were by yourself you couldn't do that, of course."

A rare color photo of a U.S. Coast Guard R-4/HNS-1 helicopter on floats, taken during the Second World War.





The Bell 47 prototype, flown by pilot Floyd Carlson. The passenger is holding Carlson's son, Blair.



The Focke-Wulf Fw 61 on wheels was considered to be the first practical helicopter to fly in Germany during the 1930s.

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In 1948, Herm Poulin's Central Aircraft of Yakima, Washington, won a contract with the U.S. Geological Survey for two helicopters to be used in Alaska for a mapping project. The pilots for the mapping survey were Tommy Hall from Central Aircraft, and Brady, part owner of Economy Pest Control. Brady was trained on helicopters at Central and had worked for them training new helicopter pilots and in crop-dusting operations on agricultural fields. Brady's helicopter was leased from Central Aircraft.

While on the job in Alaska, Brady soon found that the terrain and wet tundra was not the best for landing an under-powered Bell 47 on wheels. Sometimes one of the wheels would sink in the muskeg, while the others would not. Between Brady and his mechanic Joe Beebe, they came up with an innovative idea to attach an oak two-by-four piece of lumber, obtained from a sawmill in Pelican, Alaska, front to back on the wheels on each side of the helicopter. This greatly helped in landing the Bell 47 on soft ground. "It was illegal and not approved by the CAA [Civil Aeronautics Authority], but this type of landing gear sure relieved me," said Brady.

Hall, the other pilot on project, and his mechanic Stan Hellwick used the same system on the other Central Bell 47B-3 helicopter.

Bell became aware of the rudimentary wood skids used on the project in Alaska on the Bell 47B helicopters, and its engineers were soon working on a solution to the problem with the wheels.

"Except for floats, wheels had always been the normal form of landing gear for operational helicopters," wrote Owen Niehaus, an early U.S. Army Air Force helicopter pilot, and later Bell Aircraft test pilot, in a letter. "Under certain operational conditions, however, they were detrimental. In May of 1949, we began our first tests with skids on a production Bell 47B helicopter."

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An early version of the Anton Flettner FI 282 intermeshing helicopter on wheels. The aircraft's fuselage is completely covered.



A rare color photo of a Sikorsky R-4 on wheels.



The first production two-place Bell Model 47B coupe-type helicopter came with a wheeled undercarriage.



The HRP-1 — Frank Piasecki's transport helicopter — was created on wheels. It was sold to the U.S. Marines and to the U.S. Coast Guard.

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A patent for skid landing gear was issued to Bell on June 9, 1953, following an initial application in September 1951.

Stewart Graham, a U.S. Coast Guard pilot at Floyd Bennet Field in Brooklyn, New York, did tests on a Sikorsky R-4 helicopter with skids at about the same time. However, they were never used operationally on the type, and Sikorsky helicopters are still using wheels on their rotorcraft to this day. Floats were tested on Sikorsky R-4, R-5 and R-6 helicopters by the U.S. Coast Guard during the late years of the war.

Credit has to be given to the helicopter pilots and their mechanics in being innovative in tackling problems and finding changes and solutions in the field to keep the early helicopters flying and producing revenue in the new industry.

In the present day, wheels, floats and skids continue to be used on both commercial and military helicopters, enabling aircraft to cope with whatever type of conditions they could meet in any environment around the world. 



Bob Petite | Bob is a member of the Twirly Birds, The Vertical Flight Society, the Canadian Aviation Historical Society, the American Aviation Historical Society and the Bell 47 Helicopter Association, Inc. He is the author of *The Bell 47 Helicopter Story*.



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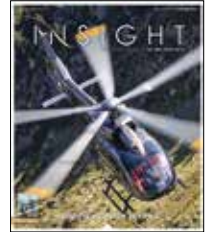
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Before loading up the Cadillac, I made a list of things to pack, starting with bug dope and ending with reading material. T-shirts, flight suits, shorts, socks and boots: check. I emptied every seam and pocket of my travel pack to make sure that there was nothing that would cause me any grief. I was confident my attention to detail would green-light me through customs inspections without so much as a raised eyebrow.

The chief pilot (let's call him Harley) was a former military man my age, highly experienced. Harley ruled over a seasoned squad of spray pilots and medium-lift firefighters. He asked me to come in two days before departure, and handed me a heaping box of aeronautical charts.

"You're going to navigate and help fly us all the way to Tuxtla, a few hours south of Mexico City," he instructed. "Us" included Harley, myself, and an A&P mechanic headed south for the fire season.

Our Bell 212 was being buttoned up in the outfit's hangar following a 100-hour inspection. Once I had our 2,000-mile ferry flight meticulously planned, Harley had me go over the ship with a fine-toothed comb and get familiar with the cockpit layout.

Takeoff was planned for dawn the next morning, giving me another night in a pink motel, and a "breakfast" that left me wondering where the breakfast was in my breakfast.

When I drove up to the helicopter early that April morning, I couldn't help but notice the ship was bulked-out with luggage, incidentals and spare parts — stuff needed for a 300-hour inspection.

Fueling up on a slick cement pad, the mechanic used a come-along to keep the skids from over-spreading as the ferry tank was topped off. We managed to get all our stuff on board and removed the skid restraint.

It was going to be a hot one. Harley tucked his flight jacket behind the left seat and started buckling up as the sun broke the horizon. He was brave enough to have me do the max gross takeoff, right down the sleepy airport's asphalt taxiway.

Our route took us through Blythe, California, to Casa Grande, Arizona, and points south, refueling every two hours or so. After a rudimentary inspection in Hermosillo, Mexico, we flew southeasterly, getting to know each other.

By the time we did our first overnighter in Los Mochis, I was more familiar with the chief. He was a Harley rider when he wasn't flying and he was married, with dogs. He also had me flying a 212 with an out-of-rig tail rotor and zero force trim control.

This made for a long ferry flight, chasing the ball-in-race back and forth, trying to find a sweet spot in the pedals that simply wasn't there. Harley explained that the rigging would be checked again further down the road, and we pressed on.

My mechanic pal and I would be budget-limited to regular rooms at our first motel, I learned. Harley boasted that his per diem afforded him the best accommodations at every stop.

I wasn't complaining, looking around my quarters for the night. I'd seen the inside of a Mexican prison, so my room, by comparison, was a VIP suite.

Rising early, we climbed hard to cross the Sierra Madres. Refueling at Durango, we headed southeast for Aguascalientes, last stop before we overnighted again in beautiful León. At the Aguascalientes airport, Harley and the mechanic took breaks while I supervised refueling with *turbosina*.

And right about the time I began to enjoy this little adventure, along came an armed federale in green camo fatigues, leading an alert-looking German shepherd straight for our helicopter. I like canines, but I knew better than to interfere with a working variety, so I relaxed and let the two do their thing.

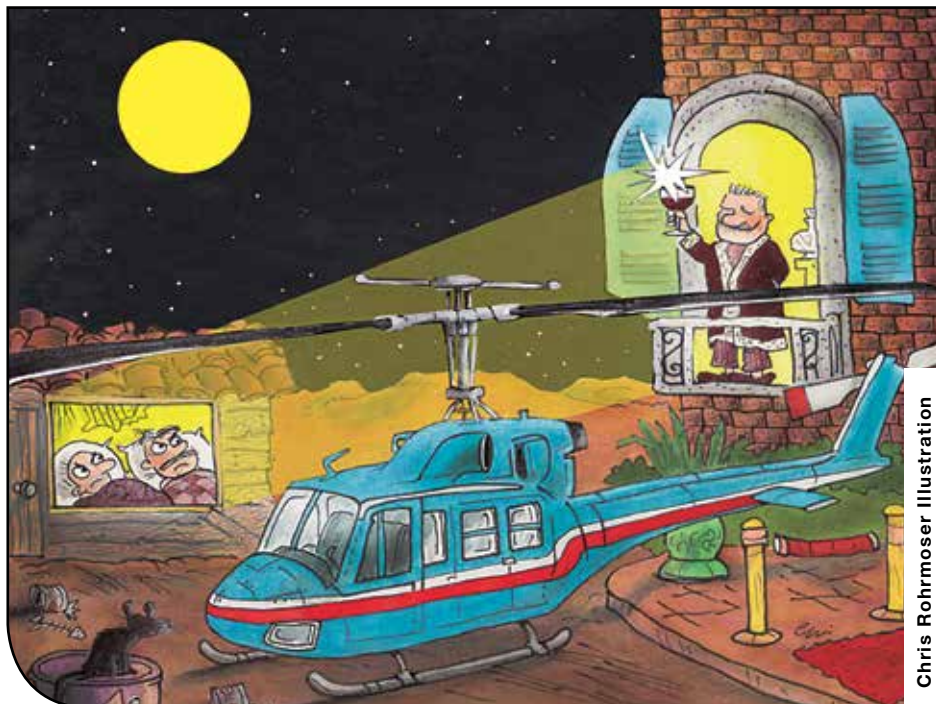
It turned out the dope-sniffing dog was VERY INTERESTED in our helicopter. He began whining loudly and straining at his leash, clawing his way toward the left front seat, leading his excited handler toward our personal effects.

The dog was doing his best to jump into the ship and go after our bags. I got eye contact with the handler and assured him, "We have NO DRUGS, NADA!" The Federale appeared not to hear me, giving the dog enough slack to reach Harley's gear. By then, Fido was going bananas. The fed admitted he'd never seen his dog so worked up.

About the time I figured my gringo friends and I were going to be spending the night in jail, Harley reappeared. When he saw the hubbub with the service dog, he let out a big laugh. The Federale allowed Harley to reach in and grab his jacket, precisely what the dog was going ape over.

"My shepherd's in heat. She needed a hug when I left home yesterday, ergo her scent on my jacket."

Ho ho ho, what a relief! I enjoyed the moment, knowing the local prisons are highly overrated. ➕



Chris Rohrmoser Illustration



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